Cephalometric Morphological Analysis Parameters – Means and Variability

From the very first day as a student in the Post Graduate Orthodontic Program under Arne Björk I found it confusing that cephalometric variables for a specific individual were compared to mean values for fourteen year old Swedish boys from Björk's previous studies. When confronted with this issue Björk answered that he (almost!) agreed with me. A more correct way would be to compare the individual patient’s values to those of the same sex, skeletal age and ethnic group.

Such values, however, have not been available and for present day ethical reasons it is not feasible to get this information. As a consequence I have chosen to follow a different path to develop these values, as explained in the following.

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The mean values for sex and skeletal age listed in the Morphological Analysis in Tiops4 have been calculated in the following way:

| NS/ML | deg  | 25.8 | 30.8 | -0.8 |

The samples from which the values have been calculated are for adults and originated from the following publication by C. H. Ingerslev and B. Solow.

Sex differences in craniofacial morphology

C. H. Ingerslev & B. Solow
The Institute of Orthodontics, Royal Dental College, Copenhagen, Denmark


An x-ray cephalometric study was performed in a male and a female group of Danish dental students with the object of examining the sex-determined component of the cranial morphology, and of obtaining a control material for subsequent studies of pathologic samples. The cranial morphology was examined on the basis of measurements on x-ray cephalometric lateral and postero-anterior radiographs. The cranium was, on average, smaller in the female than the male group except as regards the nasal bone, the foramen magnum and the inner orbital distance. The female group showed a more prominent frontal bone, and a less prominent nasal bone, than the male group.

Key-words: Craniofacial morphology; x-ray cephalometry; sex factors; adult

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There is presently no Danish age related data available, but there are several American studies that can be helpful in this respect:

In addition there is additional material available at the following web site:

http://www.aao legacycollection.org/aaof_home.html

These studies all have in common that they list the cephalometric values relative to the chronological age. As a result the actual differences between the different skeletal ages to a great extent are ignored.
To get around this problem we have constructed the following theoretical growth curves for stature in girls and boys:

Likewise problem we have constructed the following theoretical growth curves for the maxilla, the mandible and the occlusal plane area in girls and boys:
By means of regression lines and calculation of the integral, as illustrated in the shown Excel spreadsheet, we have determined the following values for the variable NSL/ML relative to skeletal age for girls and boys:

![Excel spreadsheet showing NSL/ML values for girls and boys](image)

The velocity curve for the same variable is shown below:

![Velocity curve for NSL/ML](image)

Please note that if the Adult values for other ethnic groups are known, the constructed Excel spreadsheets for the individual variables can be used to calculate sex and age specific mean values for the respective groups by placing the values in the fields marked with <------

It should be mentioned that some of these ideas may seem purely speculative.

I have, however, tested my calculations on a sample of 10,000 German patients that I have collected over a period of time. Part of this material is presented in graphical form in the following illustration as seen below. The calculations are here represented by a yearly average tracing of ca. 6,000 females between age 9 and 15. The superimpositions are made on the anterior cranial base and arranged according to their skeletal age. Note the growth spurt that is clearly visible in this illustration.
Download Excel spreadsheet

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