

1. Mixed Dentition Analysis

This analysis is based on measurement of the mandibular permanent incisor. A quantitative assessment of crowding may be obtained by this mixed dentition analysis. The space available in each dental arch is measured on the study models and the sum of the mesiodistal dimension of the unerupted teeth is determined by measuring the mesiodistal dimensions of the four erupted mandibular permanent incisors (Fig. 34, a-d). Thus, predicting the combined sizes of the unerupted canine and premolars using an equation. The following diagrams show the method used step by step:

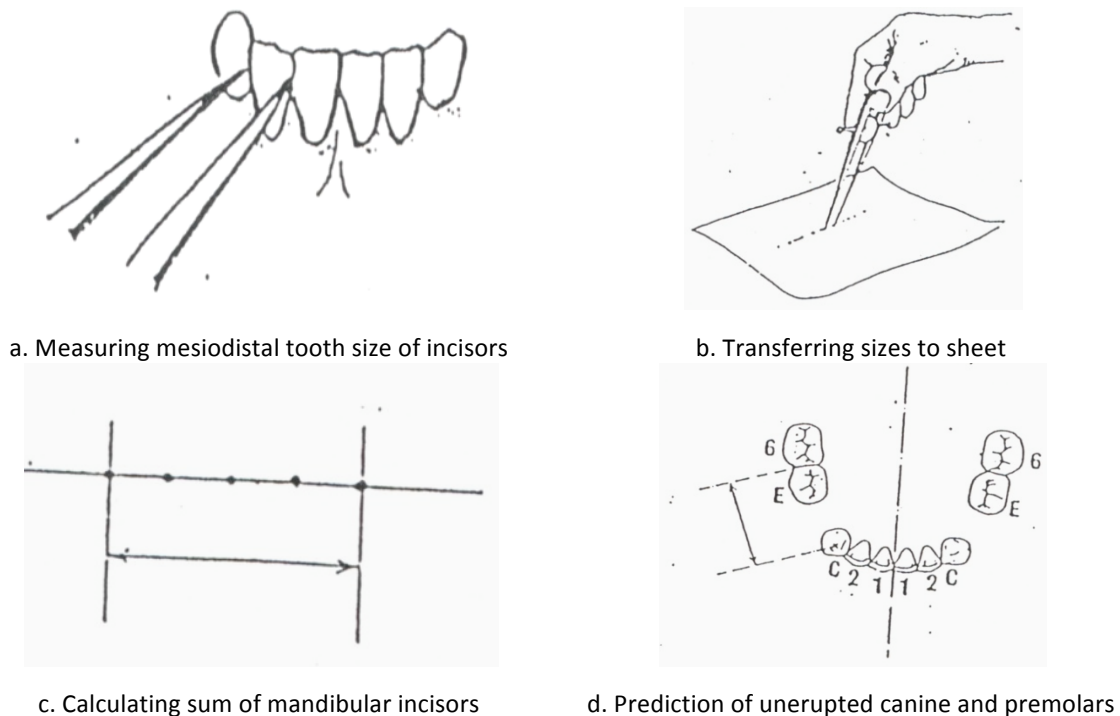


Figure. 34

How to apply Mixed Dentition Analysis:

- Determine the maximum mesiodistal width of each of the four mandibular permanent incisors in the study model. Calculate their sum.
- Using the combined MD width of the mandibular incisors determine the predicted size of the unerupted upper 3, 4 and 5 (cuspid, first and second bicuspid) on one side. This can be found by using two methods:

a. Tanaka and Johnston prediction formula:

One half of the mesiodistal width of the four lower incisors	+10.5 mm =	estimated width of mandibular canine and premolars in one quadrant
	+11.0 mm =	estimated width of maxillary canine and premolars in one quadrant

(Tanaka MM, Johnston LE: *J Am Dent Assoc* 88:798, 1974)

b. Probability Charts (Moyers Analysis):

This can be found from the probability charts on the following page. The upper chart is for the upper teeth, and the lower is for the lower teeth, this value is termed the space required (for each side).

- Add the total mesiodistal width of the maxillary permanent incisors to the predicted values of the upper permanent canines and premolars and that will constitute the space required in the upper arch.
- Calculate the space available from the mesial of the permanent first molar in one side to the mesial of the permanent first molar on the opposite side.
- Analyze the space using this equation:
The space available – space required = will give us the space adequacy or inadequacy to accommodate the teeth
- Redo the same procedure for the lower arch.

Probability chart (Moyers Analysis)

Probability chart for predicting the sum of the widths of upper 3,4, &5 on one side.

Σ lower incisors	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0
95%	21.6	21.8	22.1	22.4	22.7	22.9	23.2	23.5	23.8	24.0	24.3	24.6
85%	21.0	21.3	21.5	21.8	22.1	22.4	22.6	22.9	23.2	23.5	23.7	24.0
75%	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.9	23.1	23.4	23.7
65%	20.4	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.1	23.4
50%	20.0	20.3	20.6	20.8	21.1	21.4	21.7	21.9	22.2	22.5	22.8	23.0
35%	19.6	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4	22.7
25%	19.4	19.7	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4
15%	19.0	19.3	19.6	19.9	20.2	20.4	20.7	21.0	21.3	21.5	21.8	22.1
5%	18.5	18.8	19.0	19.3	19.6	19.9	20.1	20.4	20.7	21.0	21.2	21.5

Probability chart for predicting the sum of the widths of lower 3,4, &5 on one side.

Σ lower incisors	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0
95%	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8	24.1	24.4
85%	20.5	20.8	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8
75%	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4
65%	19.8	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1
50%	19.4	19.7	20.0	20.3	20.6	20.9	21.2	21.5	21.8	22.1	22.4	22.7
35%	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0	22.3
25%	18.7	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0
15%	18.4	18.7	19.0	19.3	19.6	19.8	20.1	20.4	20.7	21.0	21.3	21.6
5%	17.7	18.0	18.3	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7	21.0

1. Measure and obtain the mesiodistal widths of the 4 permanent mandibular incisors.
2. Find that value in the top horizontal column.
3. Reading downward in the appropriate vertical column, obtain the values for expected width of the cuspids and premolars corresponding to the level of probability you wish to choose.
4. Ordinarily, the 75% level of probability is used. Note that the mandibular incisors are used for the prediction of both the mandibular and maxillary cuspid and premolar widths.

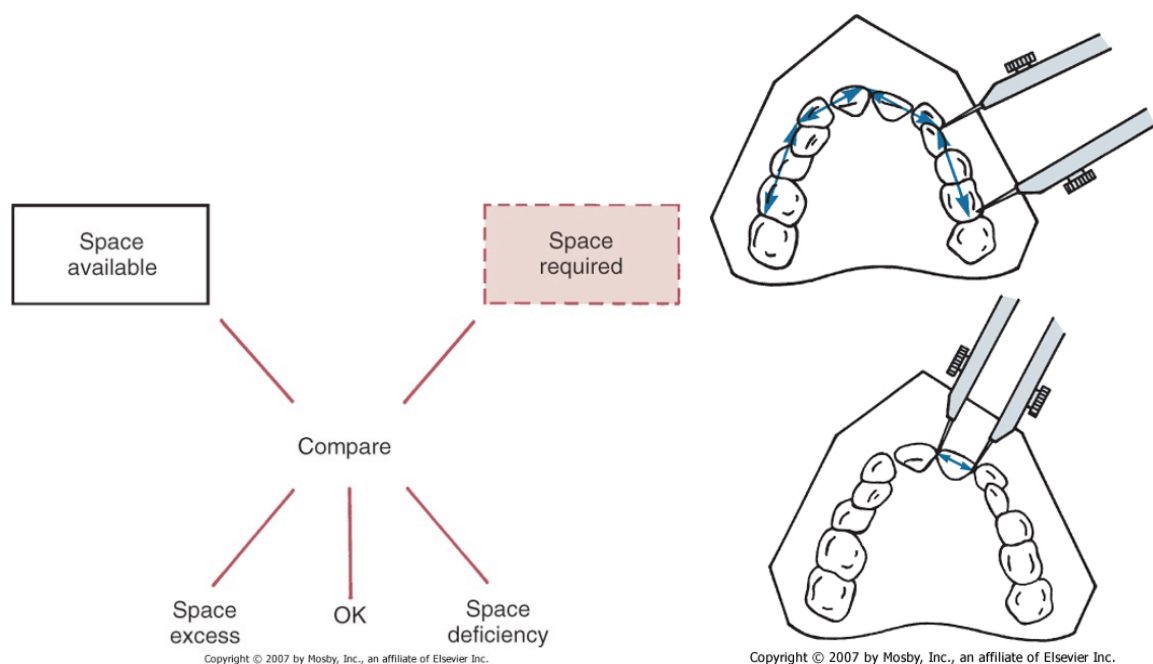
2. Arch Length Analysis, “Nance Method”

It is important to quantify the amount of crowding within the arches, because treatment varies depending on the severity of the crowding. Space analysis, using the dental casts, is required for this purpose. Since malaligned and crowded teeth usually result from lack of space, this analysis is primarily of space within the arches. Space analysis requires a comparison between the amount of *space available* for the alignment of the teeth and the amount of *space required* to align them properly.

The first step is calculation of space available. This is accomplished by measuring arch perimeter from the mesial of one first molar to the other, over the contact points of posterior teeth and incisal edge of anteriors. This can be achieved by dividing the dental arch into segments that can be measured as straight line approximations of the arch.

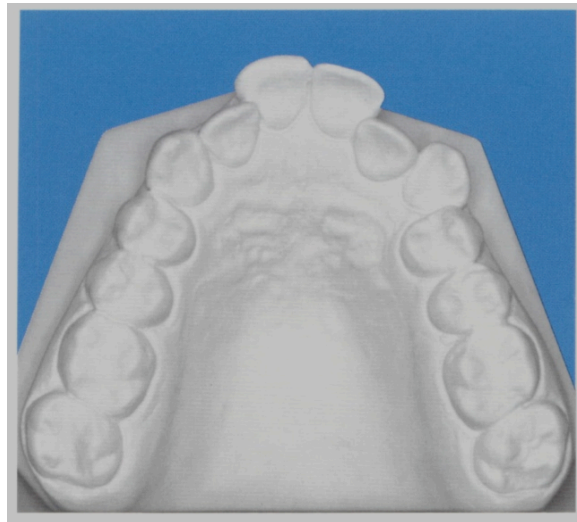
The second step is to calculate the amount of space required for alignment of the teeth. This is done by measuring the mesiodistal width of each erupted tooth from contact point to contact point, estimating the size of unerupted permanent teeth, and then summing the widths of the individual teeth. If the sum of the widths of the permanent teeth is greater than the amount of space available, there is an arch perimeter space deficiency and crowding would occur. If available space is larger than the space required (excess space), gaps between some teeth would be expected.

The space available – space required = will give us the space adequacy or inadequacy to accommodate the teeth



Space Analysis in the Permanent Dentition

Upper Arch		
A. Space Available (Arch circumference from mesial of first molar to mesial of first molar)	=	mm
B. Space Required (Combined MD width of the permanent teeth from 5 to 5)	=	mm
Difference (A – B)	=	mm



Lower Arch		
A. Space Available (Arch circumference from mesial of first molar to mesial of first molar)	=	mm
B. Space Required (Combined MD width of the permanent teeth from 5 to 5)	=	mm
Difference (A – B)	=	mm

