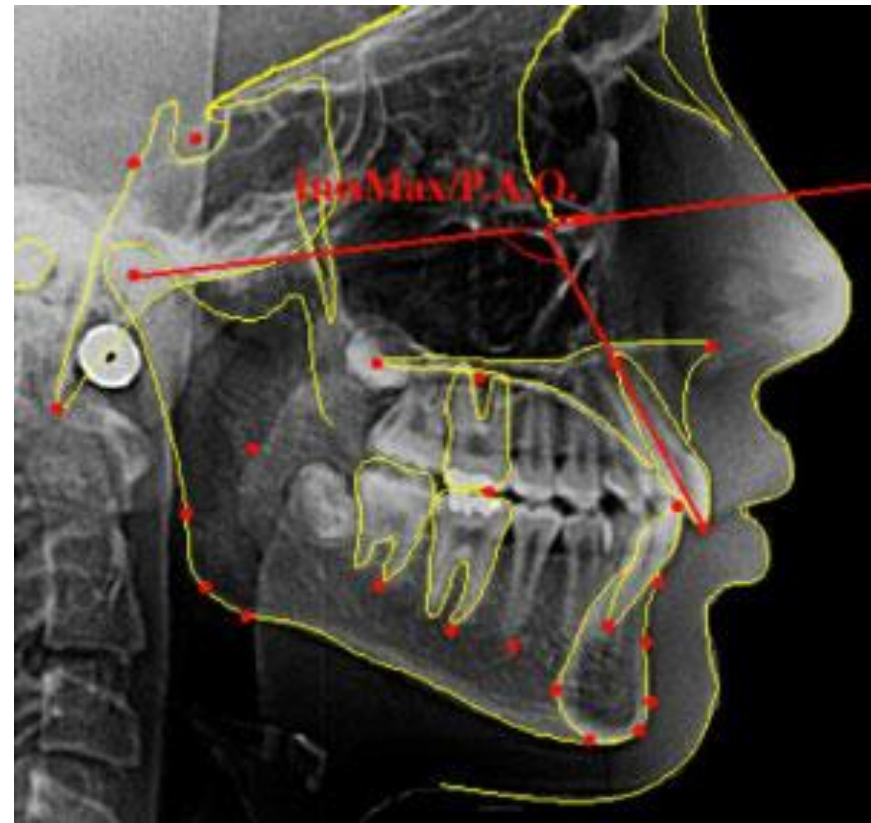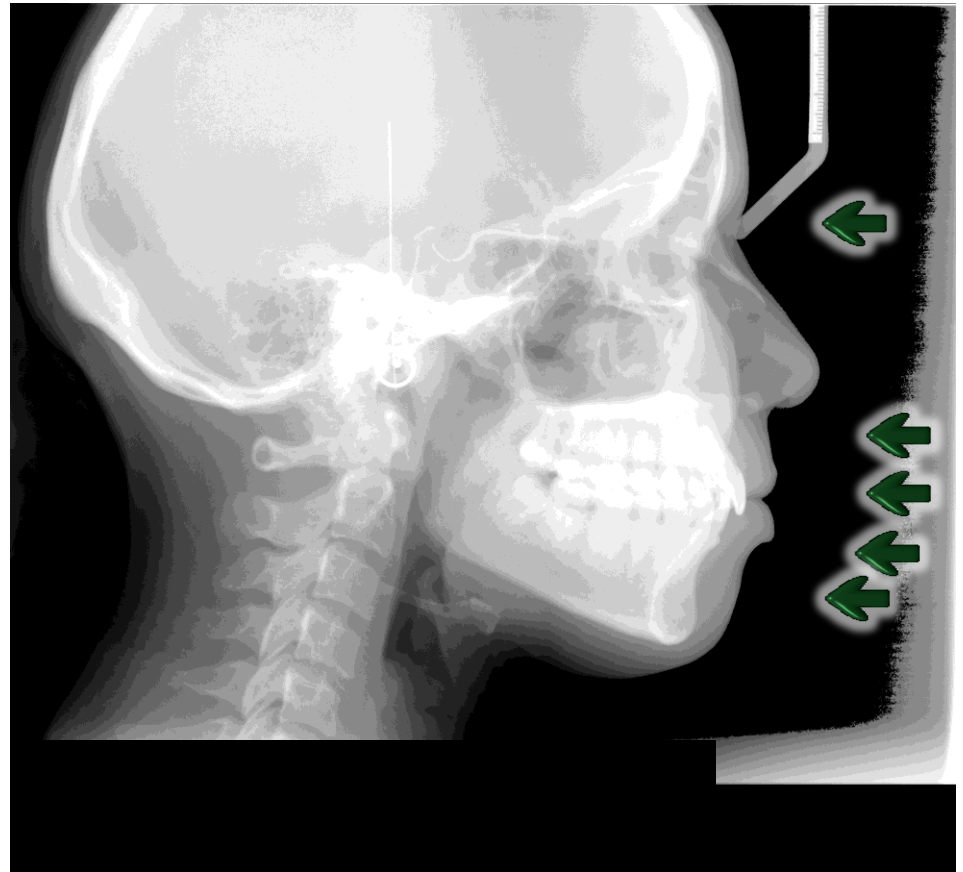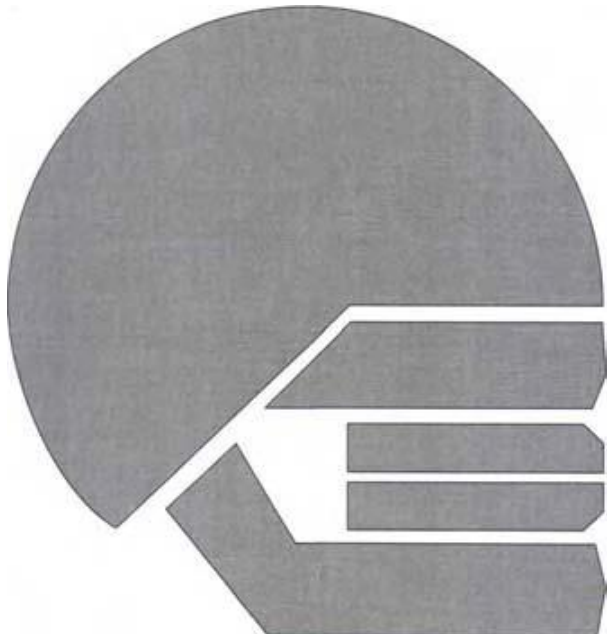# Cephalometric Analysis

Cephalometric analysis.

The process of evaluating skeletal, dental and soft tissue relationships is done by comparing measurements performed on the patient's cephalometric tracing with population norms for the respective measurements so as to come to diagnosis of patient's orthodontic problem.

It is to evaluate the relationships, both horizontally and vertically, of the five major functional components of the face : the cranium and cranial base, the skeletal maxilla (described as the portions of the maxilla that would remain if there were no teeth and alveolar processes), the skeletal mandible (similarly defined), the maxillary dentition and alveolar process, and the mandibular dentition and alveolar process.

Measurement Analysis

Choice of a Horizontal (Cranial) Reference Line. In any technique for cephalometric analysis, it is necessary to establish a reference area or reference line.

The Frankfort plane, extending from the upper rim of the external auditory meatus (porion) to the inferior border of the orbital rim (orbitale), was adopted as the best representation of the natural orientation of the skull .
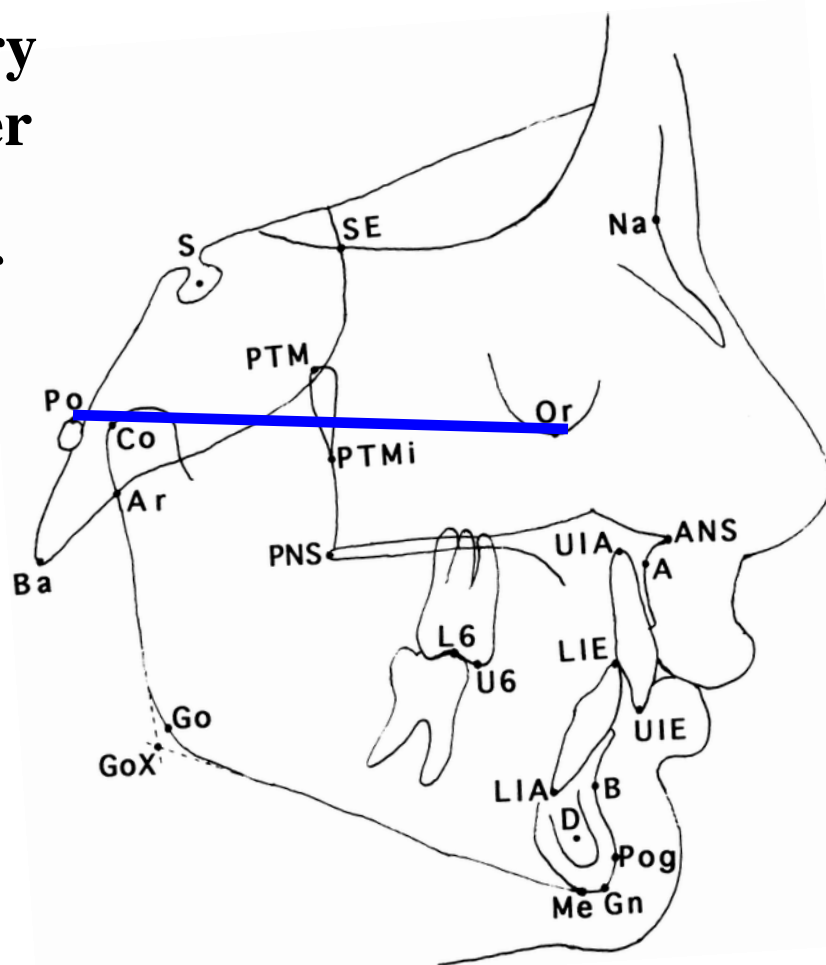
An alternative horizontal reference line, easily and reliably detected on cephalometric radiographs, is the line from sella turcica (S) to the junction between the nasal and frontal bones (N). In the average individual, the SN plane is oriented at 6 to 7 degrees upward anteriorly to the Frankfort plane. Another way to obtain a Frankfort line is simply to draw it at a specific inclination to SN, usually 6 degrees.
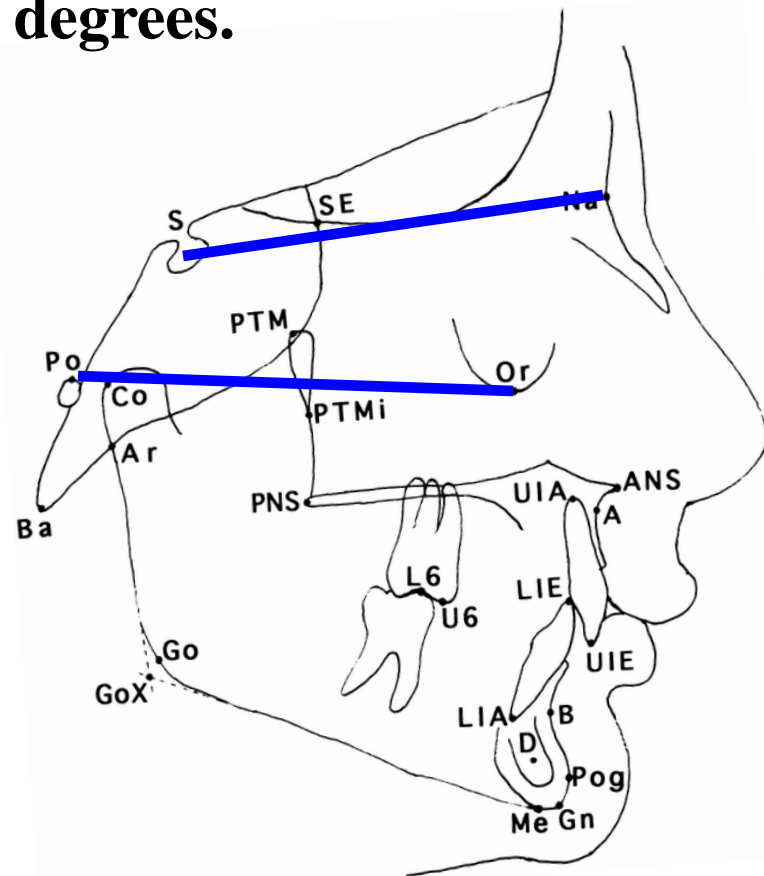
Steiner's analysis

Steiner depend in his analysis on horizontal line SN line instead of Frankfort line

and NA line instead A-Pog line
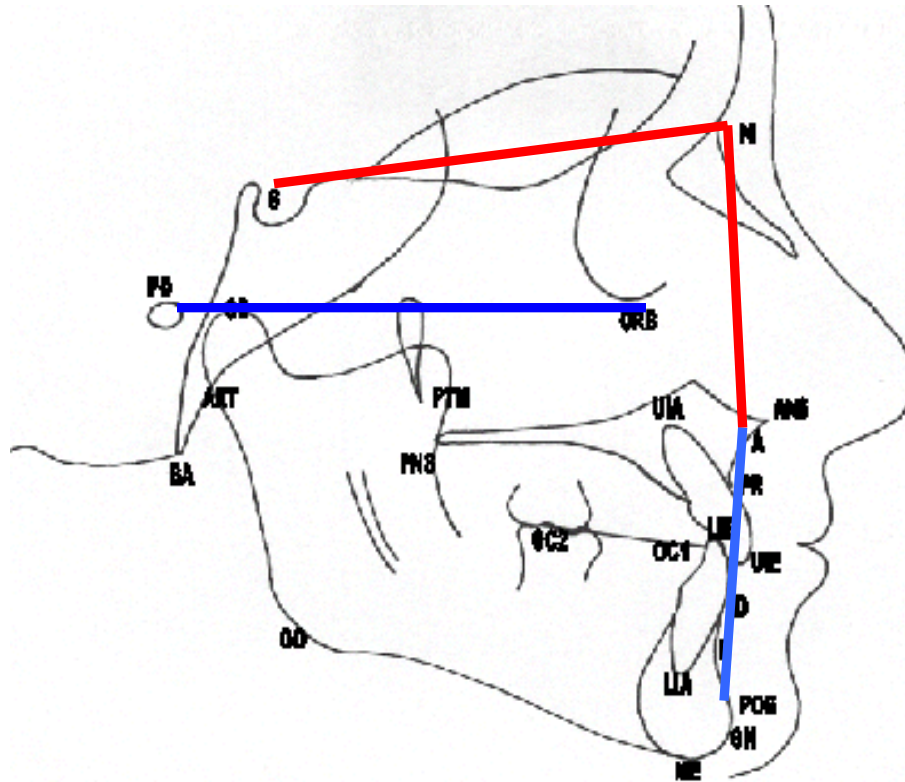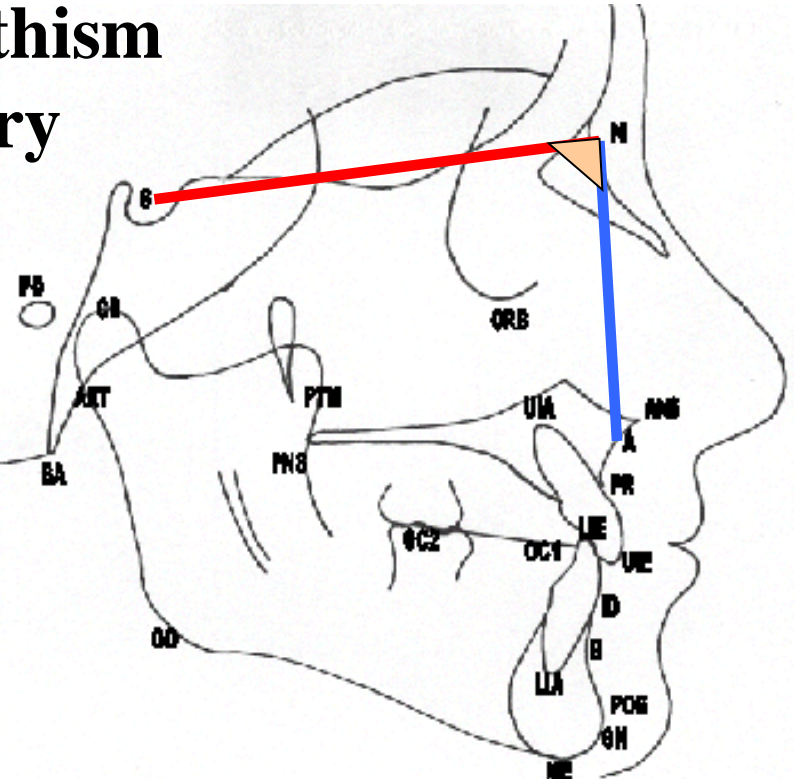
Skeletal analysis

1. SNA angle average 82° ± 2

Define the anterioposterior position of A relative to cranial base

If angle <80°

Maxillary retrognathism or decrease maxillary length

If angle >84°

Maxillary prognathism or increase maxillary length

2. SNB angle average 78° ± 2

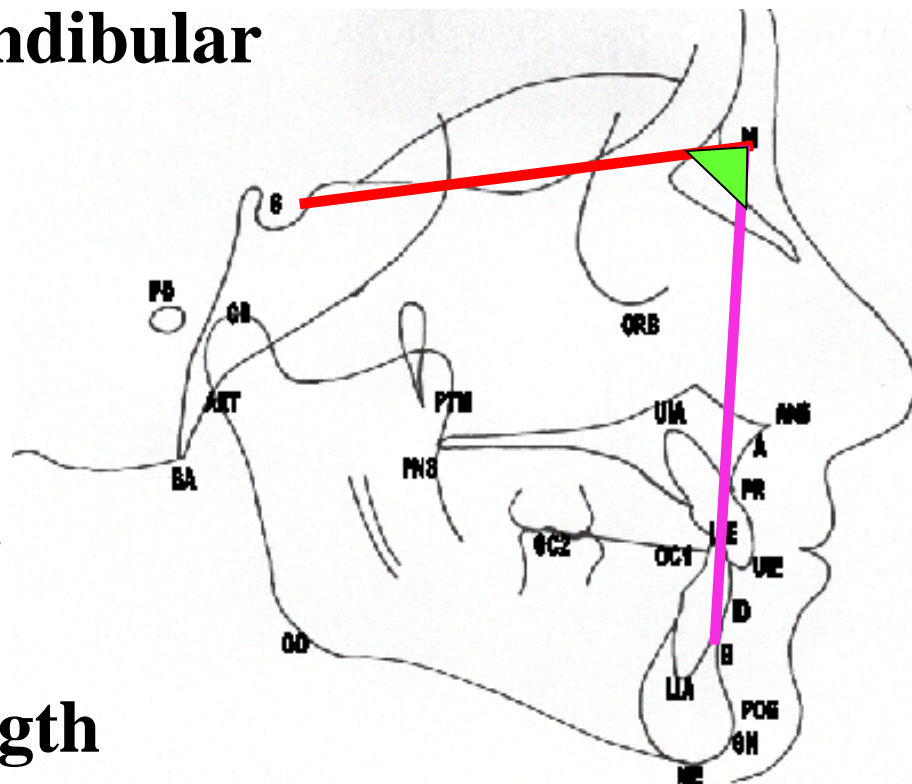**Define the anterioposterior position of B relative to cranial base**

If angle <76°

Mandibular retrognathism or decrease mandibular length
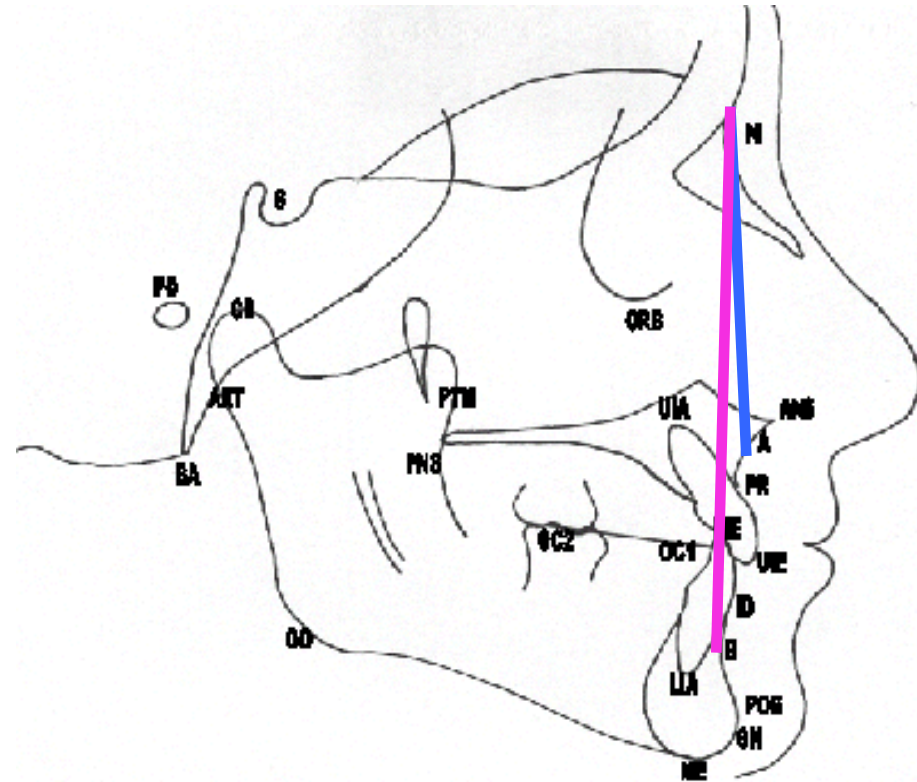
If angle >80°

Mandibular prognathism or increase mandibular length

3. ANB angle average 0° - 4°

Angle increase Skeletal Class II

Angle decrease Skeletal Class III
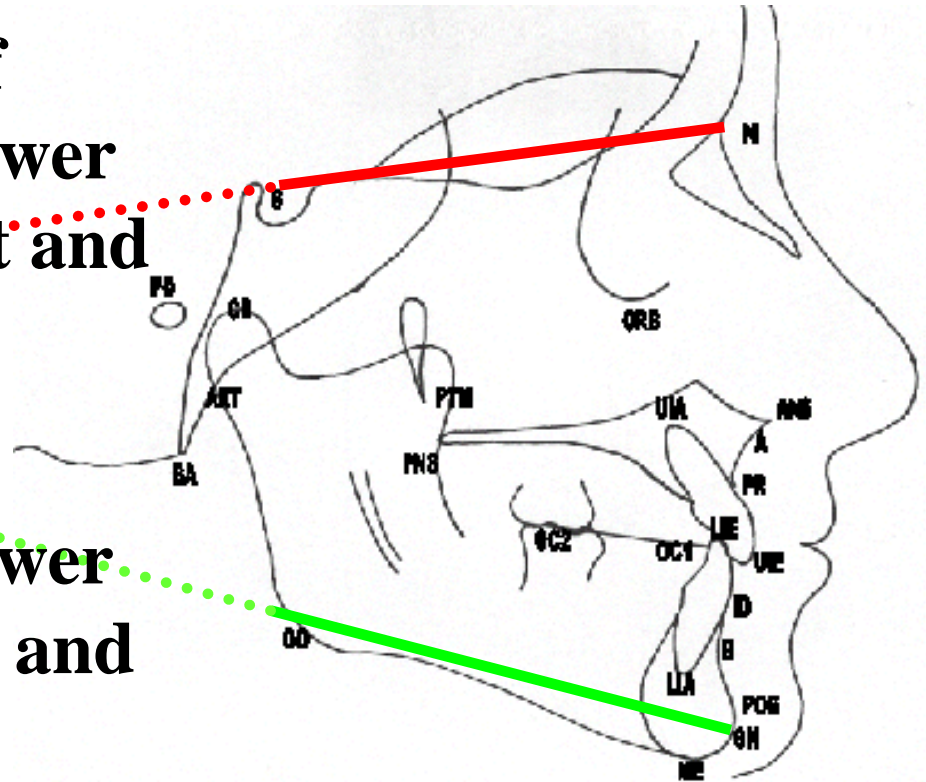
4.SN-MP angle average 33°

It refers to the orientation of mandibular body to anterior cranial base

Angle increase

Tendency of increased lower facial height and open bite

Angle decrease

Tendency of decreased lower facial height and deep bite

Dentoskeletal relationships

Upper incisor to NA angle

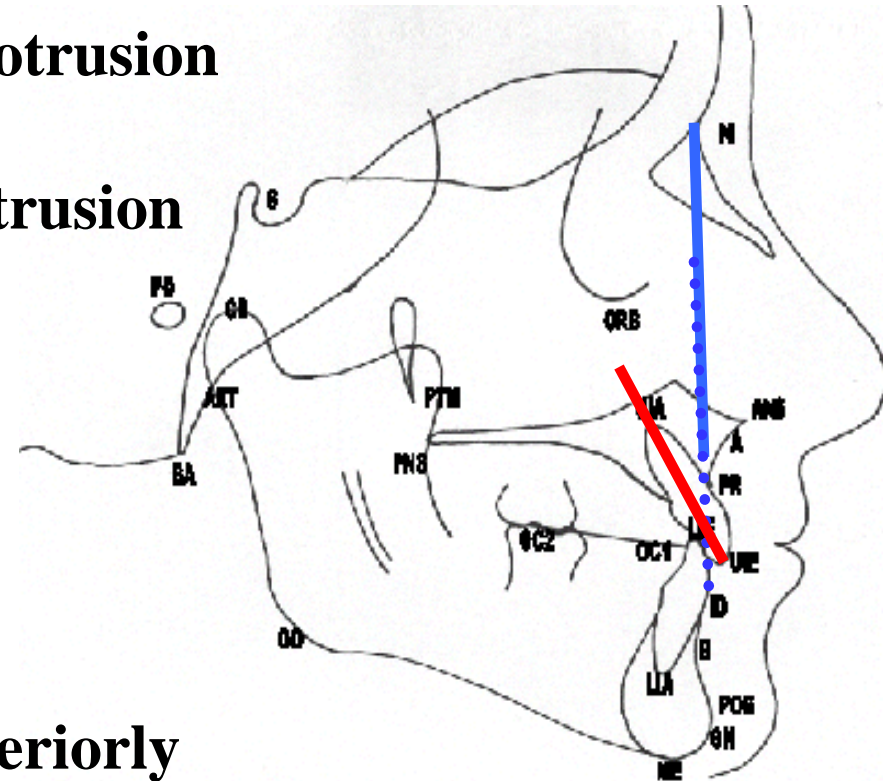This angle is important in torque control when retracting upper incisor

If angle increased means incisor protrusion

If angle decreased means incisor retrusion

Upper incisor to NA distance

If more than normal incisor are anteriorly located

If less than normal incisor are posteriorly located

Lower incisor to NB angle

If angle increased means incisor protrusion

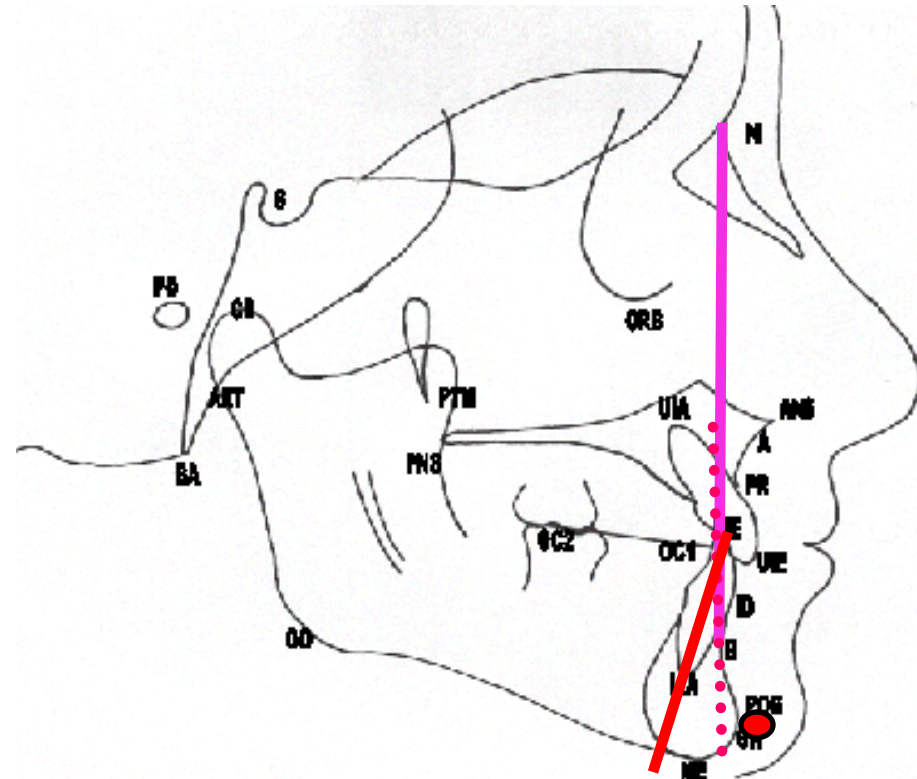**If angle decreased means incisor retrusion**

Lower incisor to NB distance

If more than normal incisor are anteriorly located

If less than normal incisor are posteriorly located
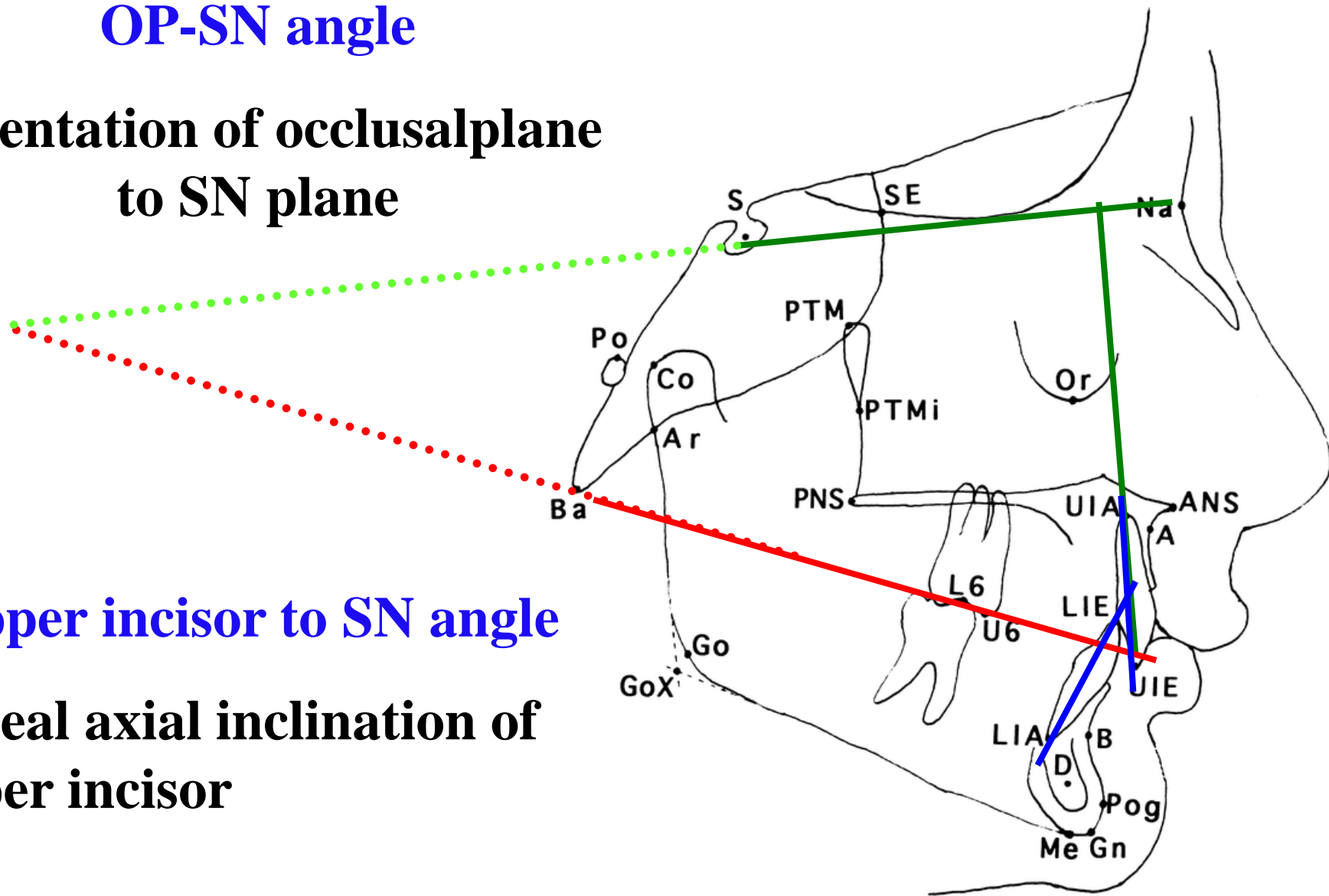
Pog to NB distance

Amount of chin bone

Interincisal angle

OP-SN angle

Orientation of occlusalplane to SN plane

Upper incisor to SN angle
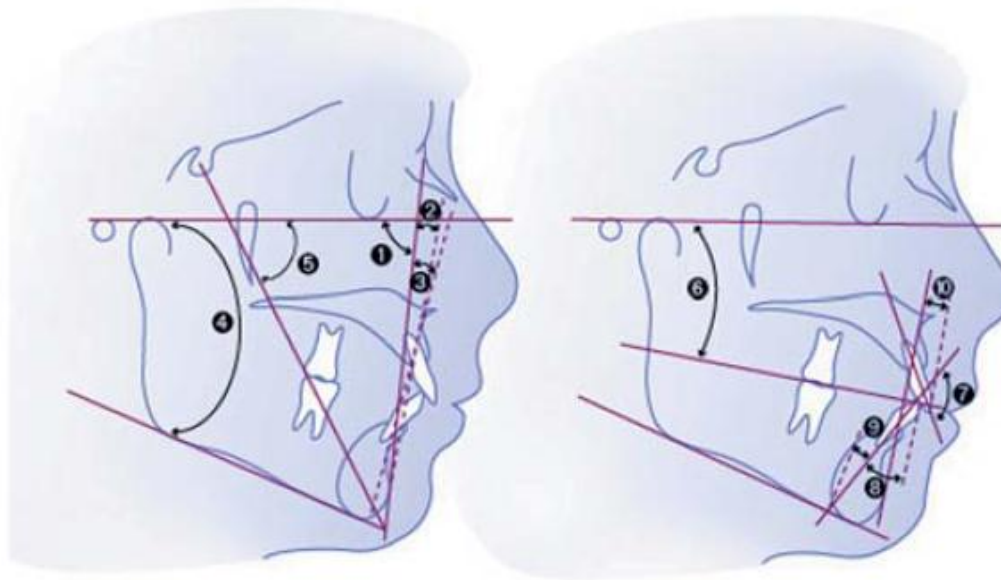
reveal axial inclination of upper incisor

DOWN`S ANALYSIS

DOWN`S ANALYSIS

 Down's analysis involves geometric and analytic manual calculations to be performed on the X-ray or tracing of the profile of a skull.

Downs analysis with the reference points identified. 1, Facial plane. 2, Convexity. 3, A-B plane. 4, Mandibular plane. 5, Y axis. 6, Occlusal plane. 7, Interincisal angle. 8, T to Occlusal plane. 9, T to mandibular plane. 10, ⊥ to A-P plane.

Skeletal Criteria

Facial angle
(NPog – FH; average = 88º)

• It gives an indication of anteroposterior position of the most anterior point of the mandible.
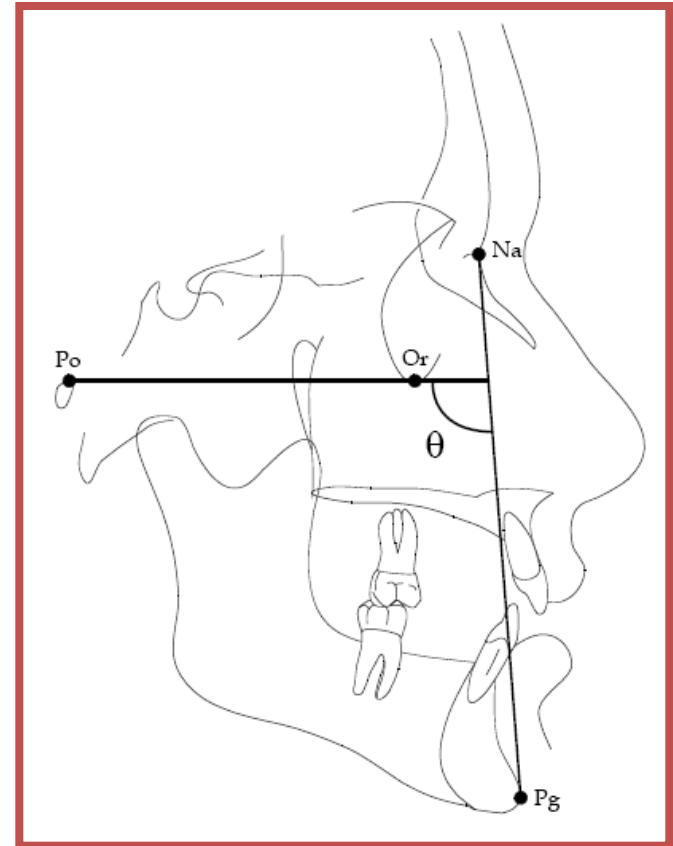
NPog-FH:

CL II skeletal malocclusion with retrognathic mandible.

CL- III skeletal malocclusion with prognathic mandible.

• This angle increase with age, since mandibular Growth coincides with general growth.
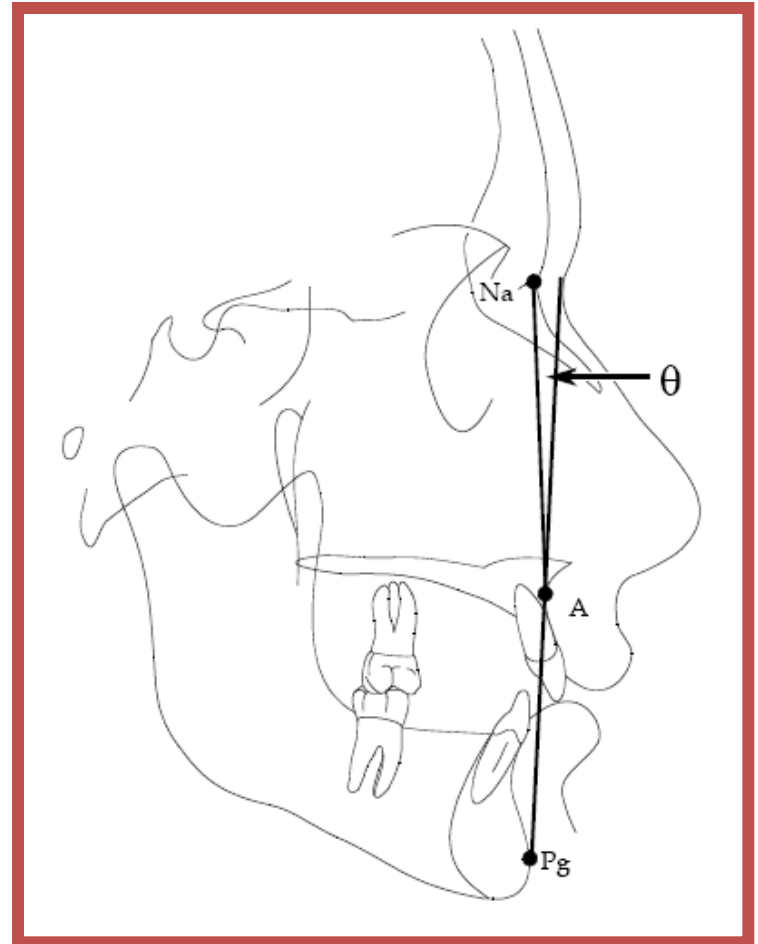
Angle of convexity (NAPog)

- Indicates the convexity or concavity of the skeletal facial profile.

- Not indicate which jaw is at fault. Points; N, A, Pog full on straight line.

- The angle formed when the point A not full on the NPog line.
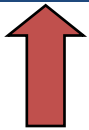
NAPog: ↑ CL-II (convex).

↓ CL-III (concave).

Mandibular Plane angle
(MP to FH; average = 27°)

• It gives an indication of the vertical height of mandibular ramus (this is the only clinical significance of the mandibular plane angle).
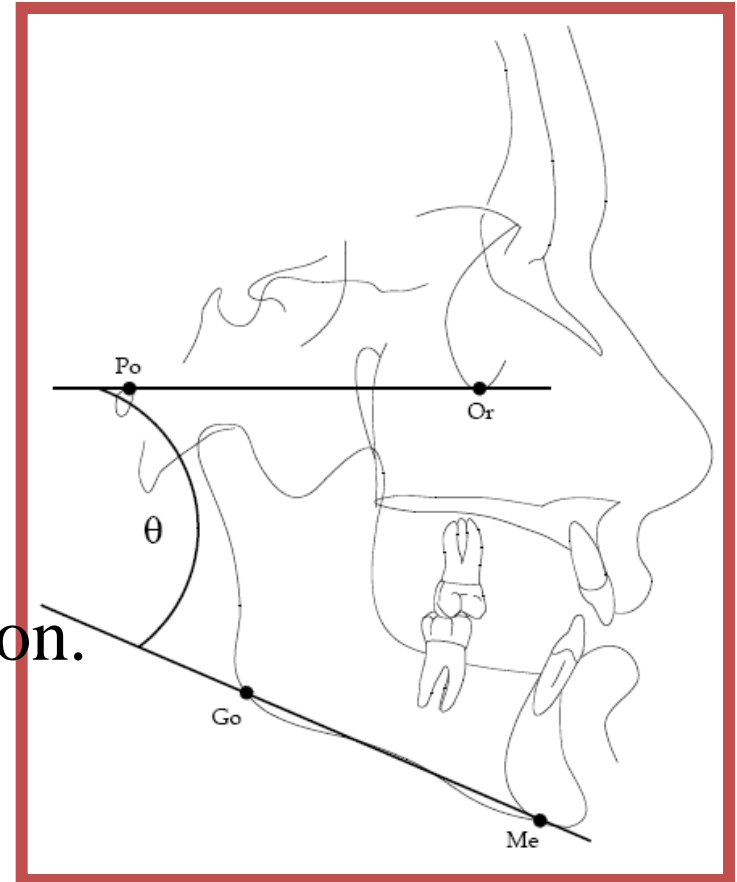
MPA:

⬆ **severe CL II DI** & **severe CL III** malocclusion.

⬇ **CL II DII** malocclusion. (producing square mandible & wide facial pattern).
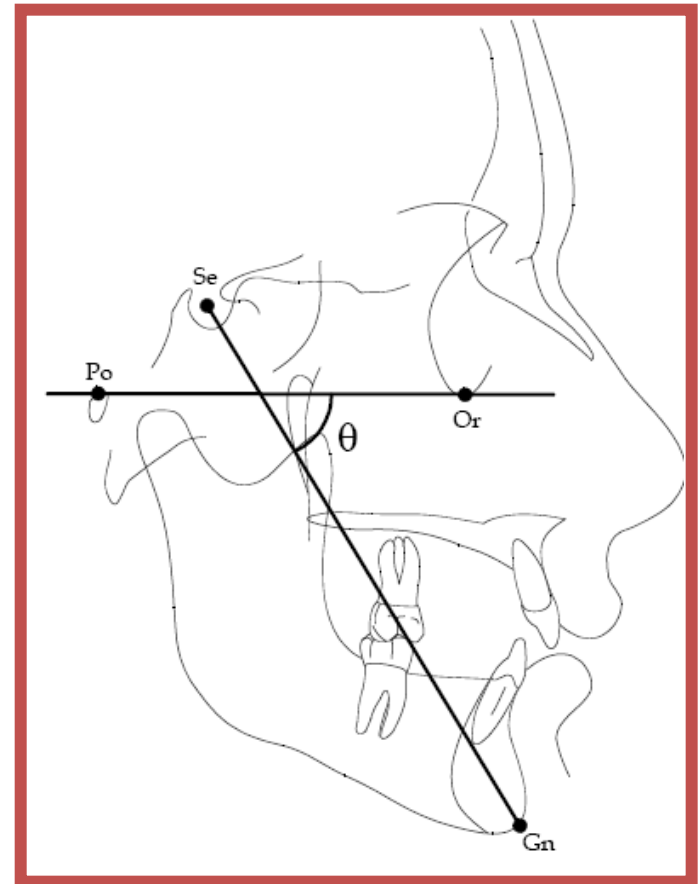
Y Axis angle
(S-Gn to FH; average = 60º)
## "Growth Axis angle"

- Indicating the growth pattern of the mandible.

- **Y Axis angle** ⬆ **severe CL-II DI** malocclusion (indicate downward – backward vertical growth of the mandible).

⬇ **CL-II DII** malocclusion (indicate more horizontal future growth & this growth whether or not will help or hinder orthodontic treatment).

Occlusal Plane angle (OP-FH; average = 10º)

- It indicates the angulation of occl. plane to the FH plane.

- (Clinically is important to maintain the original occl. plane angle throughout the treatment.

- Tipping of the occl. plane make the muscle of mastication attempt to return the occl. plane to its original position & lead to relapse of treatment during retention period).
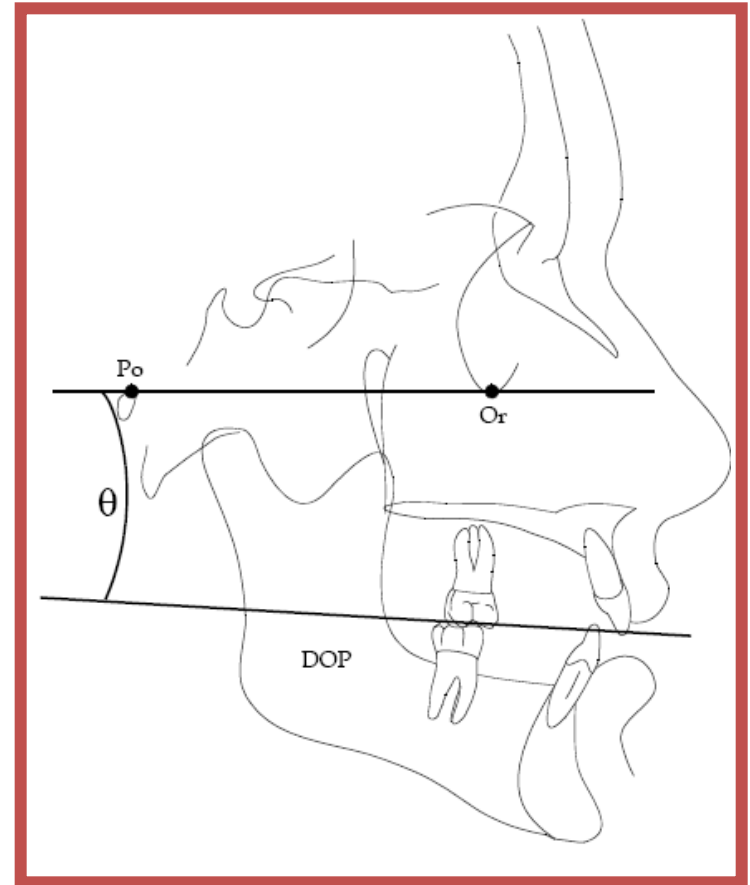
Dento-skeletal Criteria

The orientation of the incisors position in relation to the skeletal cranial structures can be evaluated by their position, using linear parameters and angular relationship to determine their inclination.

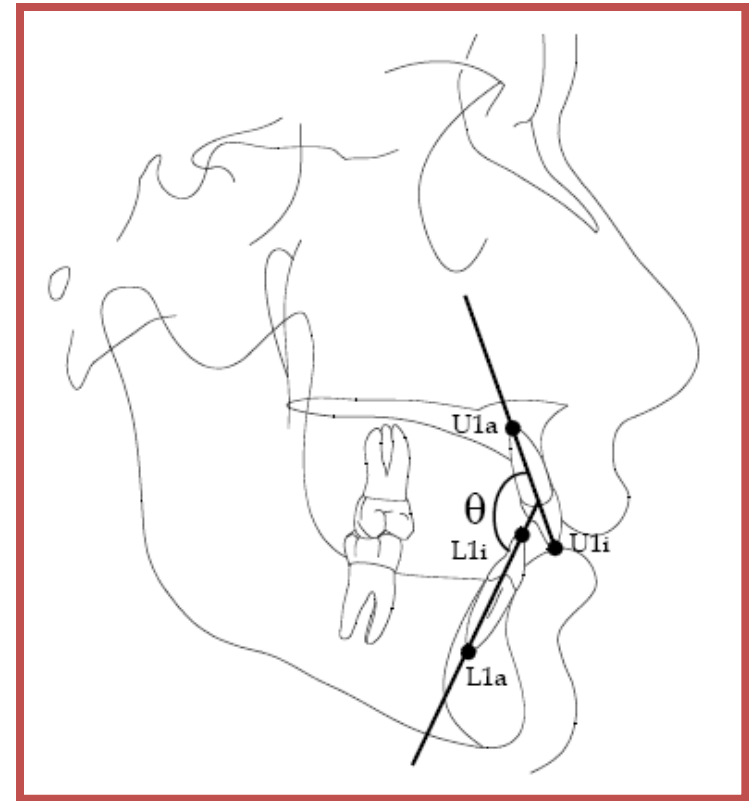# Interincisal angle ($\bar{\imath} - \underline{I}$; average = 135º)

Angulation between the long axis of the upper & lower incisors. Not reveal the specific angulation of either incisors.

$\bar{\imath} - \underline{I}$ Angle

⬇ **CL-I** bimaxillary protrusion
CL-II DI malocclusion.

⬆ **CL-II DII** (deep over bite; because there is no incisal stop).

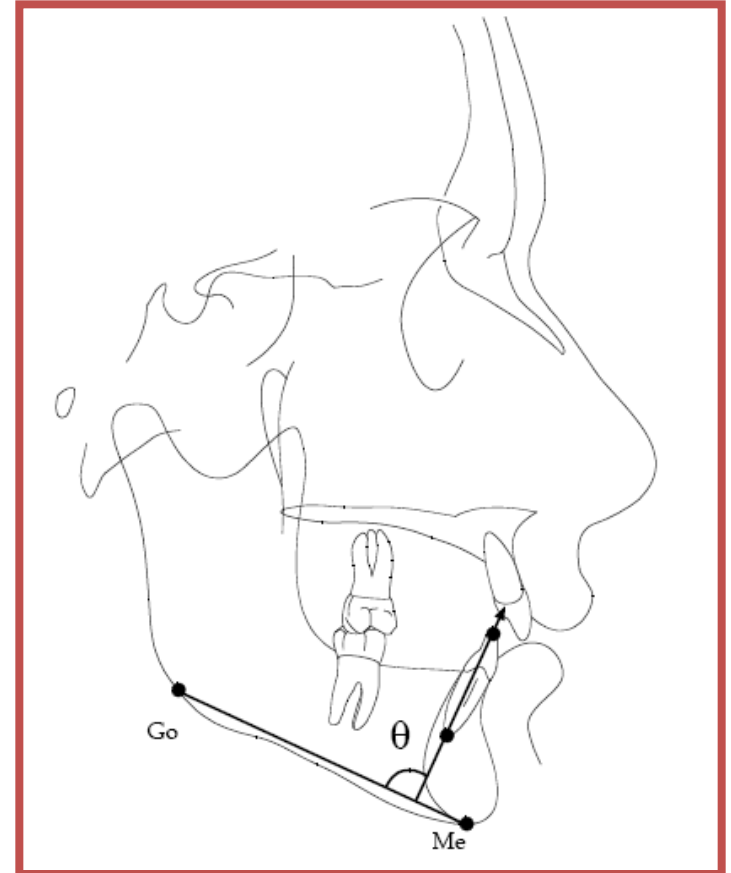⬆ Deciduous dentition because of up right nature of incisal teeth.

Lower incisor to mandibular plane angle (ī – MP; average = 91.4º ± 5º)

- It`s reveal the inclination of lower incisors to mandibular plane (MP). Usually the lower incisors is inclined labially.

ī – MP ⬆ **CL-II DI** malocclusion.

⬇ **CL III** malocclusion.

Thank you