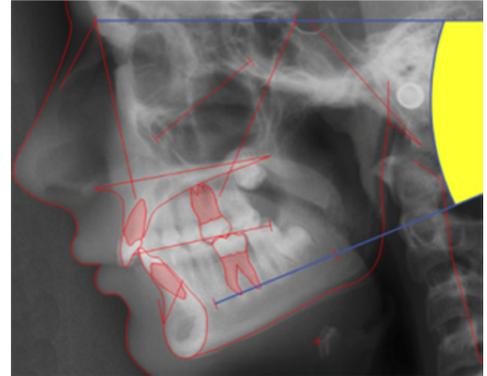


# Some thoughts about “Matrix” and “Intra Matrix” Rotation of the Mandible and the Maxilla

## Facts

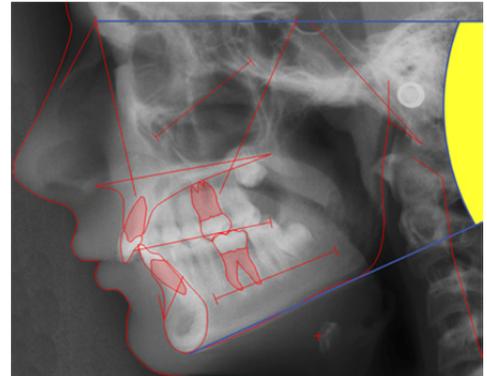
### Mandible

In the average individual the following characteristics can be observed during normal growth with respect to the so-called “Intra Matrix” and “Matrix” rotations of the lower jaw. The extent of “Intra Matrix” changes can be measured by the angle between the Mandibular Reference Lines (ma1-ma2) of two consecutive stages, in relation to the anterior cranial base represented by the line cbr1(n) –sa.



VARIABLE			MALE				FEMALE				DEFINITIONS	
			$\bar{x}$				$\bar{x}$					
			7 Yr	16 Yr	Adult	Span	7 Yr	16 Yr	Adult	Span		
<b>DEFINITION</b>	<b>NAME</b>	<b>UNIT</b>									NSL	Line through <b>n</b> and <b>s</b>
<b>PREDICTIONS</b>											MAR	Line through <b>ma1</b> and <b>ma2</b>
MandRotYear	MandRotYear	D/Yr	-1.0	-1.6	0.0	0.6	1.0	-1.0	-1.4	0.0	0.4	1.0

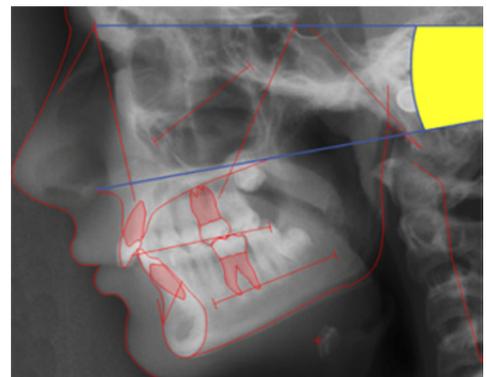
In comparison; the mean values for the “Matrix” Rotation is only .035 degrees per year. This difference is due to the fact that the average patient has apposition under the anterior lower border of the mandible and resorption of the posterior lower border.



VARIABLE			MALE				FEMALE				DEFINITIONS	
			$\bar{x}$				$\bar{x}$					
			7 Yr	16 Yr	Adult	Span	7 Yr	16 Yr	Adult	Span		
<b>DEFINITION</b>	<b>NAME</b>	<b>UNIT</b>									NSL	Line through <b>n</b> and <b>s</b>
<b>VERTICAL</b>											ML	Line through <b>gn</b> and <b>mlp</b>
NSL/ML	MandibularIncli	Deg	31.2	28.2	28.0	-3.2	6.0	33.6	30.1	30.0	-3.6	6.0

### Maxilla

The “Intra Matrix” rotation of the maxilla, on the other hand, on average is about 50% of that of the mandible. The “Matrix Rotation” of the maxilla can be measured by the change in the inclination of the palatal plane in relation to the cranial base (NSL/NL). This change is in most cases minimal as the “Intra Matrix” rotation is masked almost completely by remodeling. The “Matrix Rotation” for Males and Females can be seen in the table below.

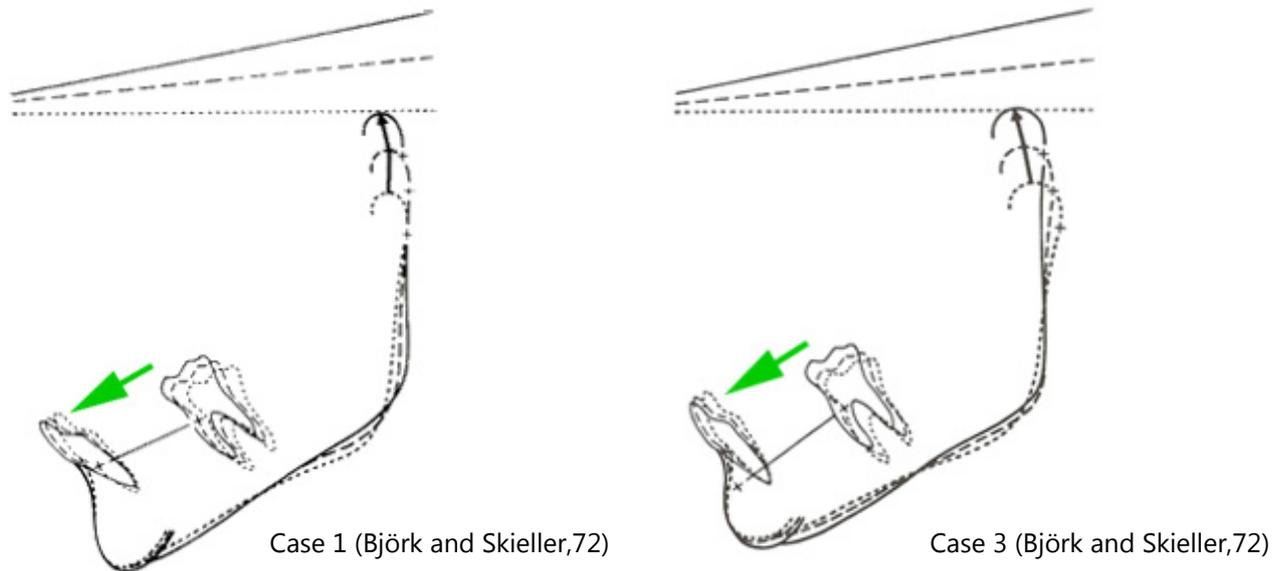


VARIABLE			MALE				FEMALE				DEFINITIONS	
			$\bar{x}$				$\bar{x}$					
			7 Yr	16 Yr	Adult	Span	7 Yr	16 Yr	Adult	Span		
<b>DEFINITION</b>	<b>NAME</b>	<b>UNIT</b>									NSL	Line through <b>n</b> and <b>s</b>
<b>VERTICAL</b>											NL	Line through <b>sp</b> and <b>pm</b>
NSL/NL	MaxillarIncli	Deg	6.1	7.4	7.5	1.4	3.0	6.2	7.5	7.5	1.3	3.0

## Dentitional Changes

It can be seen from the average change in mandibular inclination over time in both males and females that if these teeth are to maintain a stable occlusion they have to procline during growth (Table A and A). The actual mechanism behind this change is still poorly understood and needs further study.

The illustration below shows the incisor movement over a period of six years around puberty in subjects with stable anterior occlusion and pronounced forward or anterior growth rotation of the mandible.



Note the mesial migration of the posterior teeth and the **continous proclination** of the incisors that took place over this time period. The mandibular superimpositions above are from Björk and Skieller's article (AJODO, 1972). Note the similar degree of rotation and condylar grow.

## Some clinical implications of rotational growth

If during growth of the mandible this mesial migration mechanism is **disturbed** the result can be an increase in overbite resulting from the rotational growth pattern without the necessary fulcrum point at the incisors. Lack of anterior tooth contact or breaking the continuity of the dentition by removal of posterior teeth in the lower arch affects the normal mesial migration mechanism of the posterior teeth and is one of the most common causes of the development of increased overbite and anterior crowding.

During orthodontic treatment or changes in the functional balance a different phenomenon is **induced** namely a rotation of the lower jaw with a rotational center located at the condyles. This center of rotation can change if there are active growth changes in the Median Cranial Base. In that case the rotation can be either in anterior (forward) or posterior (backward) direction relative to the cranial base.

This induced rotation is generally associated with the specifik facial growth pattern of the individual. The individual variation, however, is large and not predictable.

Simultaneously with the induced rotation growing subjects will also demonstrate varying degrees of Intra Matrix rotation depending on their condylar growth potential and growth direction.

As the mandibular Intra Matrix rotation by definition is measured by the change in the angle  $n-sa/ma1-ma2$ , at the stages of interest, any change induced by treatment will change the degree of change of this angle.

Resulting from the induced rotational changes, a (compensatory?) re-modeling of the mandible takes place either simultaneously or slightly delayed in the form of resorption and apposition of the lower border of the mandible.

In principle it should be possible to distinguish between the induced rotation and the Intra Matrix rotation. However, in light of the above mentioned rather complex association between rotations of the Matrix and Intra Matrix response it has been decided in the Tiops Program to let the Intra Matrix values follow the precise definition.