

ANALYSIS OF THE DENTITION & OCCLUSION

By

Debora Priestap, Michelle J. Thornberg, Michael L. Riolo

From

Riolo, M. and Avery, J. Eds., Essentials for Orthodontic Practice, EFOP Press of EFOP, LLC. Ann Arbor and Grand Haven, Michigan, U.S.A., 2003.

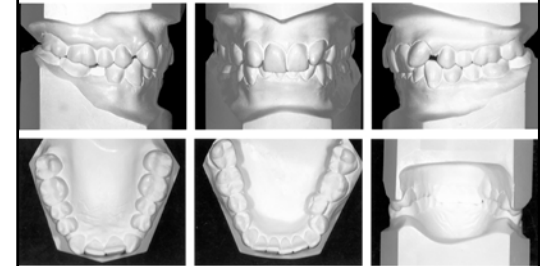
CHAPTER 13
Pages 315-370

DIAGNOSIS & TREATMENT PLANNING

ANALYSIS OF THE DENTITION & OCCLUSION

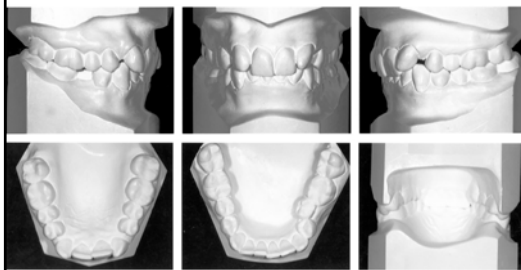
- BOLTON ANALYSIS
- SPACE ANALYSIS
- MIXED DENTITION ANALYSIS

DENTAL CASTS



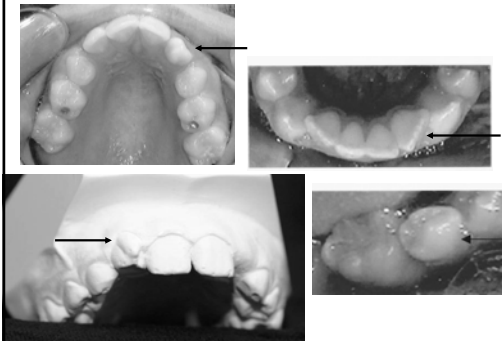
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|-------|--------------|---------------|-----------|-----------|-------------|
| TEETH | -number | DENTAL ARCH | -shape | OCCLUSION | -sagittal |
| | -size | | -symmetry | | -vertical |
| | -morphology | | -midlines | | -transverse |
| | -position | PALATAL VAULT | -depth | | |
| | -inclination | | -width | | |

DENTAL CASTS



- | | |
|-------|-------------|
| TEETH | -number |
| | -size |
| | -morphology |

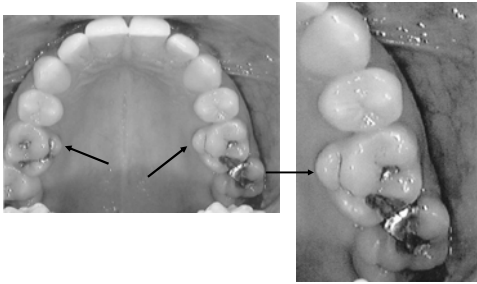
TEETH SHAPE / SIZE



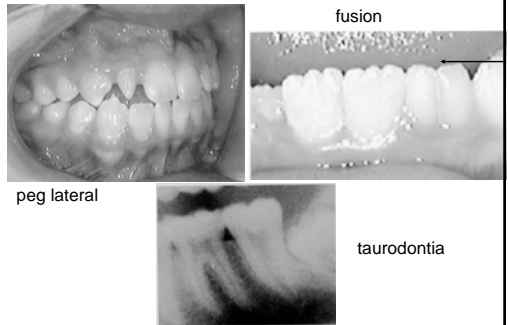
PEG LIKE LATERAL INCISOR



CUSP OF CARABELLI



FACTORS AFFECTING OCCLUSION



BALANCE
BETWEEN THE MESIODISTAL DIAMETER
(SIZE)
OF MAXILLARY & MANDIBULAR TEETH

BOLTON TOOTH RATIO ANALYSIS

Over-all Ratio					Anterior Ratio						
Sum mandibular 12	mm	÷	× 100	%	Mean 91.3 ± 0.26	Sum mandibular 6	mm	÷	× 100	%	Mean 77.2 ± 0.22
Sum maxillary 12	mm			Over-all ratio	S. D. 1st 1.91	Sum maxillary 6	mm			Anterior ratio	S. D. 1st 1.65
					Range 82.5 - 94.8						Range 74.5 - 81.4
Maxillary 12	Mandibular 12	Maxillary 12	Mandibular 12	Maxillary 6	Mandibular 6	Maxillary 6	Mandibular 6	Maxillary 6	Mandibular 6	Maxillary 6	Mandibular 6
86	77.6	94	85.9	105	94.0	40.5	30.9	45.5	35.1	50.5	39.0
87	75.5	95	86.7	104	95.0	40.5	31.3	46.0	35.5	51.0	39.4
88	79.4	96	87.6	105	95.9	41.0	31.7	46.5	35.9	51.5	39.8
89	86.3	97	88.6	106	96.8	41.5	32.0	47.0	36.3	52.0	40.1
90	81.3	98	89.5	107	97.8	42.0	32.4	47.5	36.7	52.5	40.5
91	82.1	99	91.4	108	98.6	42.5	32.8	48.0	37.1	53.0	40.9
92	83.1	100	91.9	109	99.5	43.0	33.2	48.5	37.4	53.5	41.3
93	84.0	101	92.2	110	100.4	43.5	33.6	49.0	37.8	54.0	41.7
94	84.9	102	93.1			44.0	34.0	49.5	38.2	54.5	42.1
						44.5	34.4	50.0	38.4	55.0	42.5
						45.0	34.7				

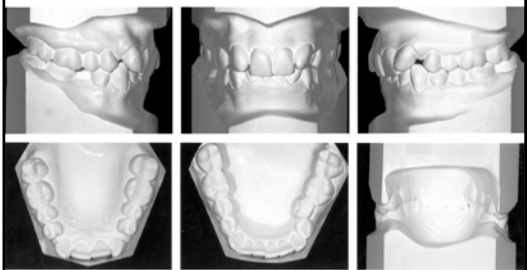
Patient Analysis

If the over-all ratio exceeds 91.3 the discrepancy is in excessive mandibular arch length. In above chart locate the patient's maxillary 12 measurement and opposite 6 is the correct mandibular measurement. The difference between the actual and correct mandibular measurement is the amount of excessive mandibular arch length.

Actual mandibular 12 - Correct mandibular 12 = Excess mandibular 12
If over-all ratio is less than 91.3:

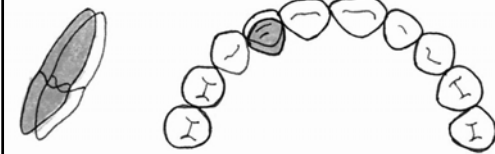
Actual maxillary 12 - Correct maxillary 12 = Excess maxillary 12

DENTAL CASTS

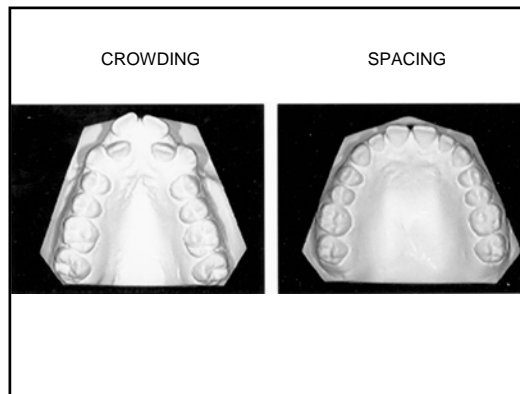
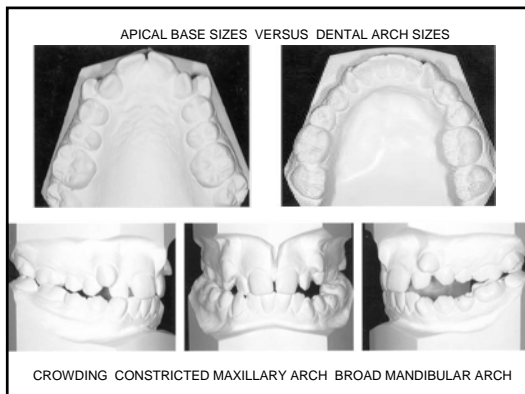
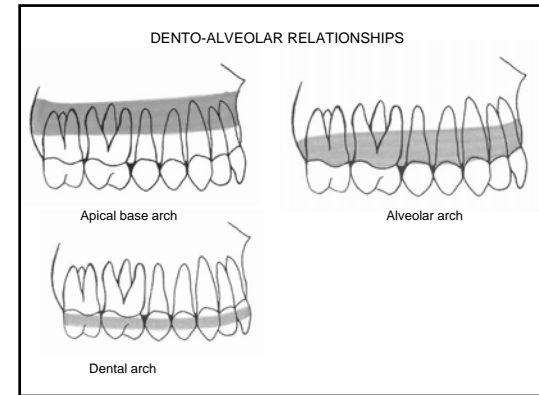
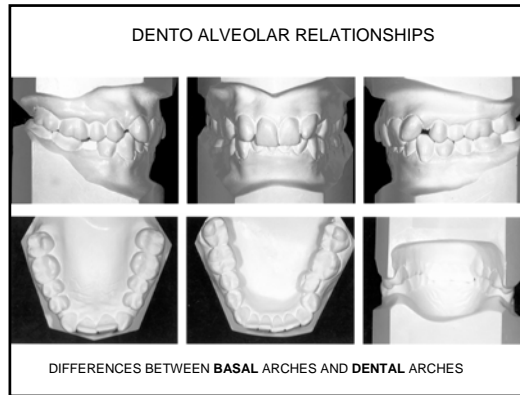
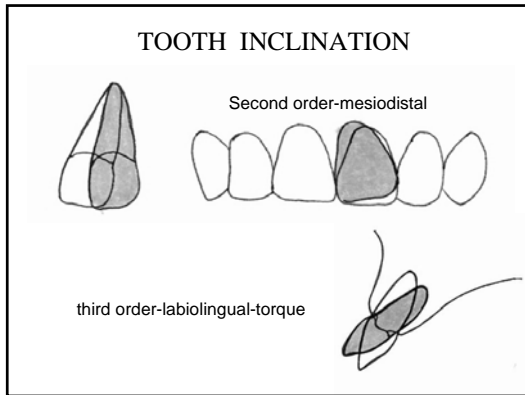


TEETH -position
-inclination

TOOTH POSITION



First order-labiolingual



FORSYTH DENTAL CENTER - HARVARD SCHOOL OF DENTAL MEDICINE
Assessment of Available Space

Maxilla					Mandible					
MESIODISTAL CROWN DIAMETERS					MESIODISTAL CROWN DIAMETERS					
	Observed Value	Mean*	Difference	S. D.	Standard Score		Observed Value	Mean*	Difference	Standard Score
DECIDUOUS	CC	6.7	0.4			DECIDUOUS	CC	5.7	0.4	
	dm ₁	7.0	0.4				dm ₁	7.7	0.4	
	dm ₂	8.8	0.6				dm ₂	9.6	0.5	
S.D.M. <input type="text"/>					S.D.M. <input type="text"/>					
PERMANENT I ₁ <input type="text"/>					PERMANENT I ₁ <input type="text"/>					
	I ₂	8.4	0.5				I ₂	5.3	0.4	
	I ₂	6.5	0.6				I ₂	5.8	0.4	
S.D.M. <input type="text"/>					S.D.M. <input type="text"/>					
C					C					
	Pm ₁	7.5	0.4				Pm ₁	6.5	0.3	
	Pm ₂	6.9	0.4				Pm ₂	6.9	0.4	
	Pm ₃	6.6	0.4				Pm ₃	7.0	0.4	
S.D.M. <input type="text"/>					S.D.M. <input type="text"/>					
TOTAL <input type="text"/>					TOTAL <input type="text"/>					
ARCH CIRCUMFERENCE <input type="text"/>					ARCH CIRCUMFERENCE <input type="text"/>					
CORRECTED ARCH CIRCUMFERENCE <input type="text"/>					CORRECTED ARCH CIRCUMFERENCE <input type="text"/>					
LACK/EXCESS OF AVAILABLE SPACE <input type="text"/>					LACK/EXCESS OF AVAILABLE SPACE <input type="text"/>					

* Moorrees, et al., J. Dent. Research, 31: 38-47, 1952.

FOURTH DENTAL CENTER - HARVARD SCHOOL OF DENTAL MEDICINE
Assessment of Available Space

Maxilla ♂

MESIODISTAL CROWN DIAMETERS				
	Observed Value	Mean	Difference	S. D.
DECIDUOUS dc	6.9	6.9	0.4	
dm ₁	7.1	7.1	0.4	
dm ₂	9.1	9.1	0.5	
PERMANENT I ₁	8.8	8.8	0.5	
I ₂	6.6	6.6	0.6	
C	8.0	8.0	0.4	
Pm ₁	7.0	7.0	0.4	
Pm ₂	6.8	6.8	0.4	
TOTAL				

ARCH CIRCUMFERENCE

CONSTRUCTED ARCH CIRCUMFERENCE

LACK/EXCESS OF AVAILABLE SPACE

Mandible

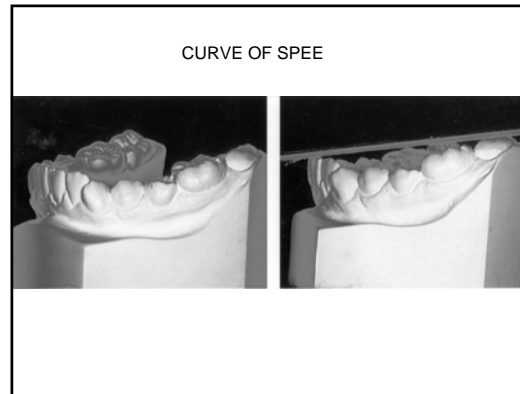
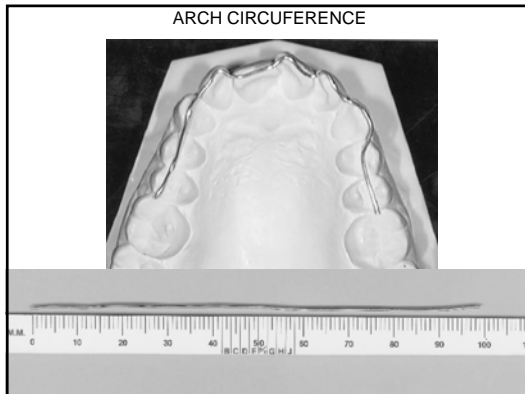
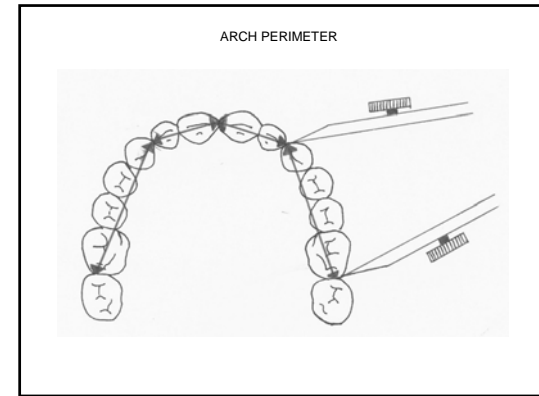
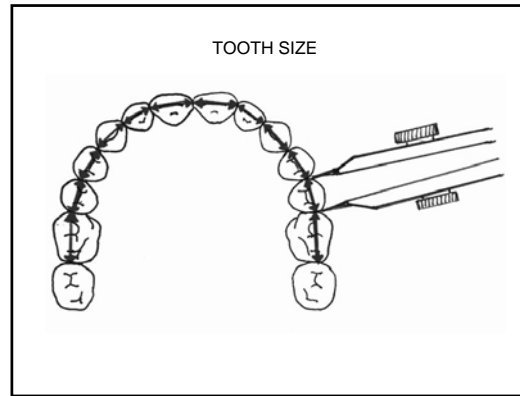
MESIODISTAL CROWN DIAMETERS				
	Observed Value	Mean	Difference	S. D.
DECIDUOUS dc	5.9	5.9	0.3	
dm ₁	7.8	7.8	0.4	
dm ₂	9.8	9.8	0.5	
PERMANENT I ₁	5.4	5.4	0.3	
I ₂	6.0	6.0	0.4	
C	7.0	7.0	0.4	
Pm ₁	7.1	7.1	0.4	
Pm ₂	7.3	7.3	0.5	
TOTAL				

ARCH CIRCUMFERENCE

CONSTRUCTED ARCH CIRCUMFERENCE

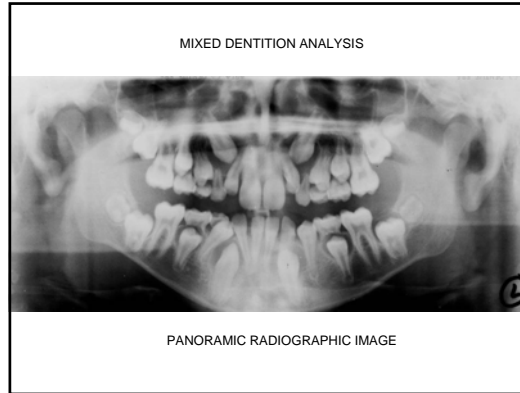
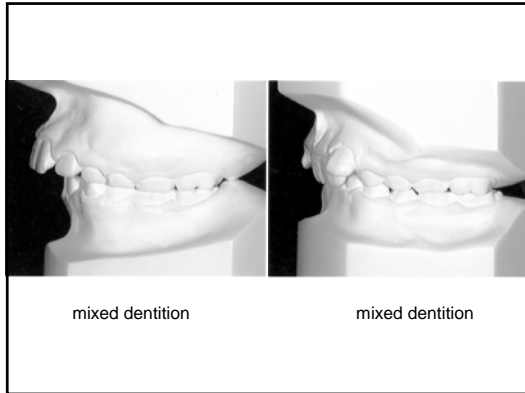
LACK/EXCESS OF AVAILABLE SPACE

WINTER, et al., J. Dent. Research, 31: 33-37, 1952.



MIXED DENTITION ANALYSIS

- Estimate of the size of permanent canines and premolars
- Estimate of the available space in permanent dentition



MIXED DENTITION ANALYSIS

Patient _____ Age _____ years _____ months Sex _____
 Date _____ Address _____ Parent _____

Teeth Size

Right Left

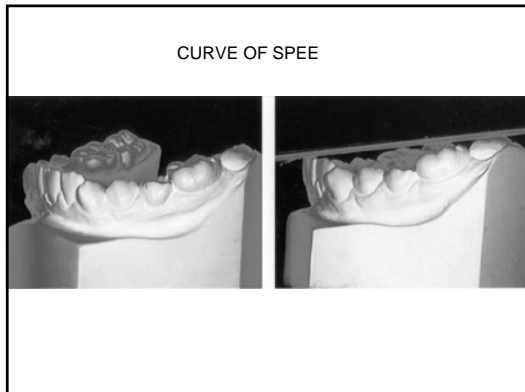
Space left for Alignment of 2 and 1		
Predicted size of 2 + 4 + 5		
Space left for molar adjustment		

Center

Right Left

Space left after Alignment of 2 and 1		
Predicted size of 2 + 4 + 5		
Space left for molar adjustment		

Remarks: Occlusal = _____ Occlusal = _____
 Molar Relationship = _____
 Remarks = _____



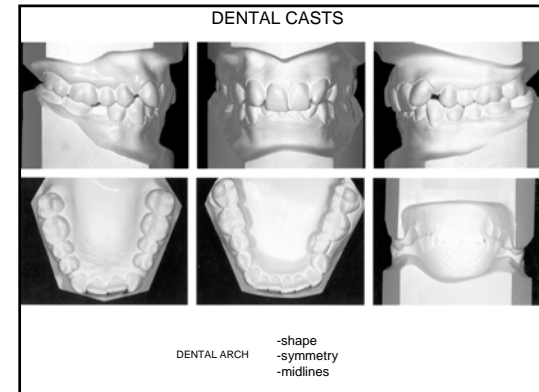
MOYERS MIXED DENTITION ANALYSIS

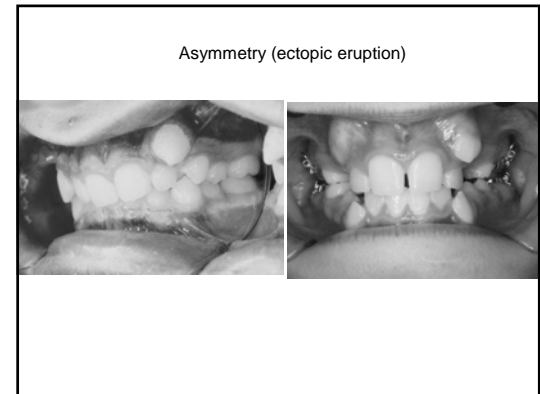
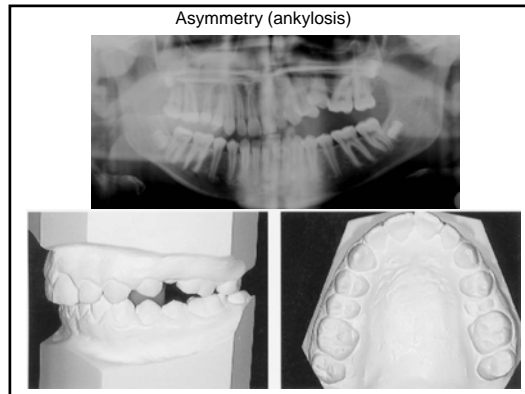
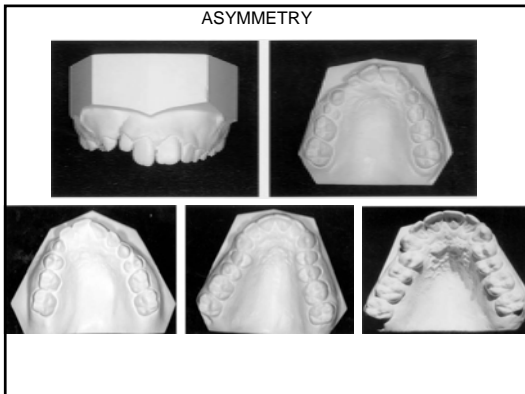
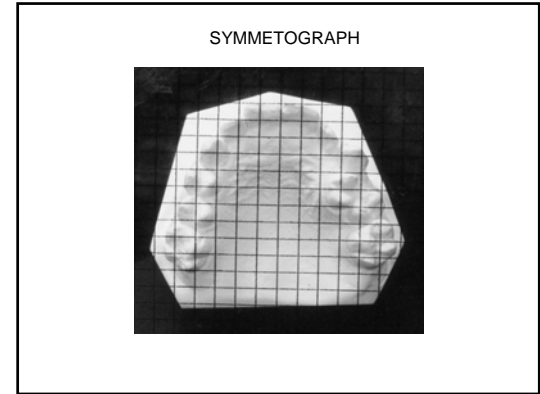
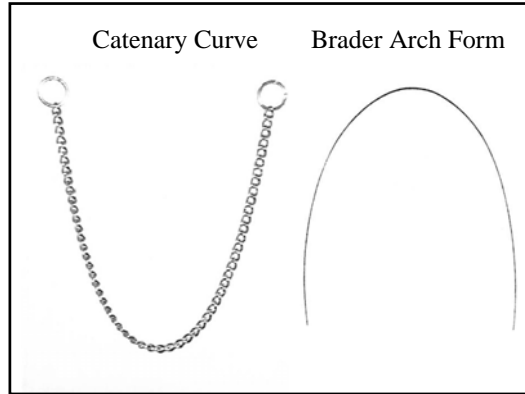
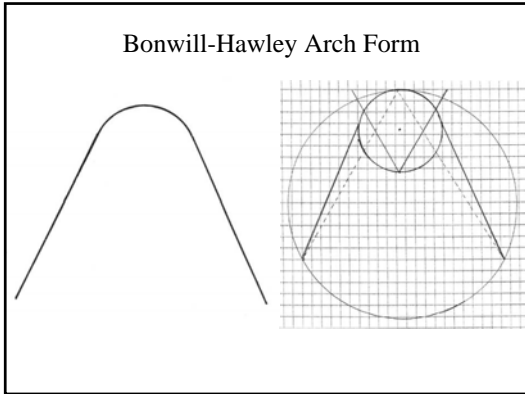
PROBABILITY CHART FOR PREDICTING THE SUM OF THE WIDTHS OF 345 FROM 21112

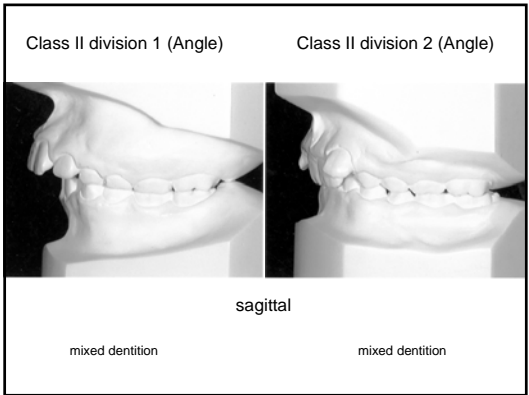
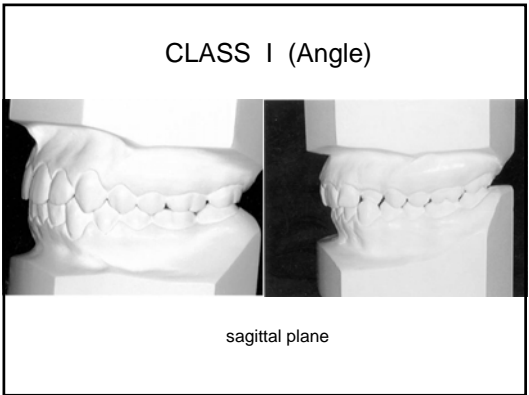
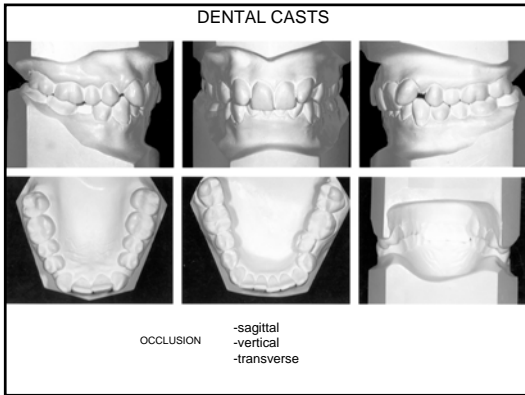
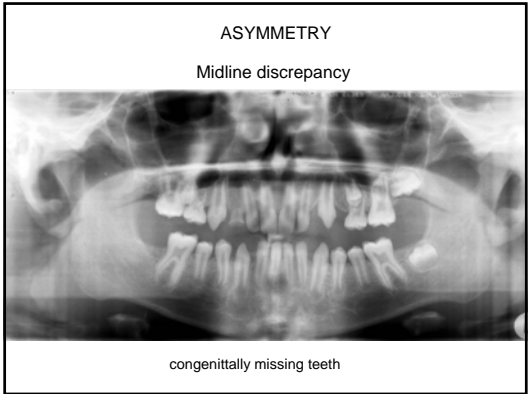
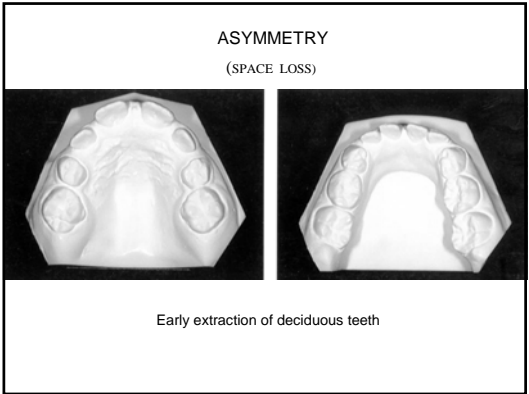
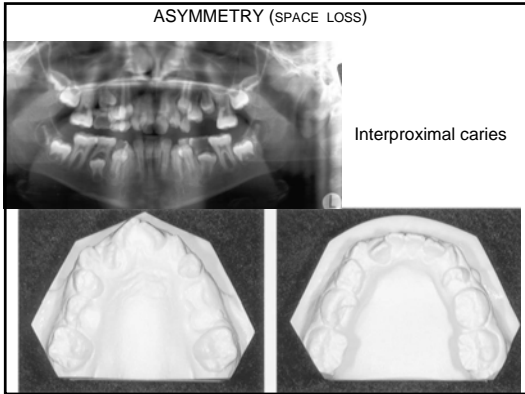
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95%	21.6	21.8	22.1	22.4	22.7	22.9	23.2	23.5	23.8	24.0	24.3	24.6
85%	21.0	21.3	21.5	21.8	22.1	22.4	22.6	22.9	23.2	23.5	23.7	24.0
75%	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.9	23.1	23.4	23.7
65%	20.4	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.1	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

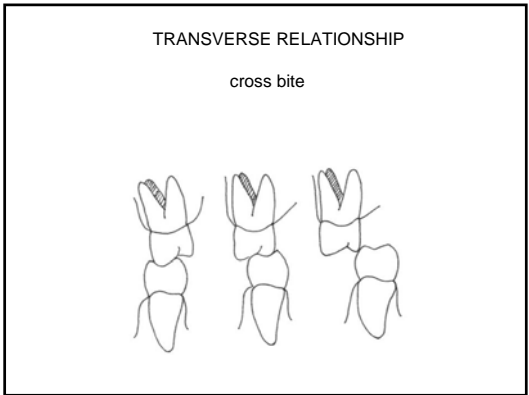
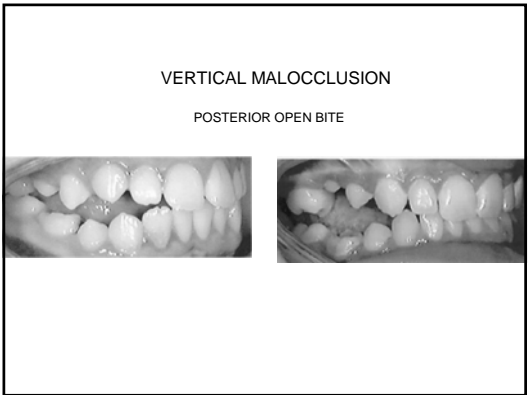
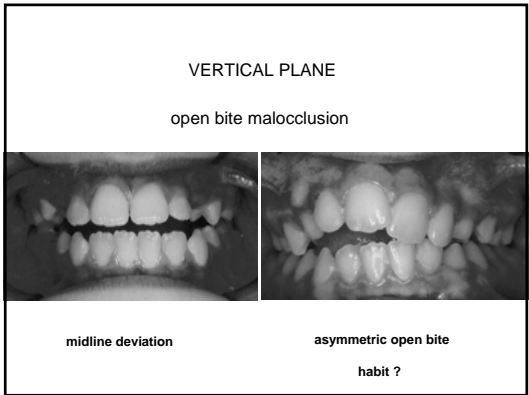
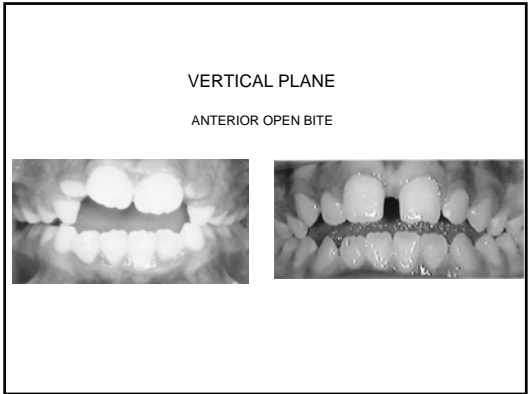
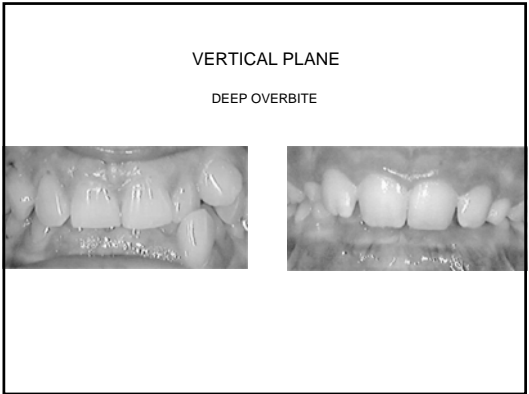
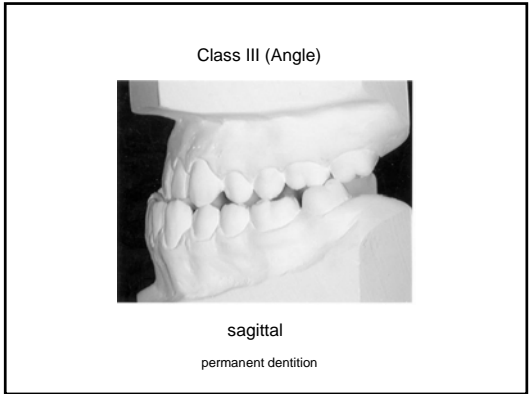
PROBABILITY CHART FOR PREDICTING THE SUM OF THE WIDTHS OF 345 FROM 21112

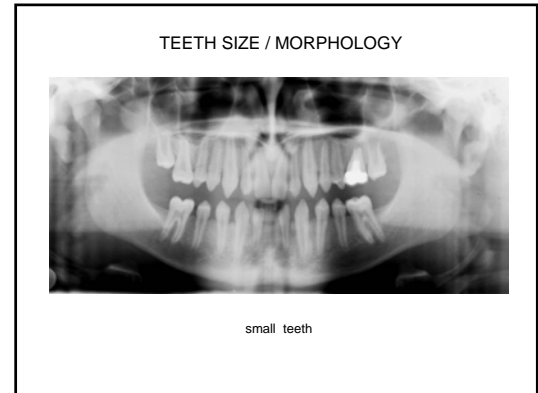
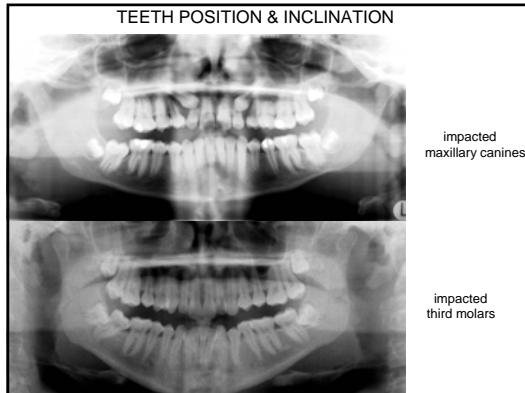
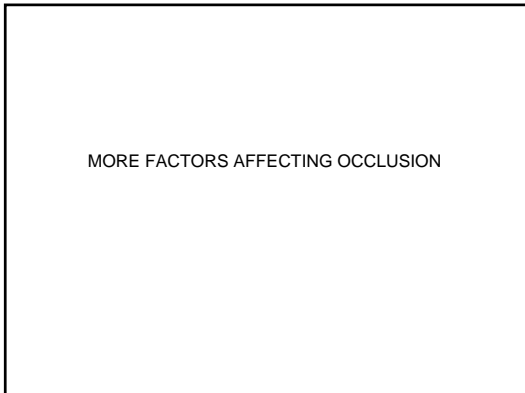
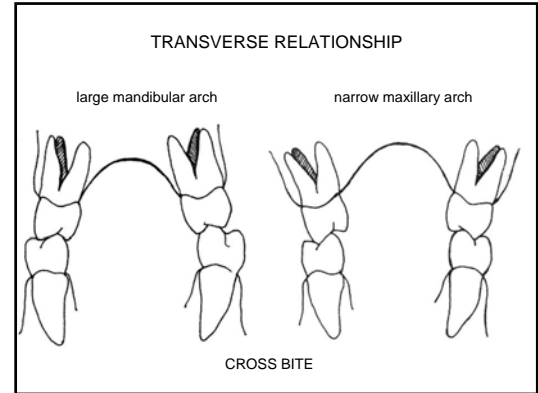
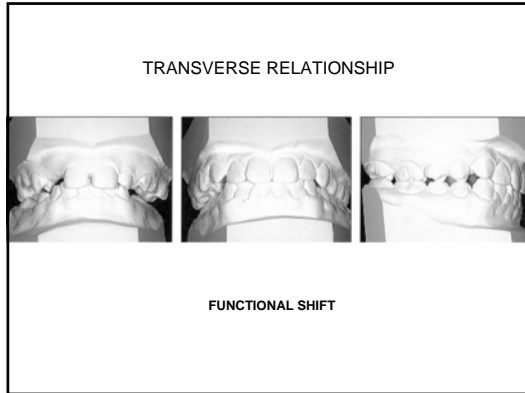
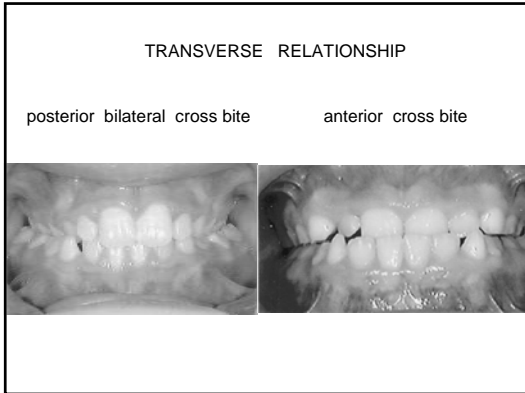
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95%	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8	24.1	24.4
85%	20.5	20.8	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8
75%	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4
65%	19.8	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	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

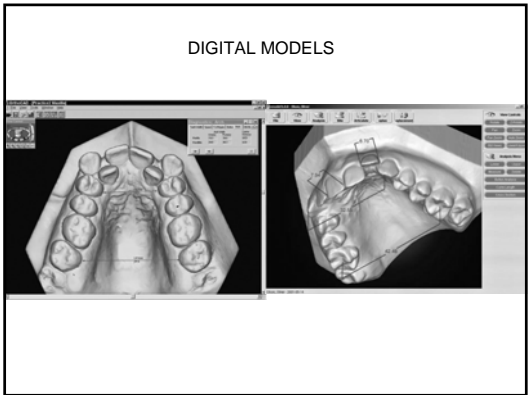
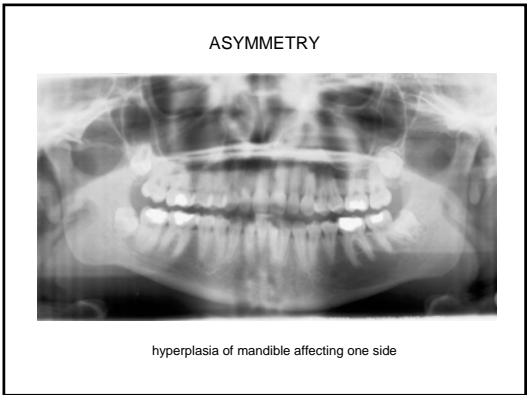
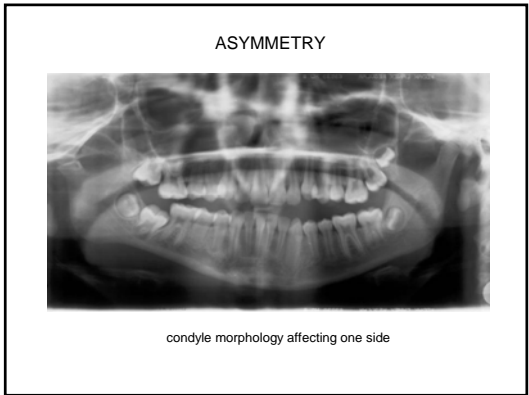
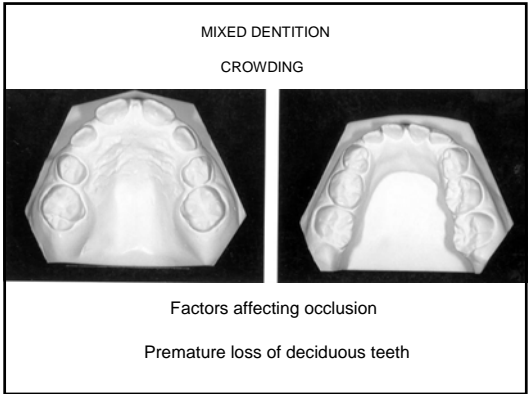
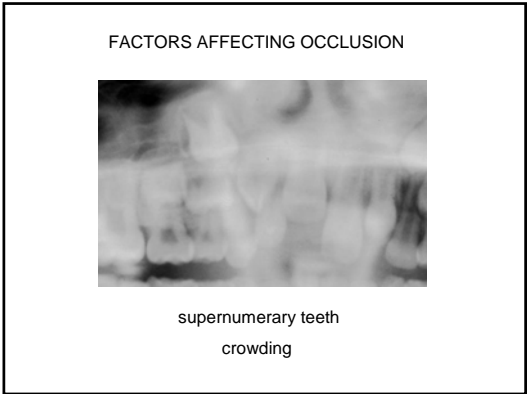
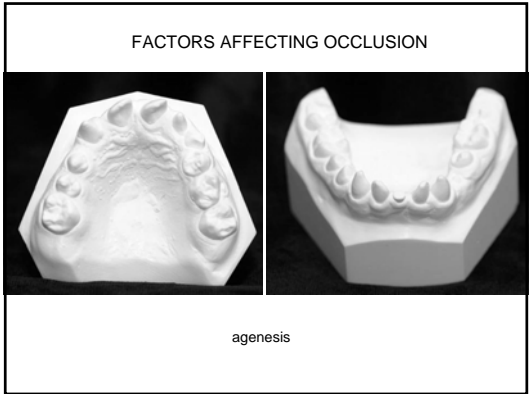


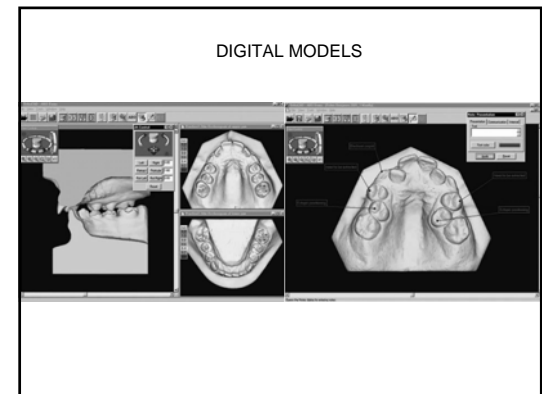
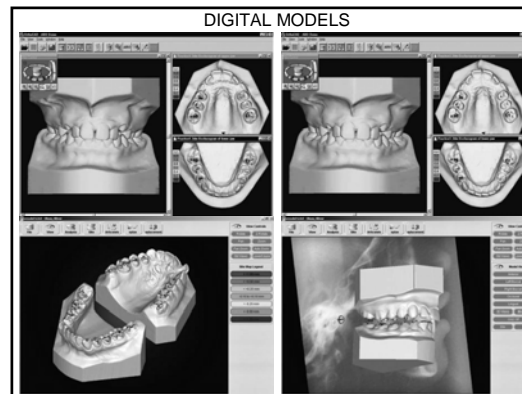
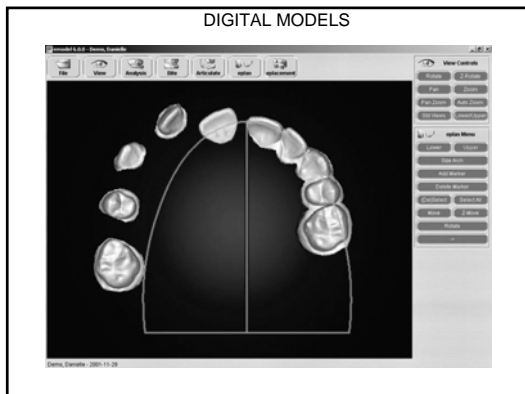
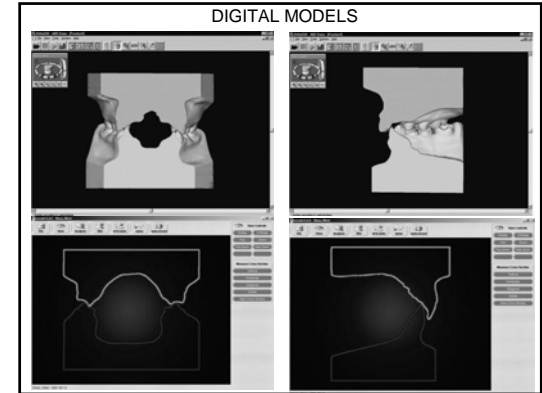
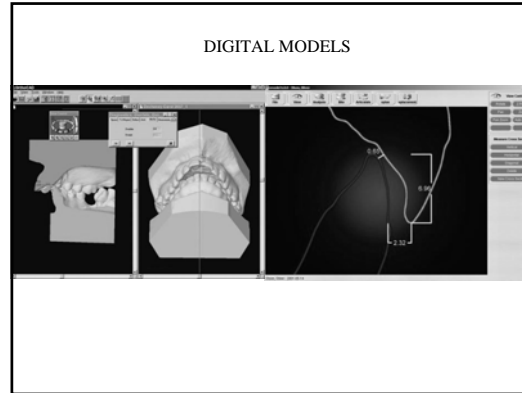
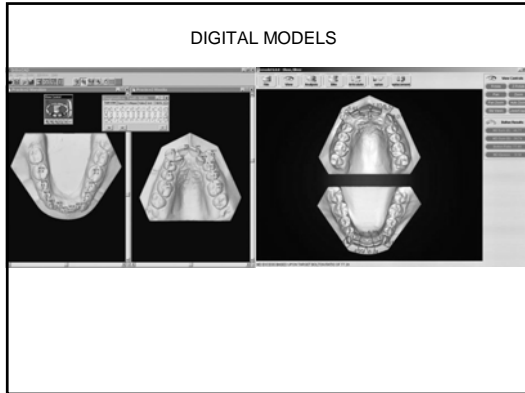












THANK YOU

MELTON ANALYSIS OF TOOTH-SIZE DISCREPANCIES *

ANTERIOR RATIO

Sum mandibular 6 ___ mm. = ___ x 100 = ___ % Mean: 77.2 ± 0.22

Sum maxillary 6 ___ mm. = ___ x 100 = ___ % S.D.: 1.65

EXTERIOR RATIO

Range: 74.5 - 80.4

Maxillary 6	Mandibular 6	Maxillary 6	Mandibular 6	Maxillary 6	Mandibular 6
40.0	30.9	45.5	35.1	50.5	39.0
40.5	31.3	46.0	35.5	51.0	39.4
41.0	31.7	46.5	35.9	51.5	39.8
41.5	32.0	47.0	36.3	52.0	40.2
42.0	32.4	47.5	36.7	52.5	40.5
42.5	32.8	48.0	37.1	53.0	40.9
43.0	33.2	48.5	37.4	53.5	41.3
43.5	33.6	49.0	37.8	54.0	41.7
44.0	34.0	49.5	38.2	54.5	42.1
44.5	34.4	50.0	38.6	55.0	42.5
45.0	34.7				

FAVIENT ANALYSIS

If anterior ratio exceeds 77.2:

Actual	Correct	Excess
mandibular 6	mandibular 6	mandibular 6

If anterior ratio is less than 77.2:

Actual	Correct	Excess
maxillary 6	maxillary 6	maxillary 6

*Am. J. Orthodontics, 48: 504-529, 1962.

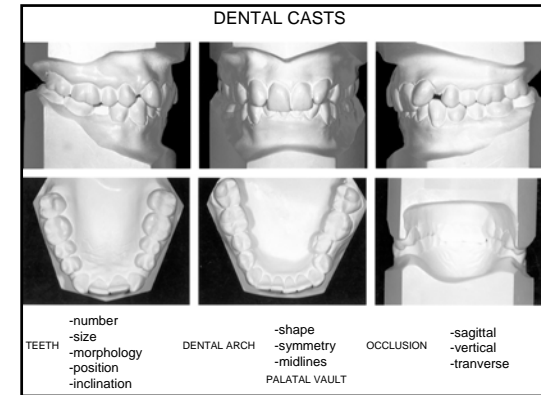


Figure 13-8

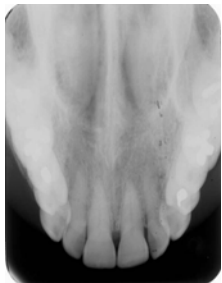


Figure 13-71

Figure 13-72



Figure 13-7



