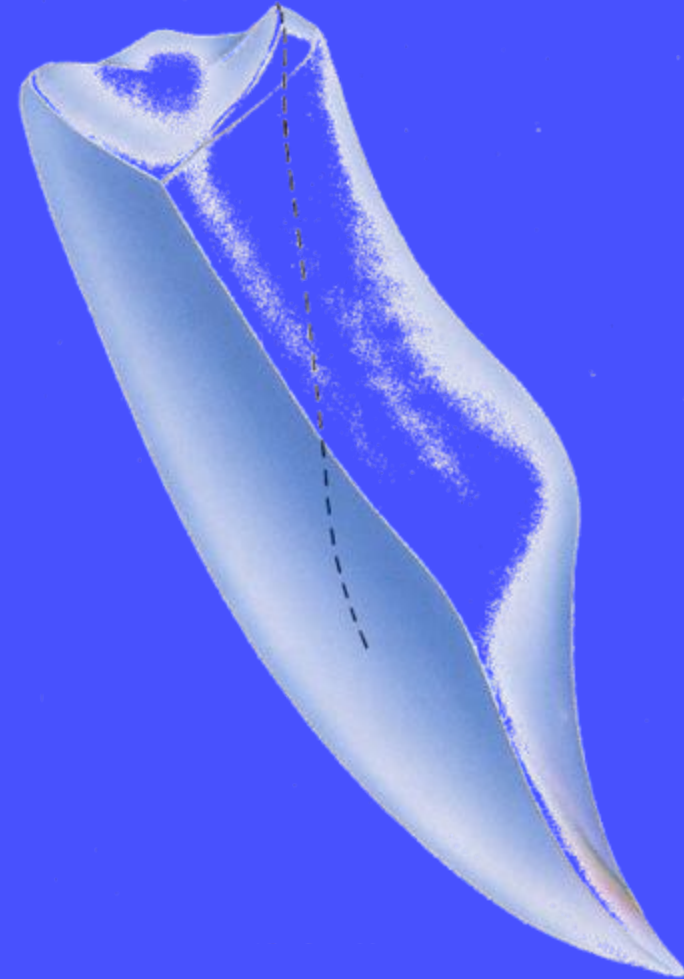




# Occlusion

## Mandibular movements



## **Learning outcomes**

- **Describe the mandibular border movements in the Sagittal, Frontal and Horizontal planes**
- **Differentiate Border movements and Functional movements**
- **Understand the Posselt's Envelope of mandibular movement**
- **Understand the Gothic arch tracing**
- **Discuss biomechanics of the Temporomandibular joint**

# MANDIBULAR MOVEMENTS

Movement: the act or process of moving, changing place, position or posture



Description of movements depends on the viewer perspective or viewer's position.



Is this the ....

FRONT VIEW (Coronal plane) ???

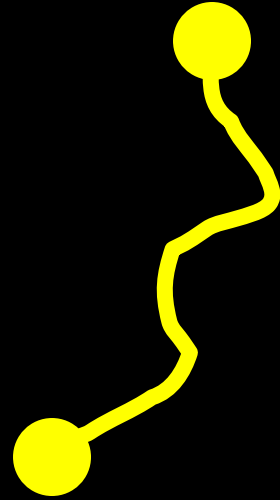
LATERAL VIEW (Sagittal plane) ??

TOP VIEW (Transverse or horizontal plane) ?

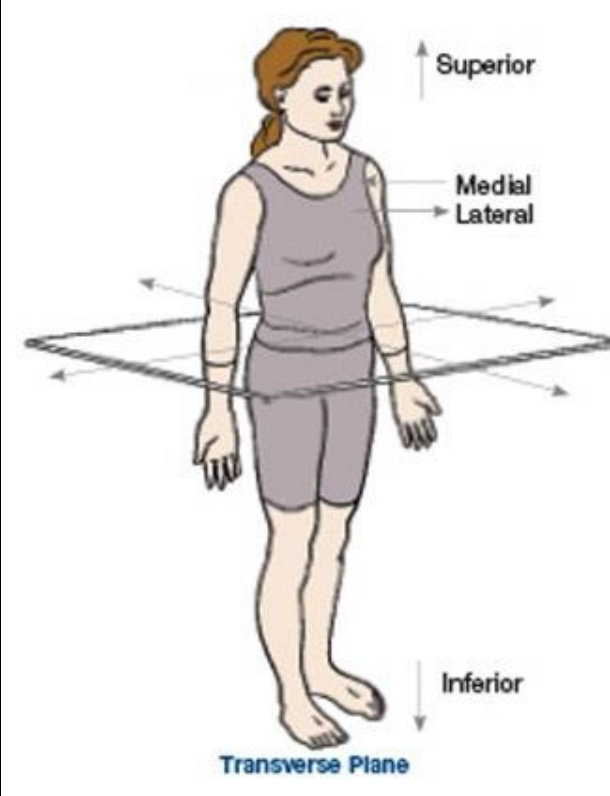
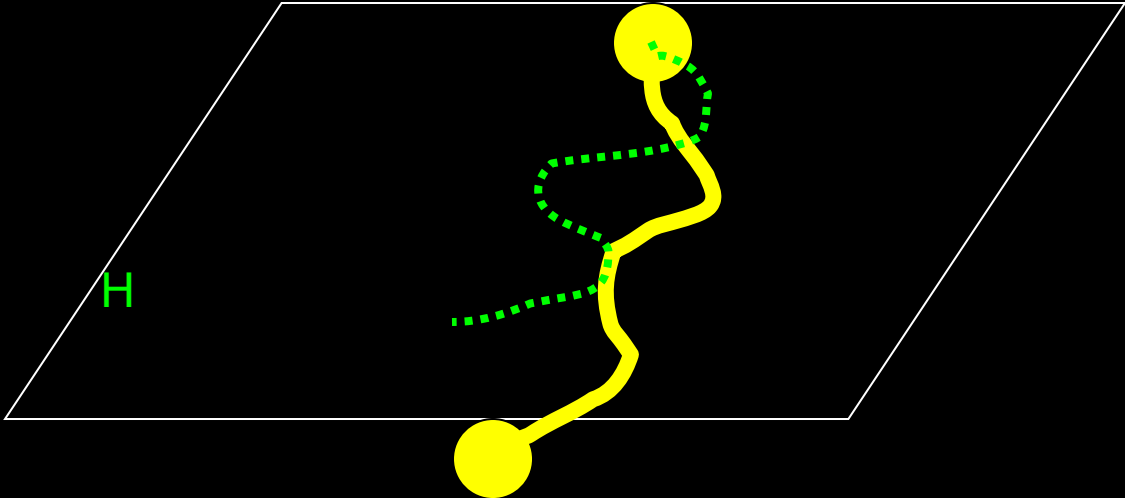


The perception of motion is subjective and depends on the viewer's point of view

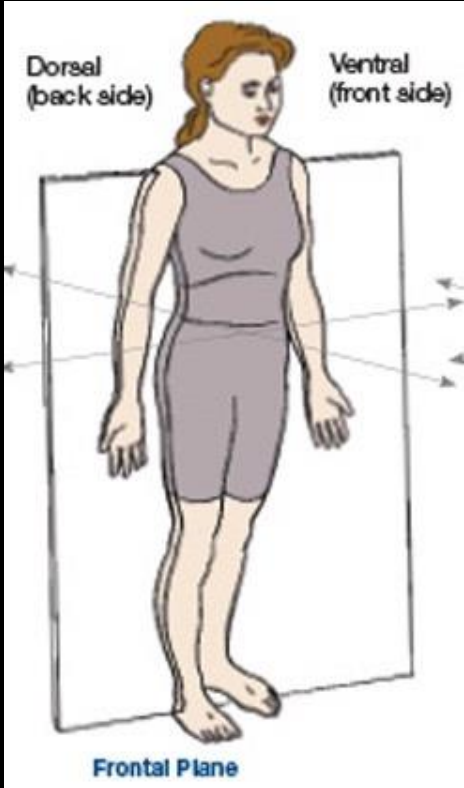
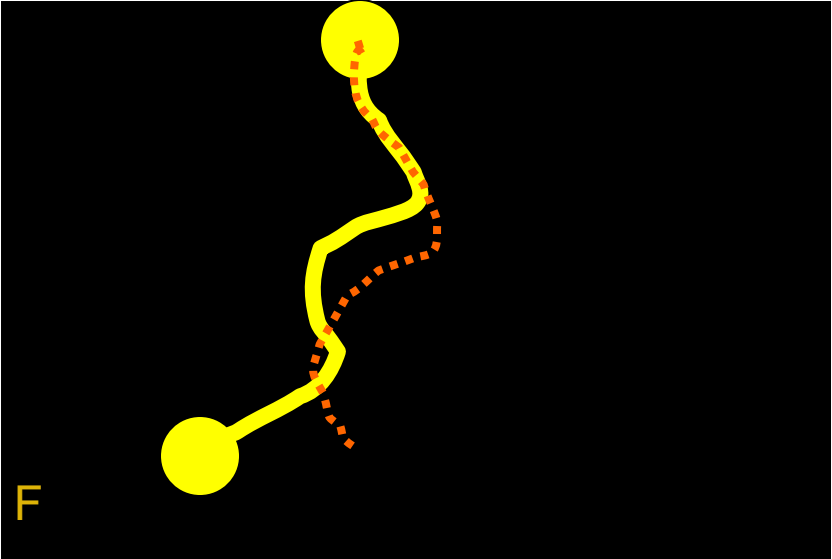
Trajectory of the object



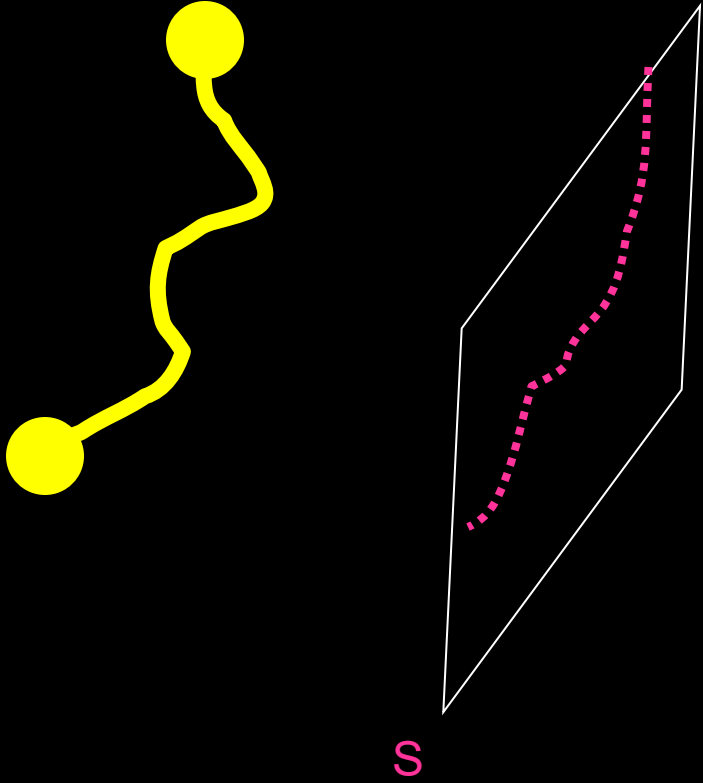
# Transverse or Horizontal plane

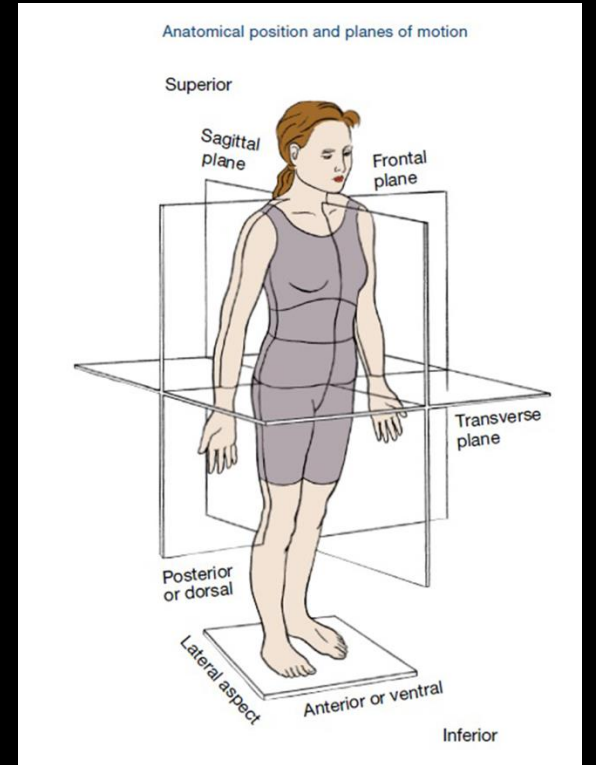
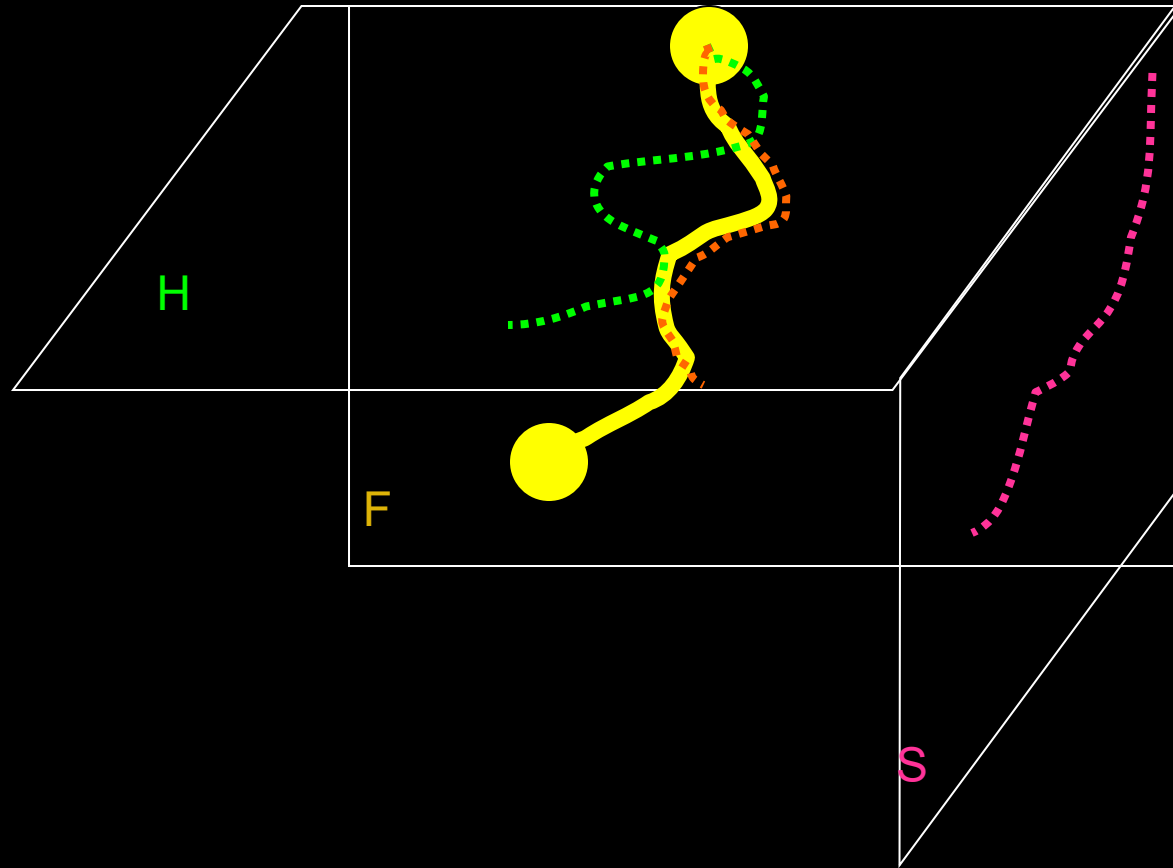


# Coronal or Frontal plane

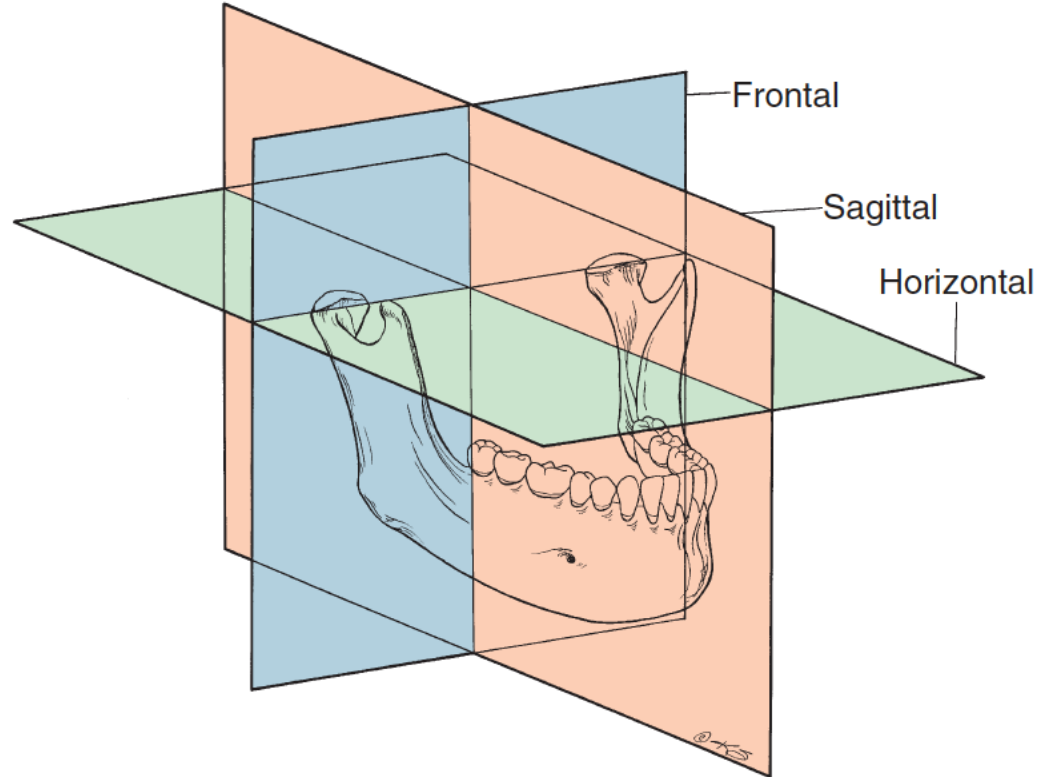


# Sagittal plane



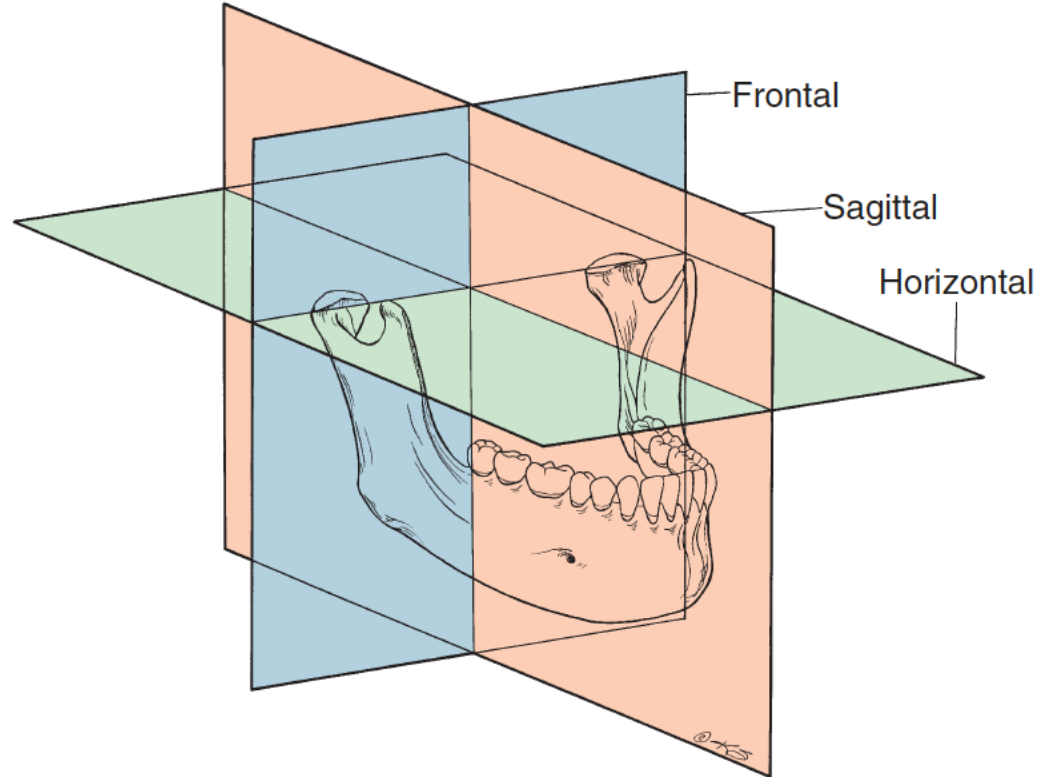


# MANDIBULAR BORDER MOVEMENTS



- Maximum extension of the mandibular motion
- Reference points

# MANDIBULAR BORDER MOVEMENTS



## **Sagittal plane:**

- Protrusion and Opening

## **Horizontal plane:**

- Laterotrusion

## **Frontal plane:**

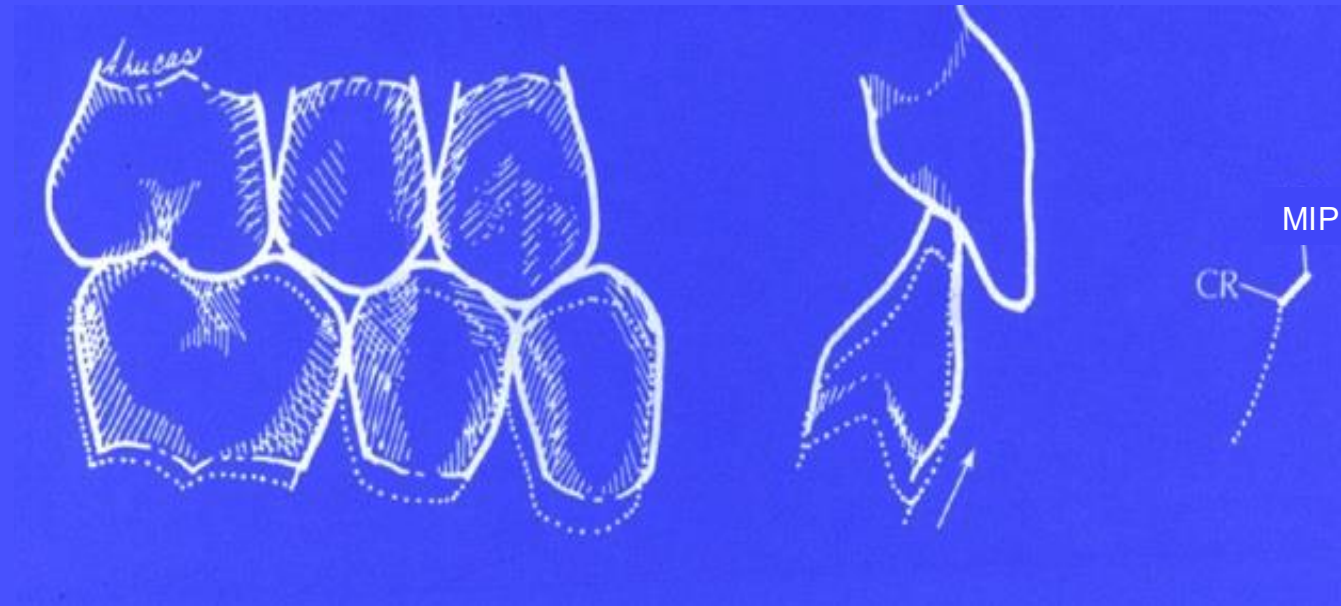
- Lateral and Opening

## SAGITTAL PLANE

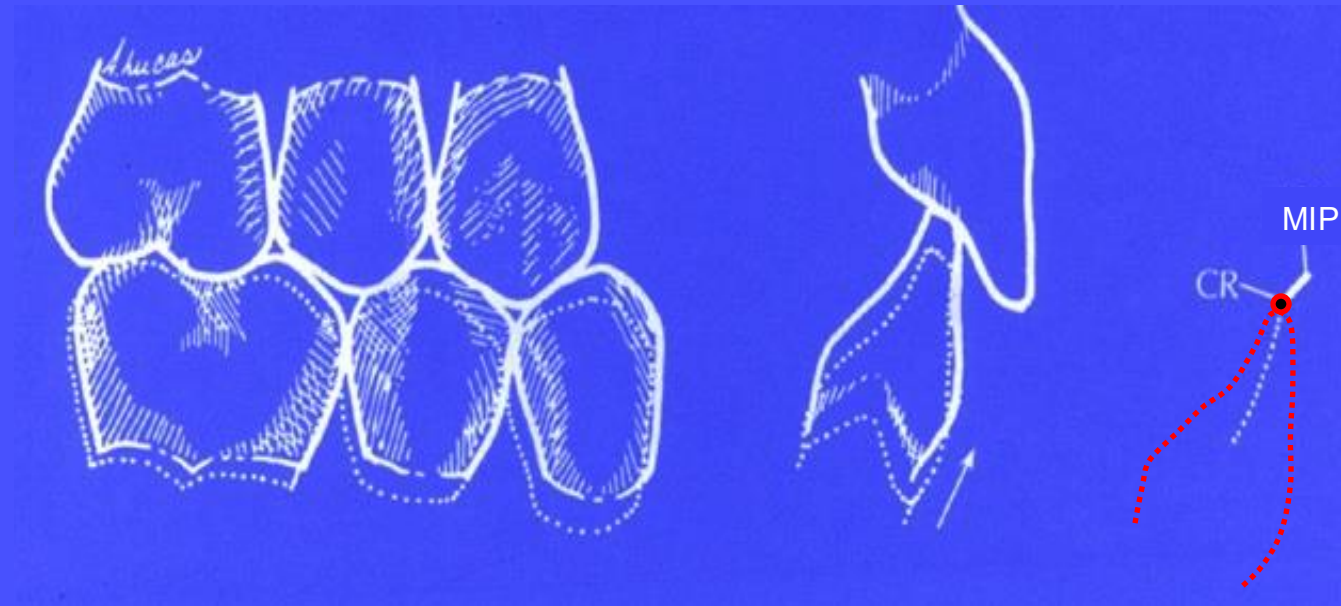


Centric Relation: a maxillomandibular relationship independent of tooth contact, the condyles articulate in the anterior-superior position against the posterior slopes of the articular eminences.

## SAGITTAL PLANE



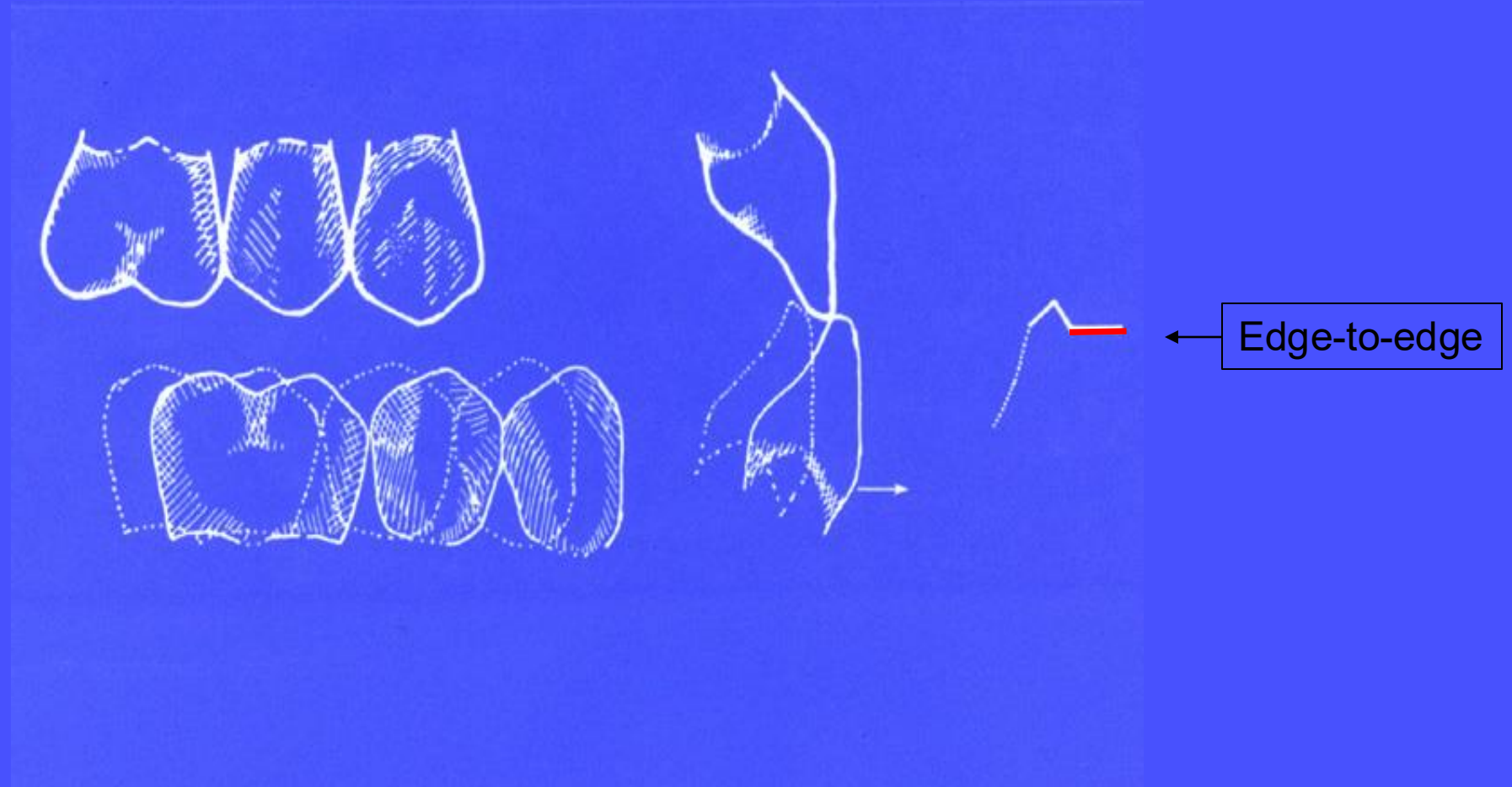
## SAGITTAL PLANE



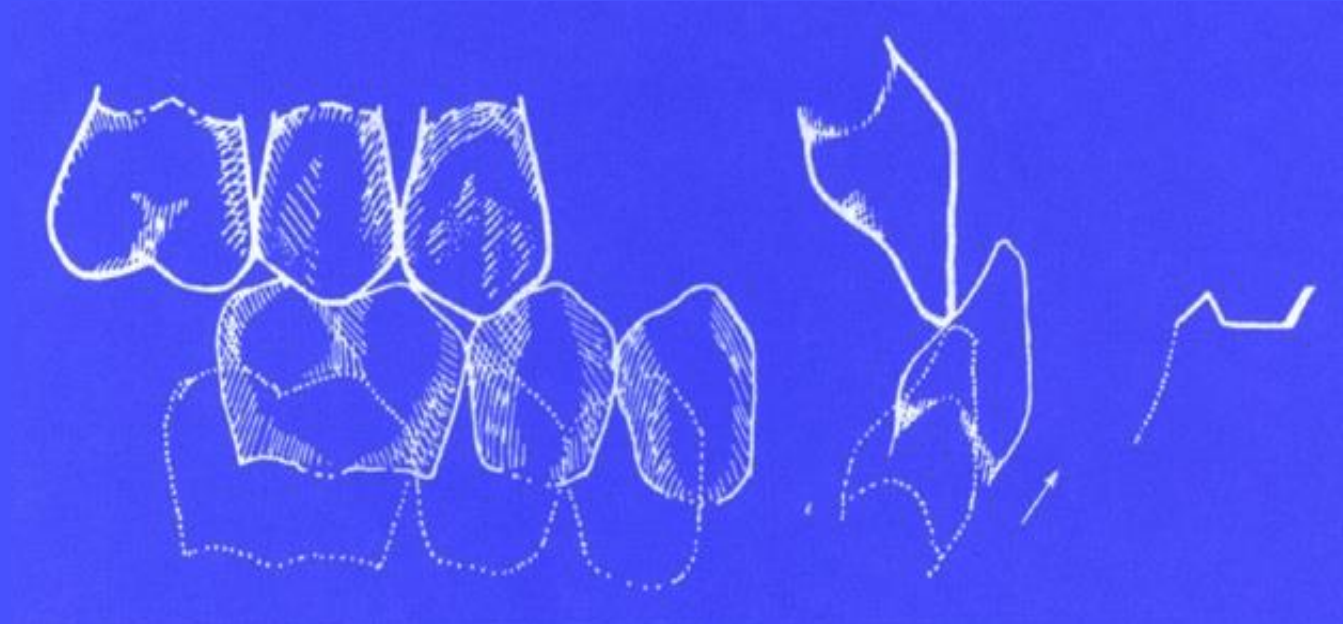
## SAGITTAL PLANE



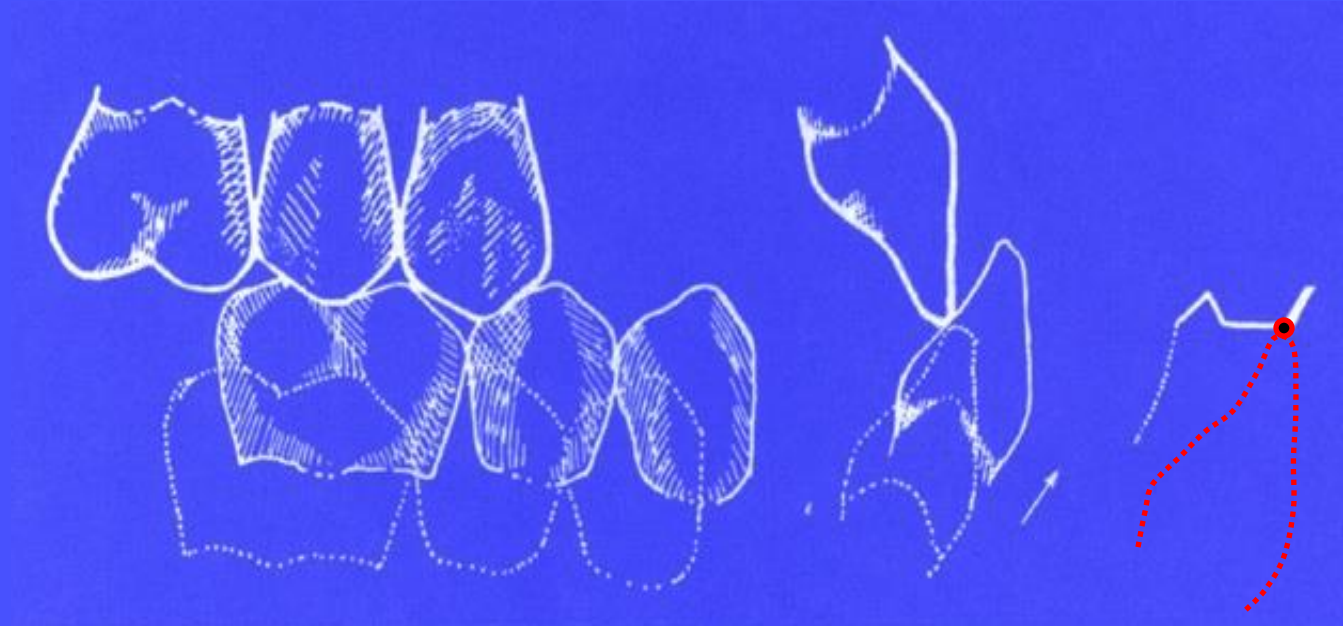
## SAGITTAL PLANE



## SAGITTAL PLANE

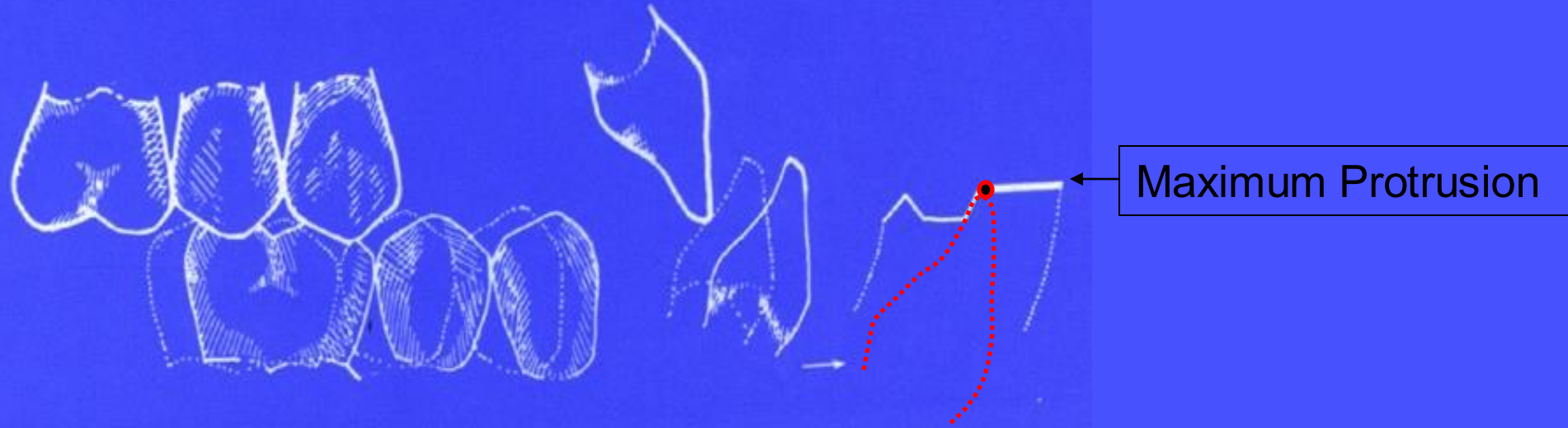


## SAGITTAL PLANE



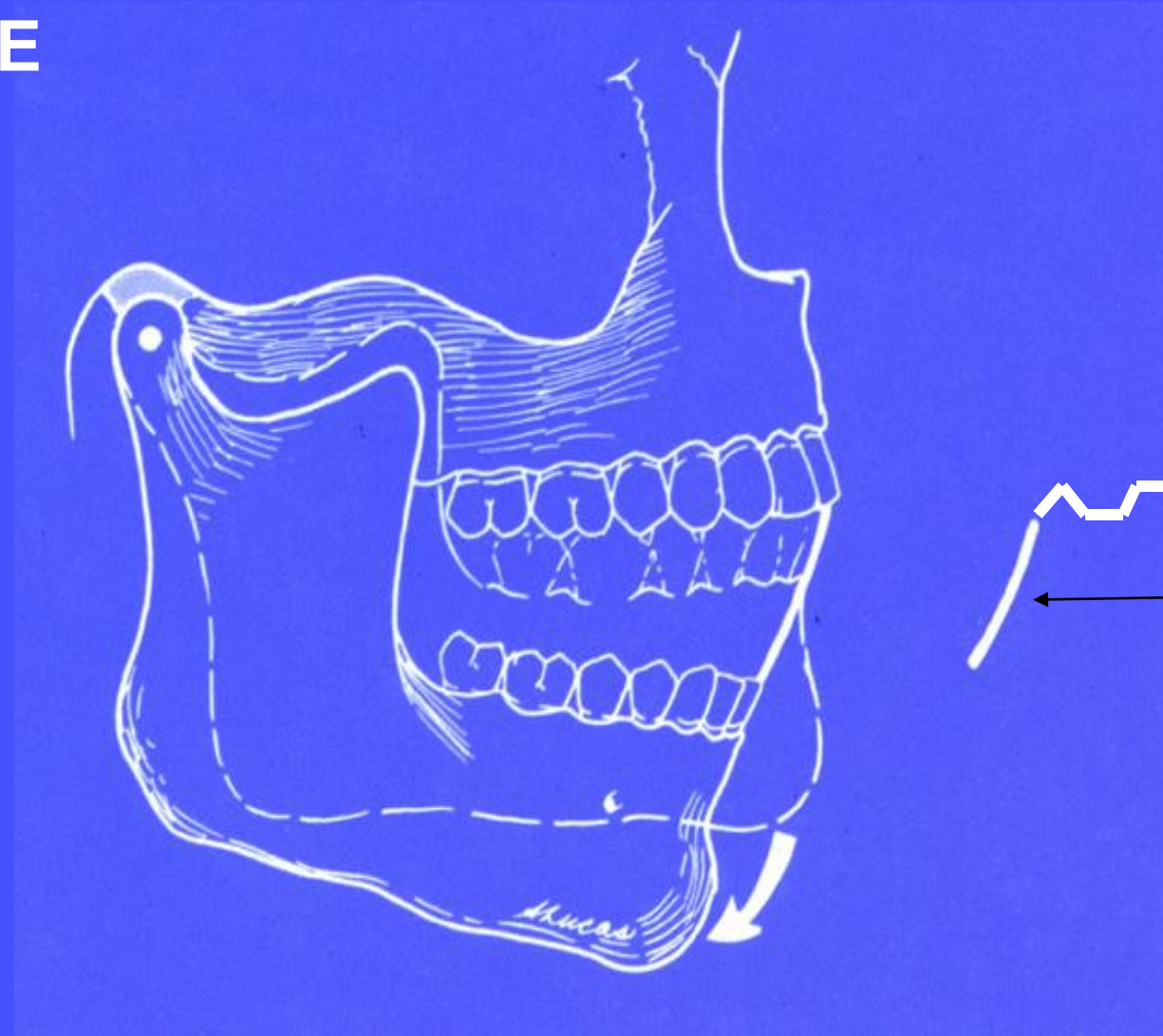
## SAGITTAL PLANE

Superior Contact  
Border  
Movements



## SAGITTAL PLANE

### Posterior Opening Border Movements



#### 1<sup>st</sup> Stage:

- Pure rotation of condyle
- Terminal hinge axis
- Up to 2 cm of opening

# MANDIBULAR BORDER MOVEMENTS



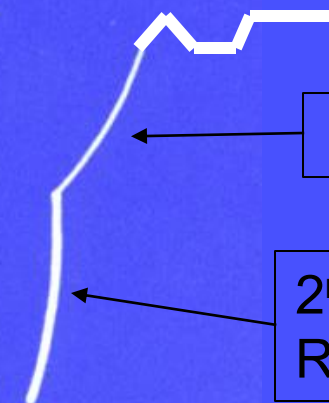
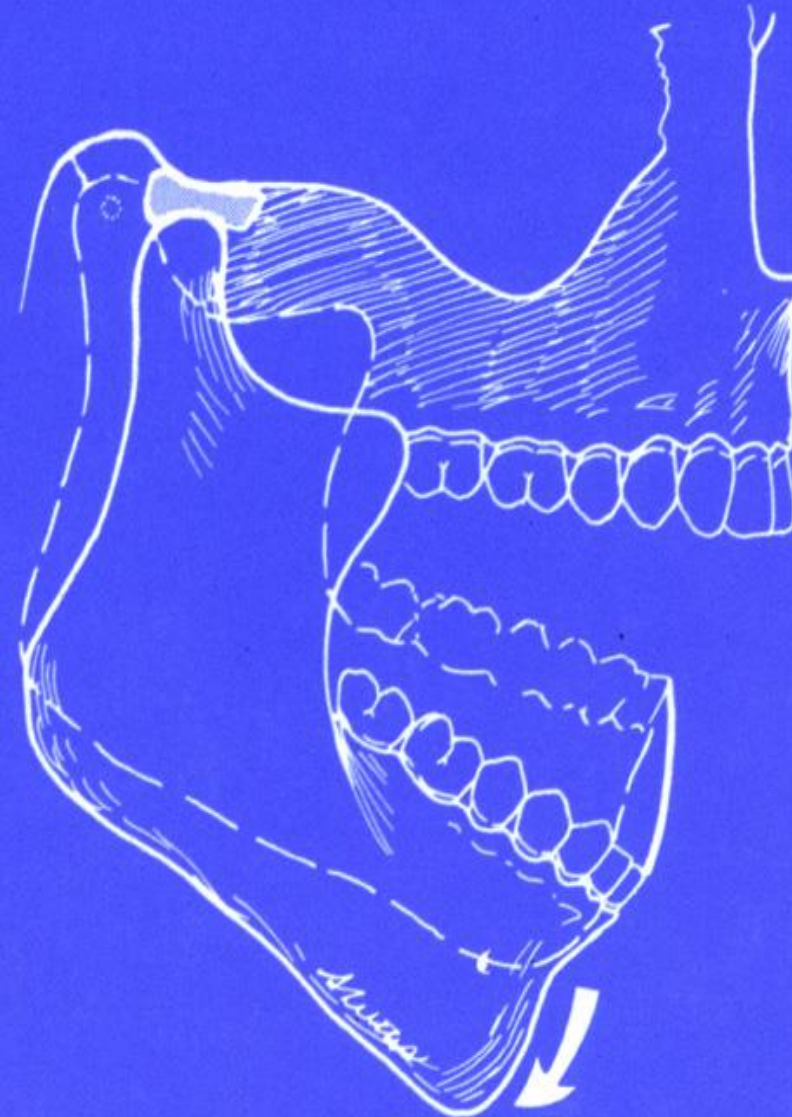
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## SAGITTAL PLANE

### Posterior Opening Border Movements



1<sup>st</sup> Stage

2<sup>nd</sup> Stage  
Rotation + Translation

Maximum Opening

# MANDIBULAR BORDER MOVEMENTS



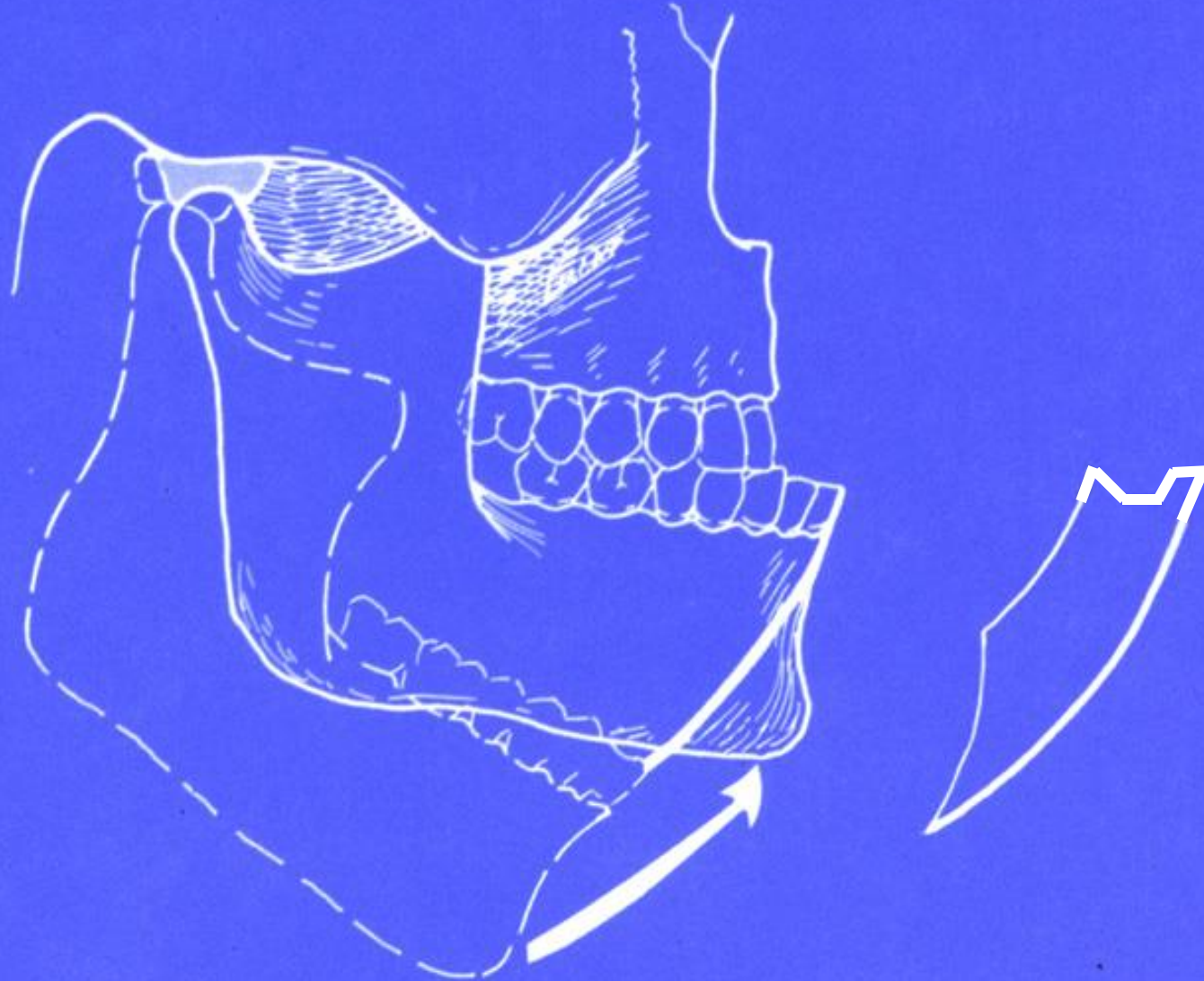
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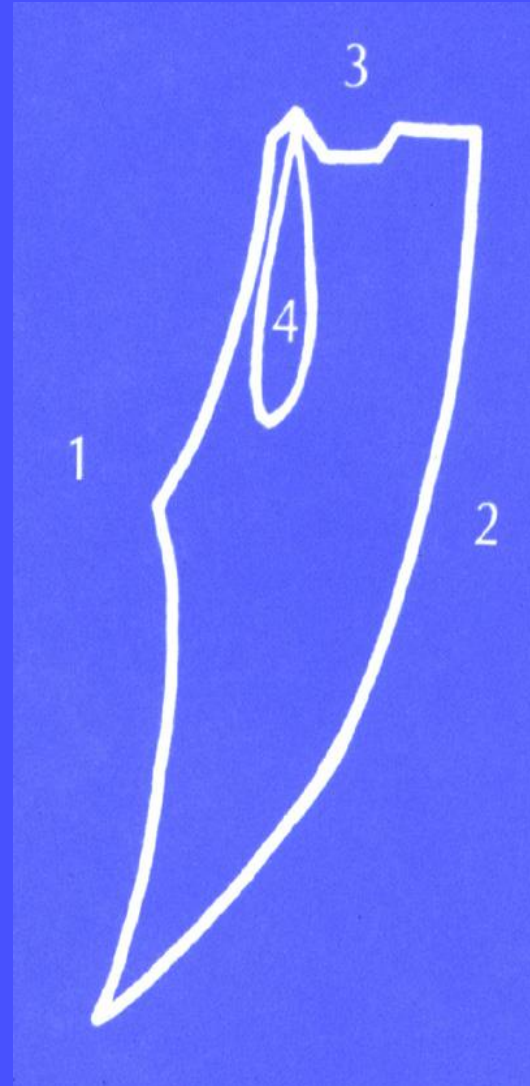
## SAGITTAL PLANE

### Anterior Opening Border Movements



## SAGITTAL PLANE

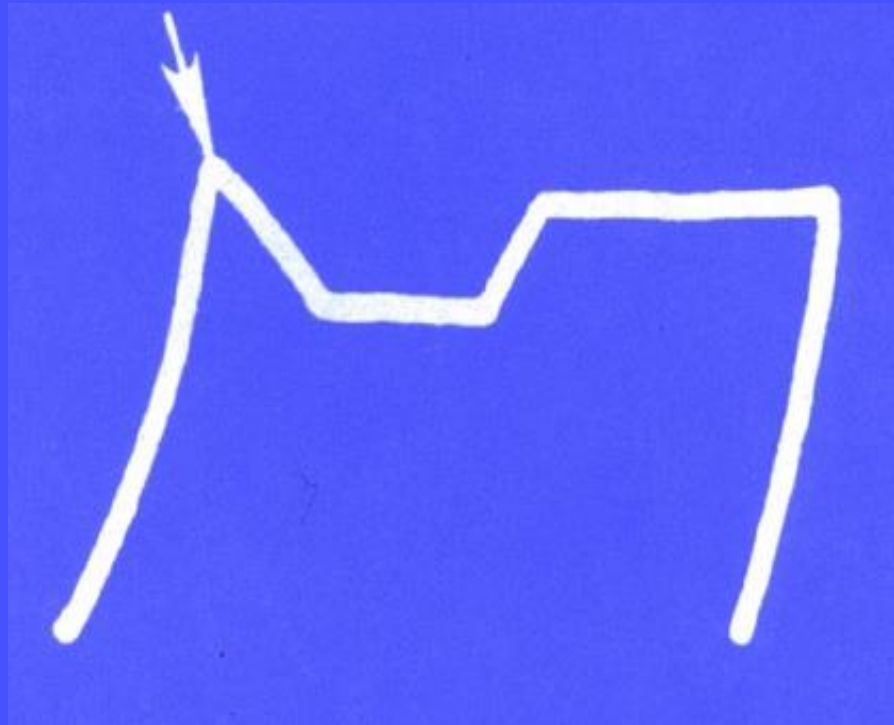
1. Posterior Opening Border
2. Anterior Opening Border
3. Superior Contact Border
4. Typical Functional movements -  
chewing  
(not part of the border movements)



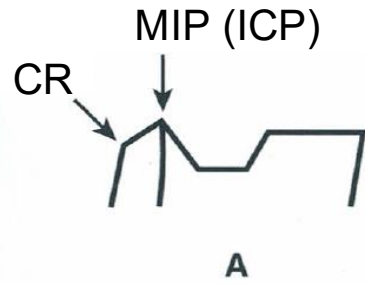
# MANDIBULAR BORDER MOVEMENTS

## SAGITTAL PLANE

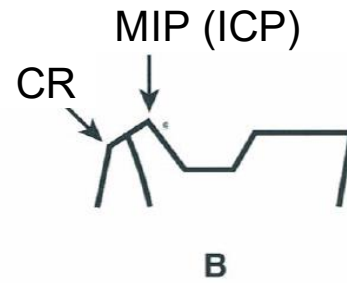
CO = MIP



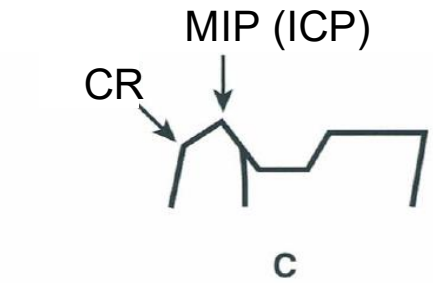
# MANDIBULAR BORDER MOVEMENTS



Head upright  
Position



Head tilted  
backward 45°



Head tilted  
Forward 30°

# MANDIBULAR BORDER MOVEMENTS

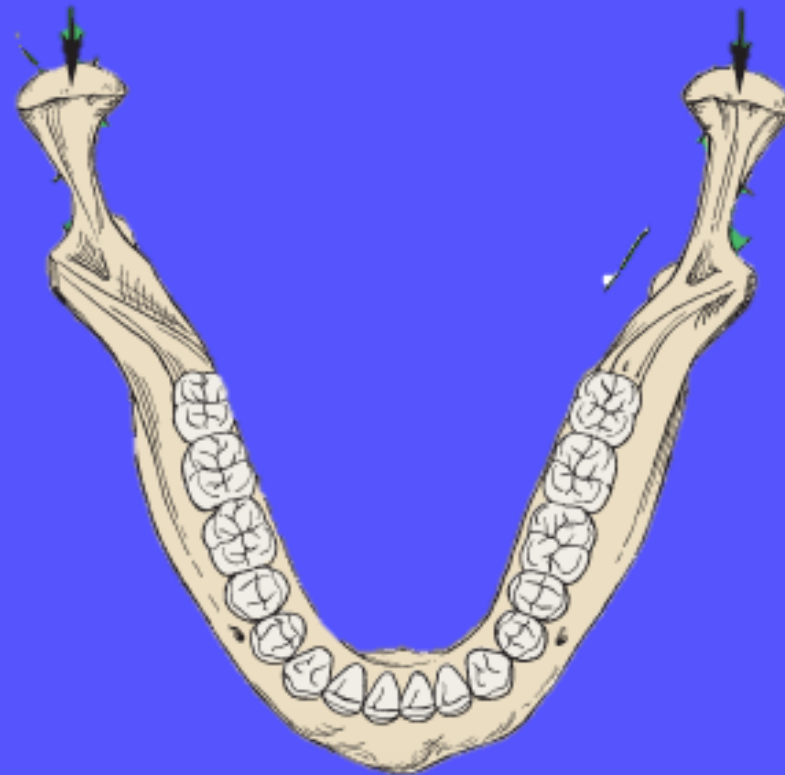


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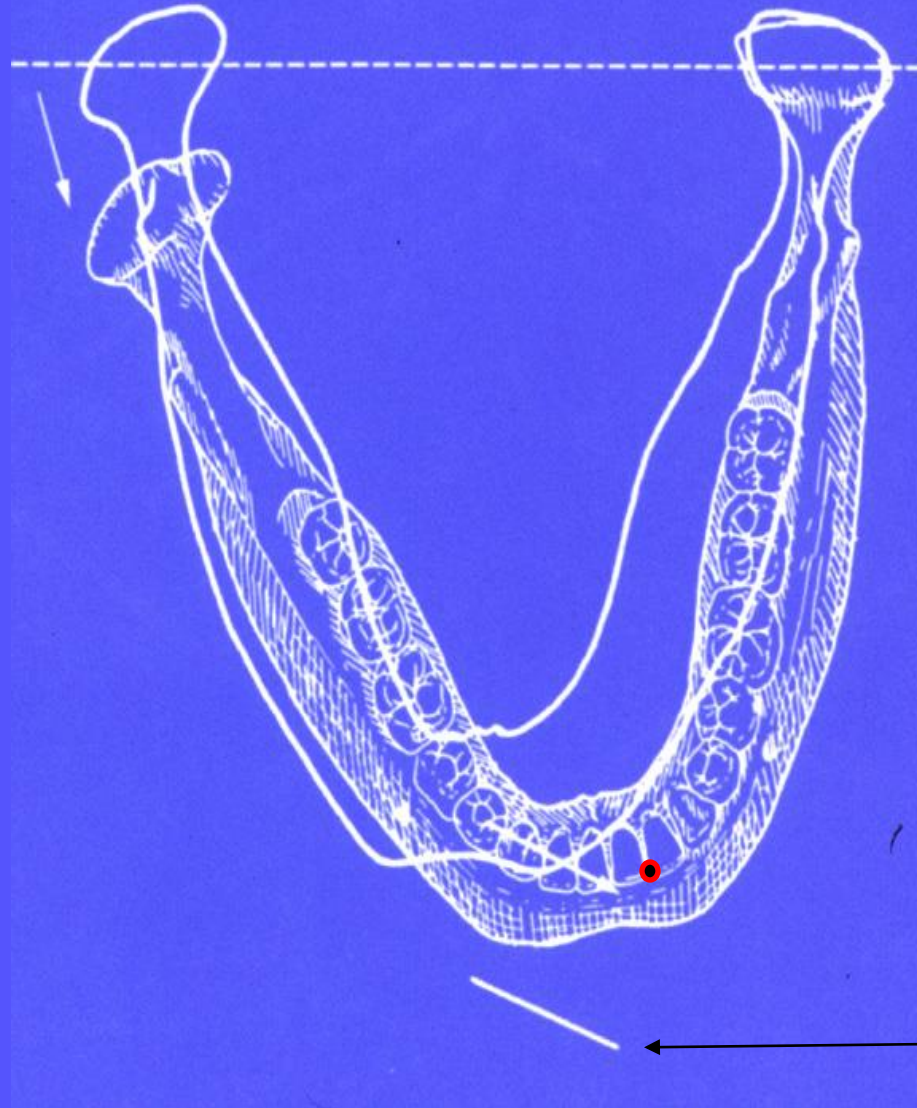
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## HORIZONTAL PLANE



# MANDIBULAR BORDER MOVEMENTS

## HORIZONTAL PLANE



Maximum  
laterotrusion left

# MANDIBULAR BORDER MOVEMENTS

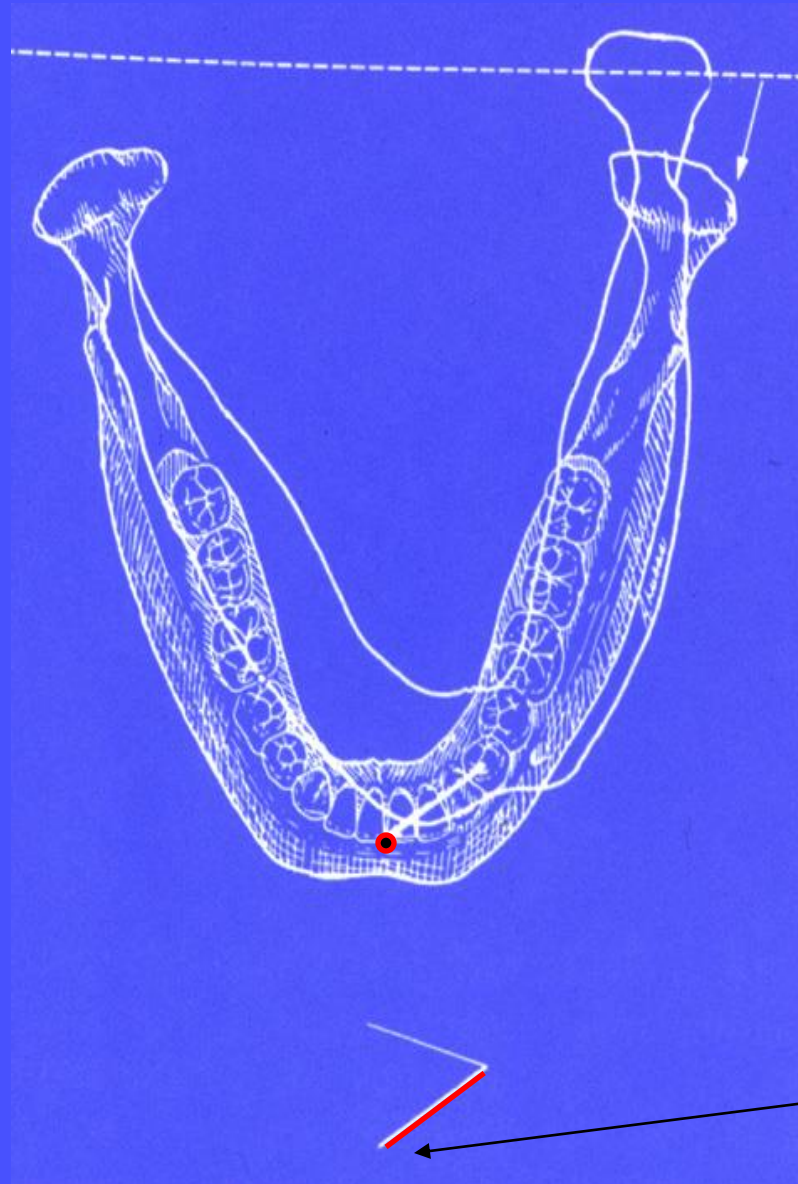


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## HORIZONTAL PLANE



Maximum protrusion

# MANDIBULAR BORDER MOVEMENTS

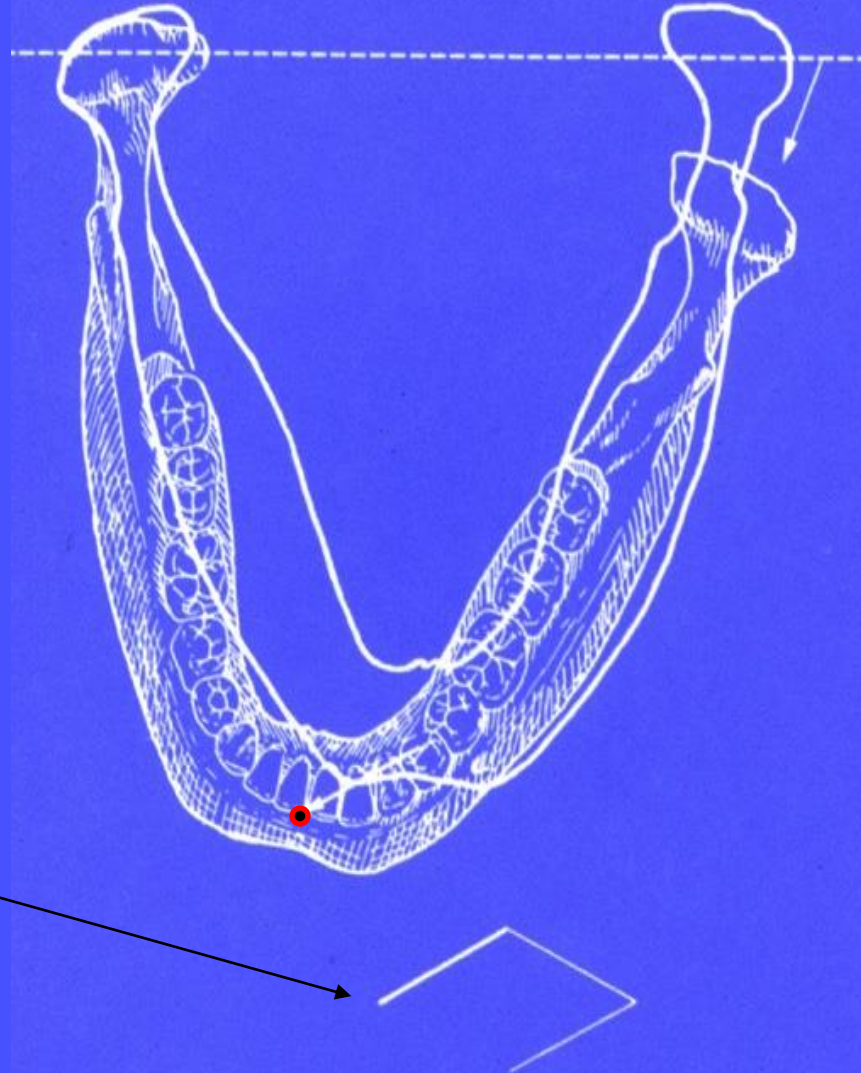


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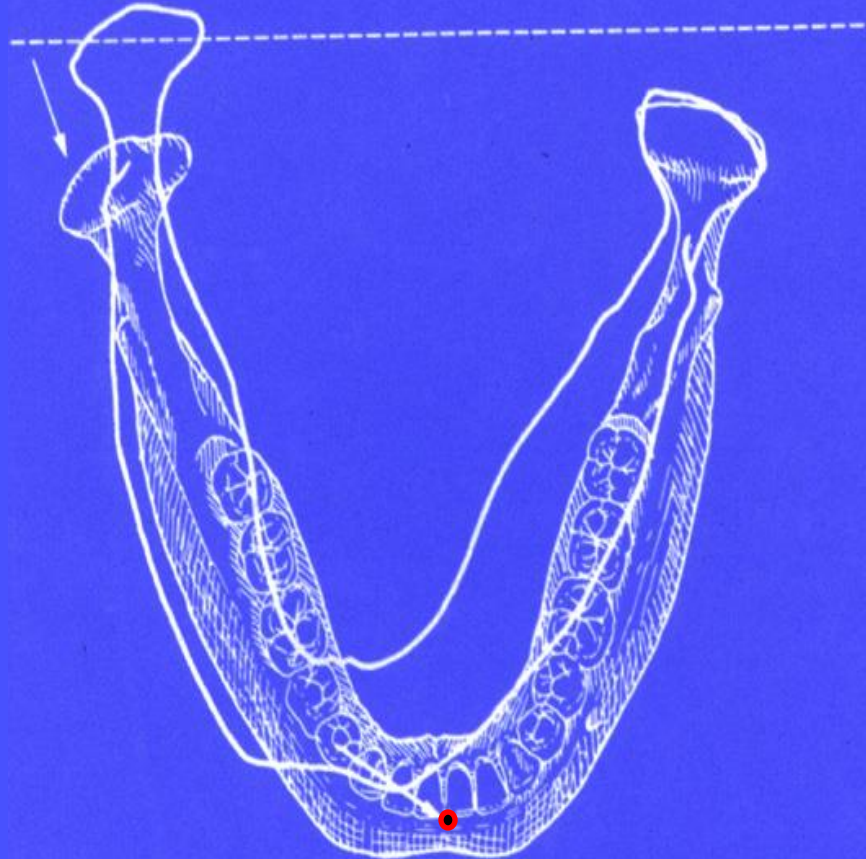
## HORIZONTAL PLANE



Maximum  
laterotrusion right

# MANDIBULAR BORDER MOVEMENTS

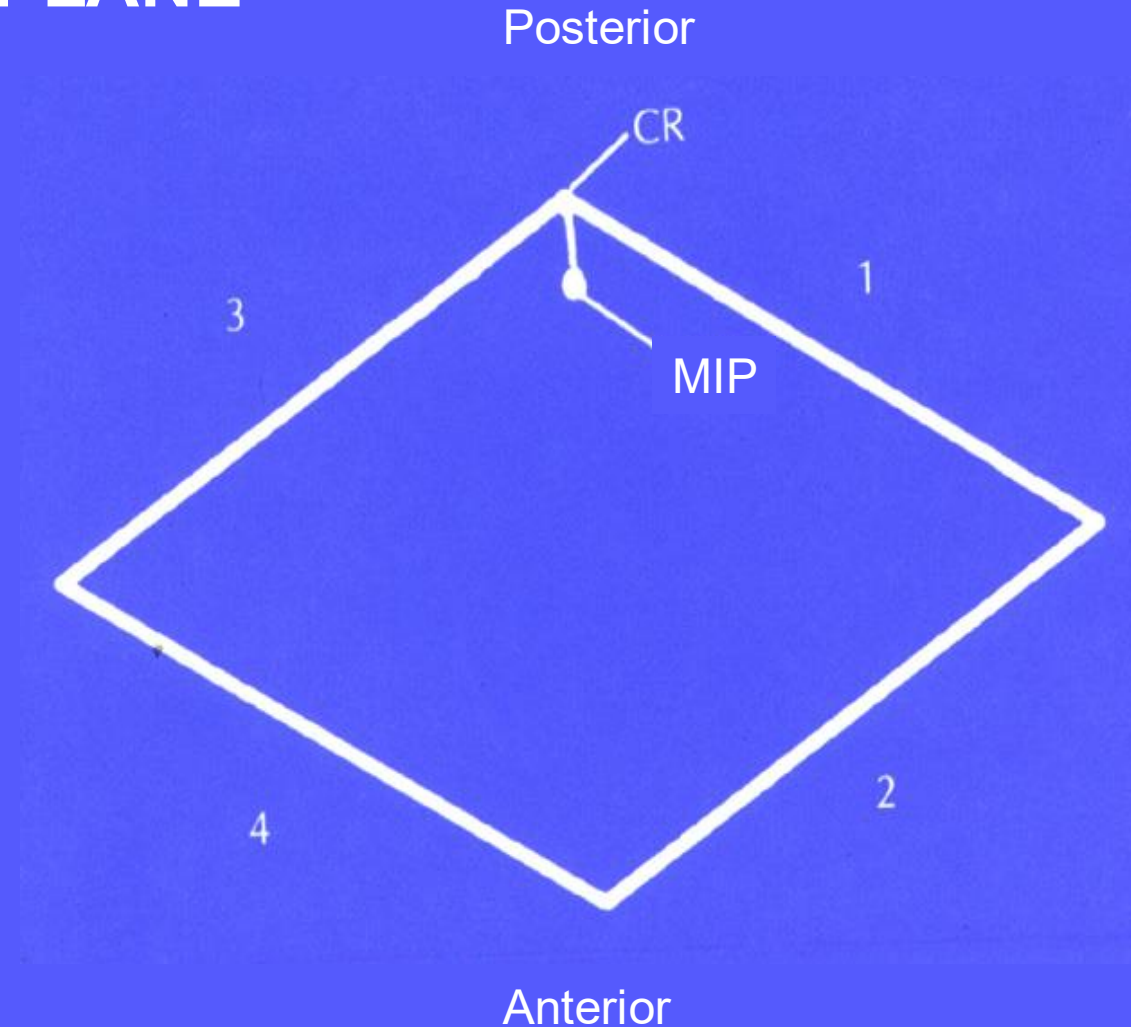
## HORIZONTAL PLANE



Maximum protrusion

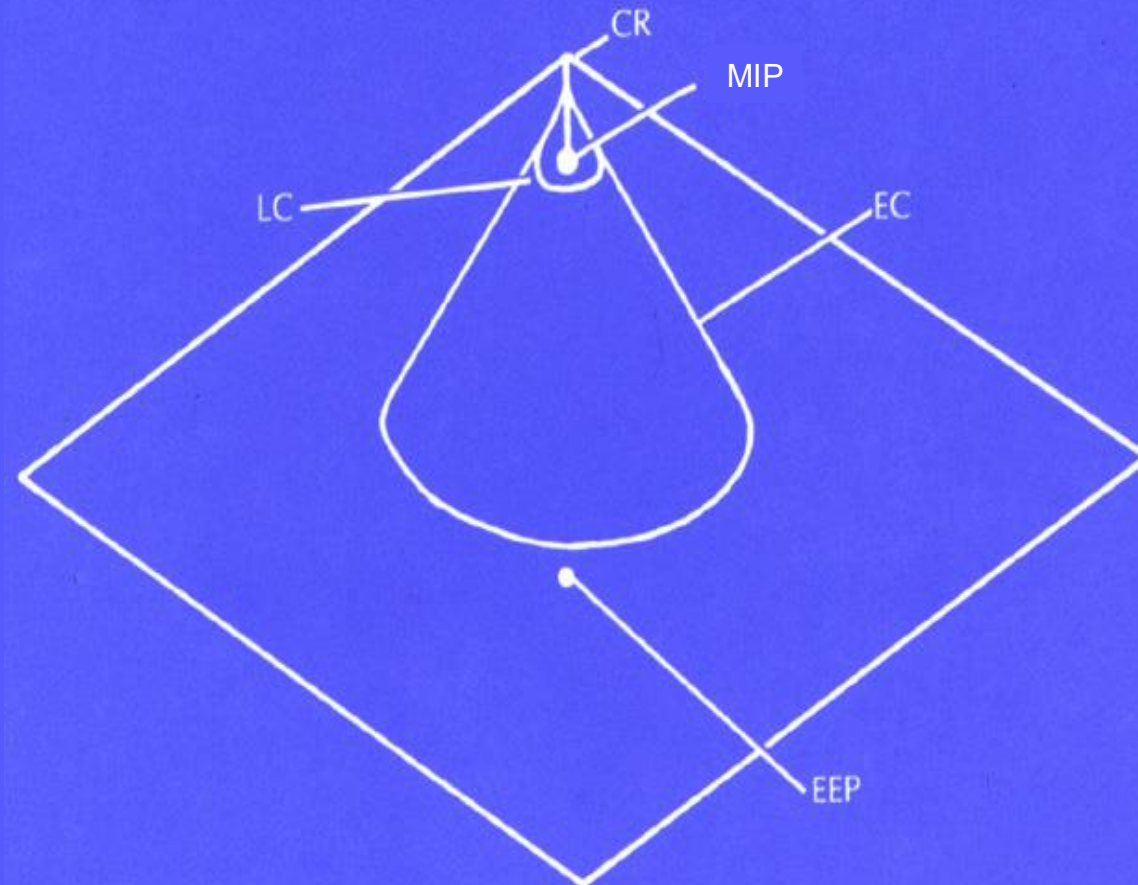
## HORIZONTAL PLANE

3. Lateral to the right
4. Lateral to the right followed by protrusion



1. Lateral to the left
2. Lateral to the left followed by protrusion

## HORIZONTAL PLANE



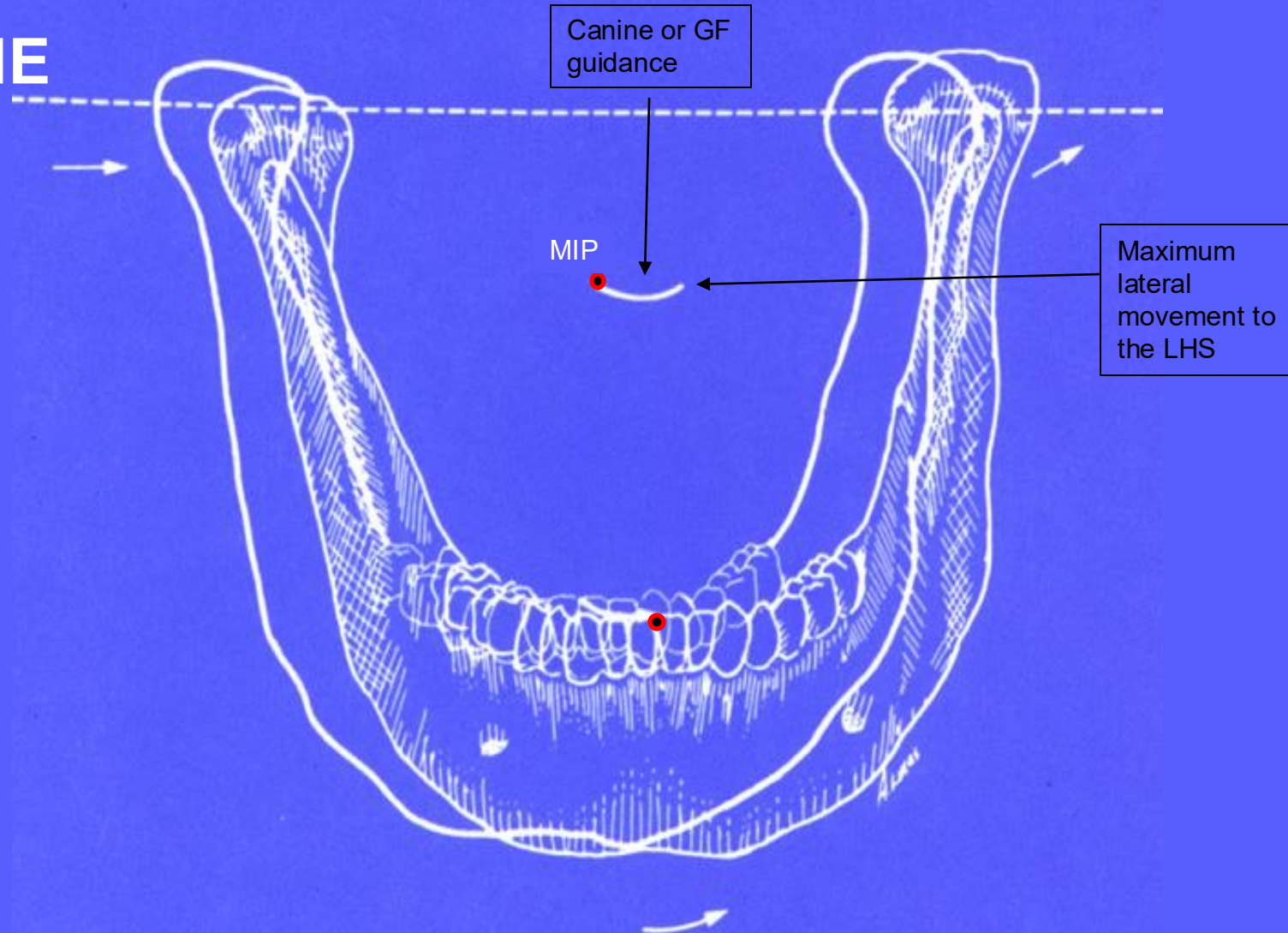
EC = Early chewing movements

LC = Late chewing movements

EEP = Edge-to-edge position

# MANDIBULAR BORDER MOVEMENTS

## FRONTAL PLANE



# MANDIBULAR BORDER MOVEMENTS

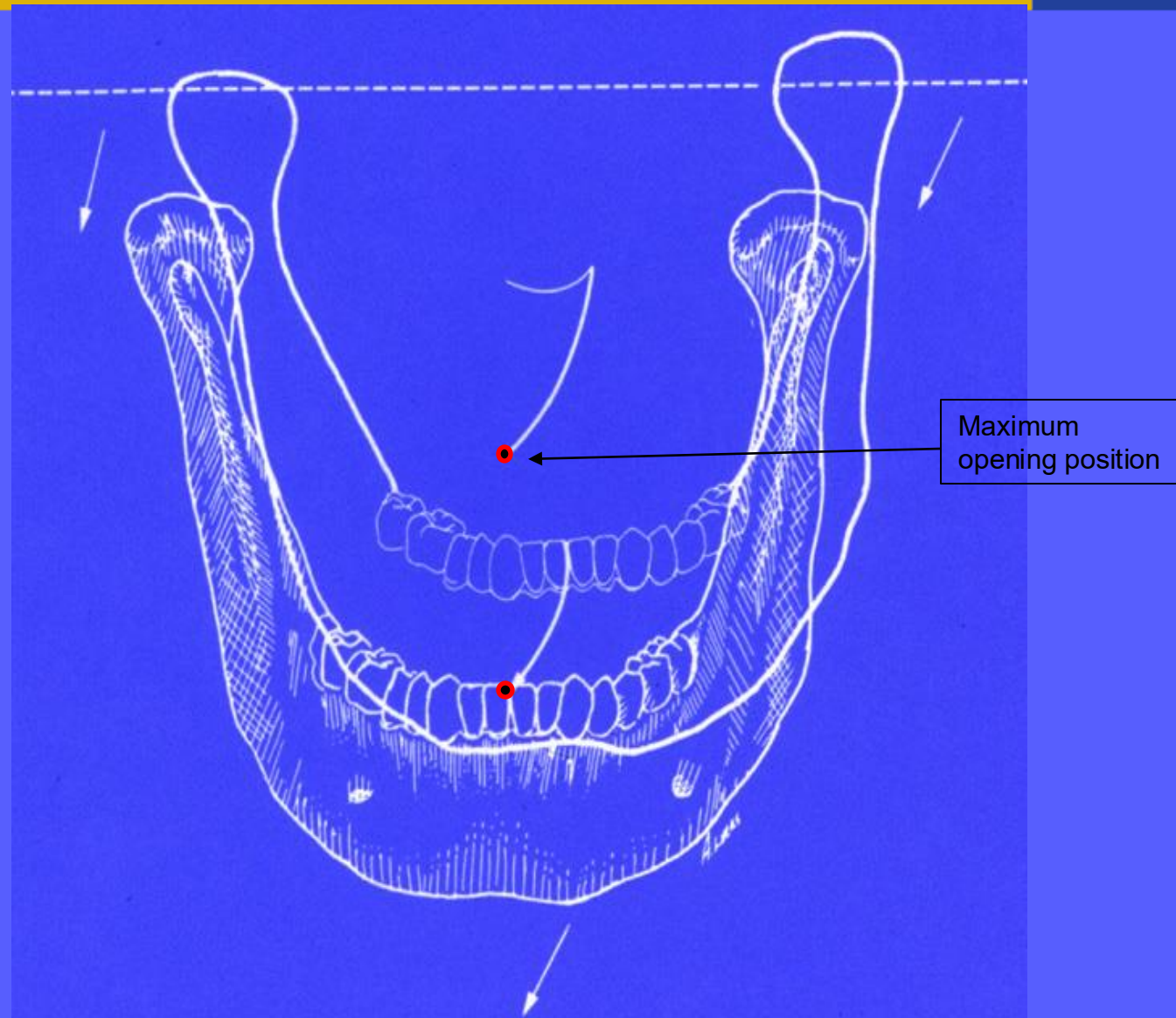


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## FRONTAL PLANE



# MANDIBULAR BORDER MOVEMENTS

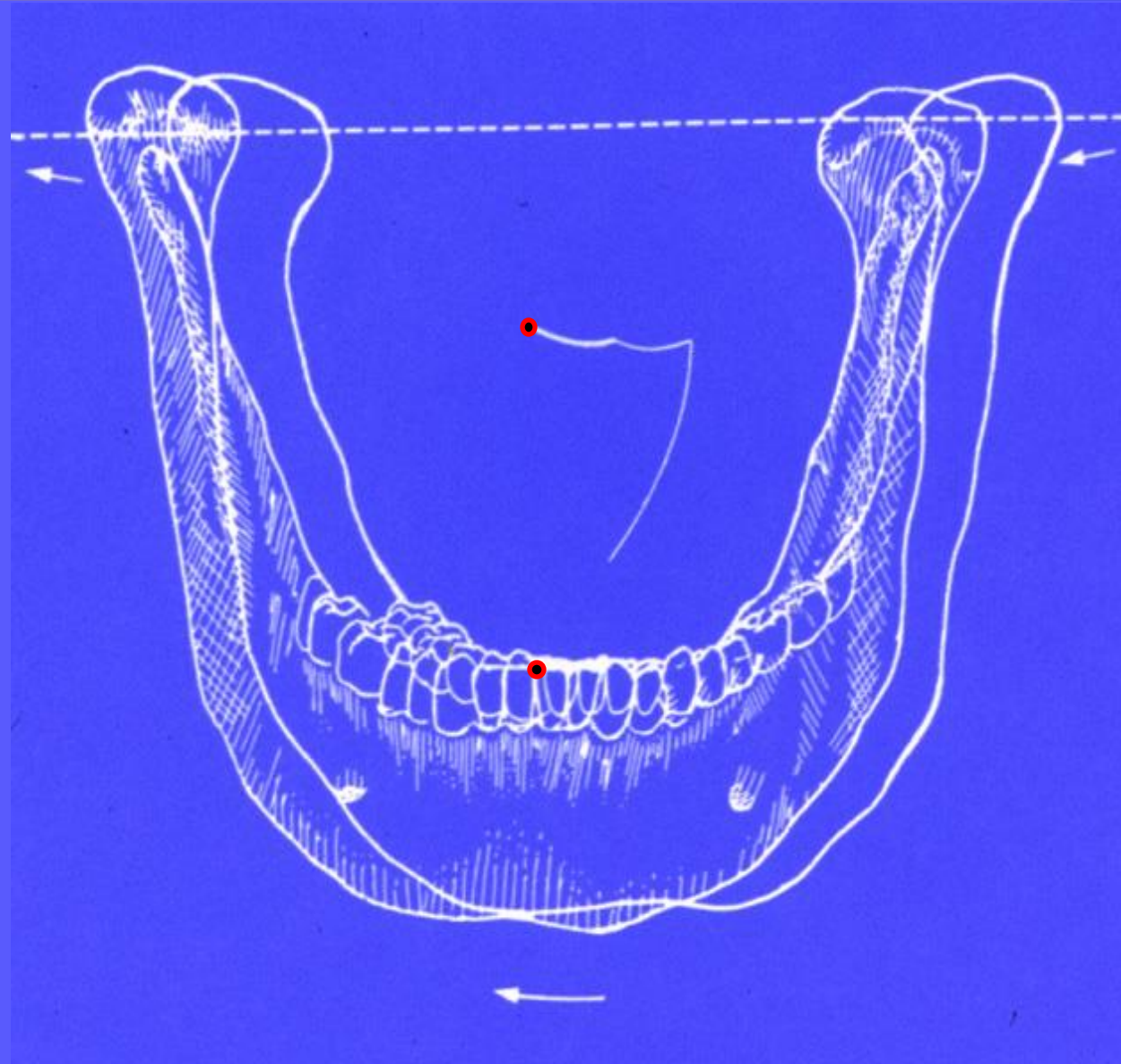


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**FRONTAL PLANE**



# MANDIBULAR BORDER MOVEMENTS

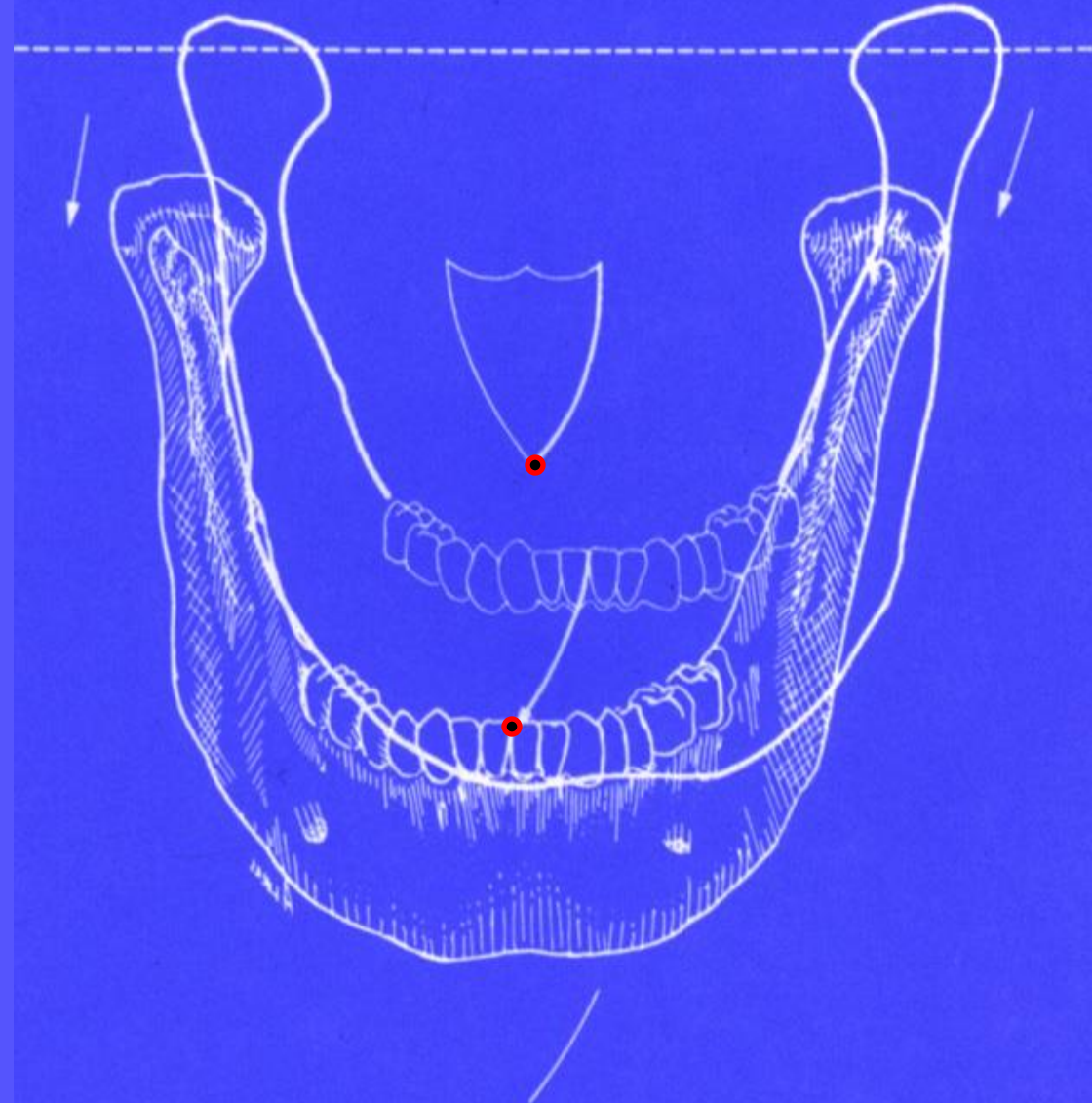


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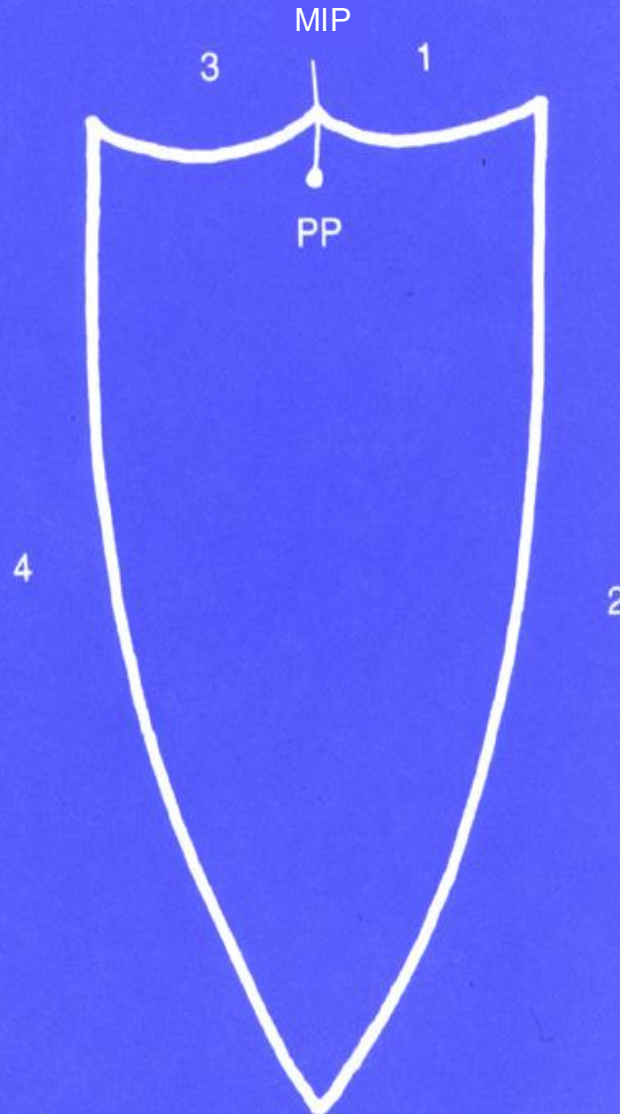
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## FRONTAL PLANE



## FRONTAL PLANE

- 3. Superior lateral to the right
- 4. Opening lateral to the right



- 1. Superior lateral to the left
- 2. Opening lateral to the left

PP = Postural position

# MANDIBULAR BORDER MOVEMENTS

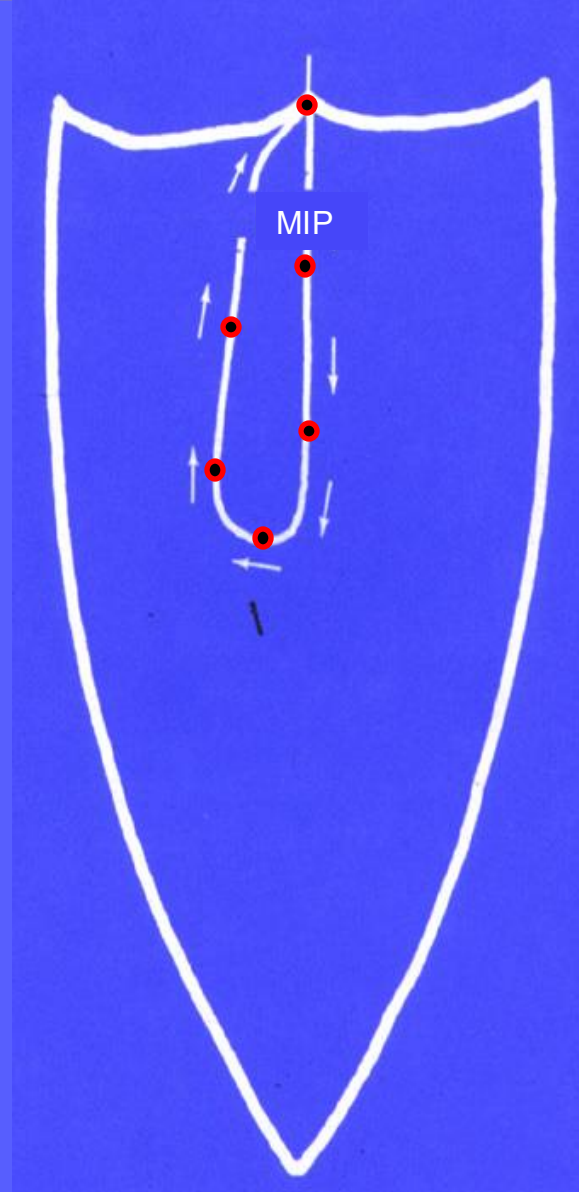


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## FRONTAL PLANE

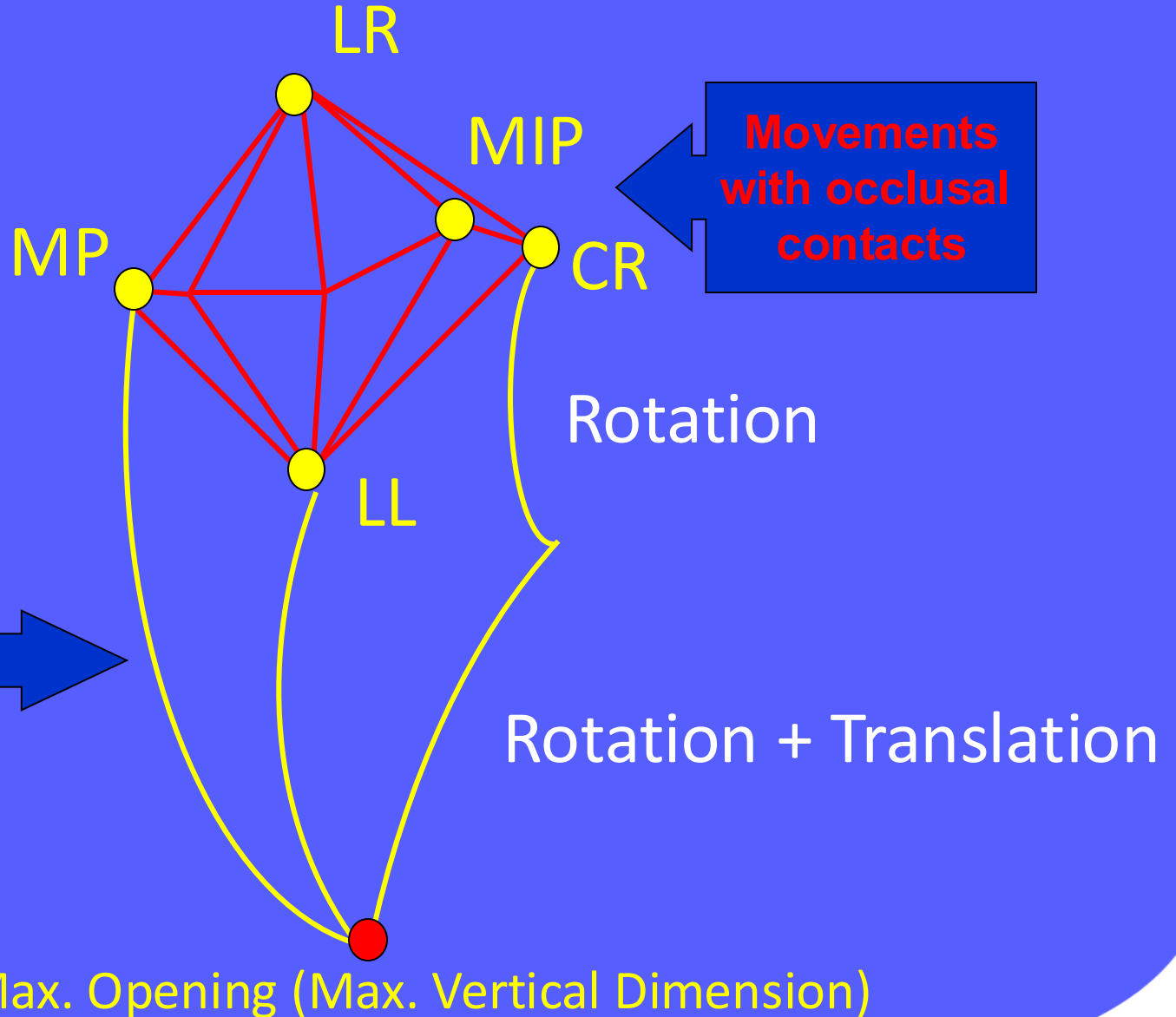


# MANDIBULAR BORDER MOVEMENTS

## POSSELT'S ENVELOPE OF MANDIBULAR MOVEMENT



Movements  
without  
occlusal  
contacts



# MANDIBULAR BORDER MOVEMENTS

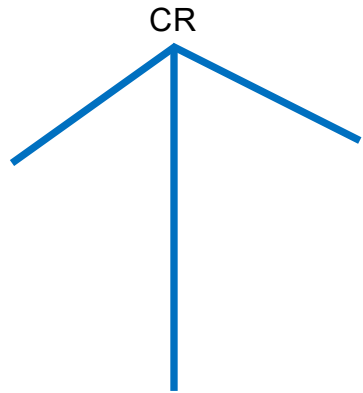


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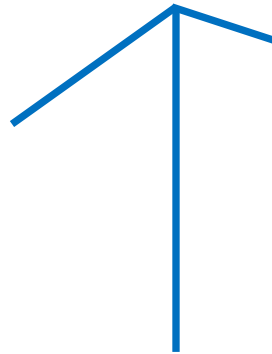


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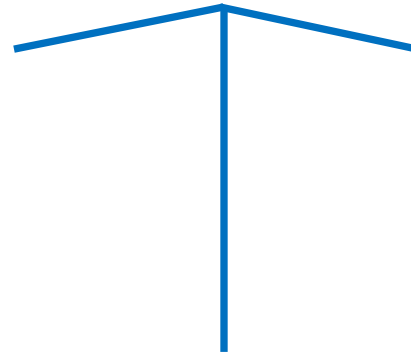
## Gothic Arch Tracing (Gysi)



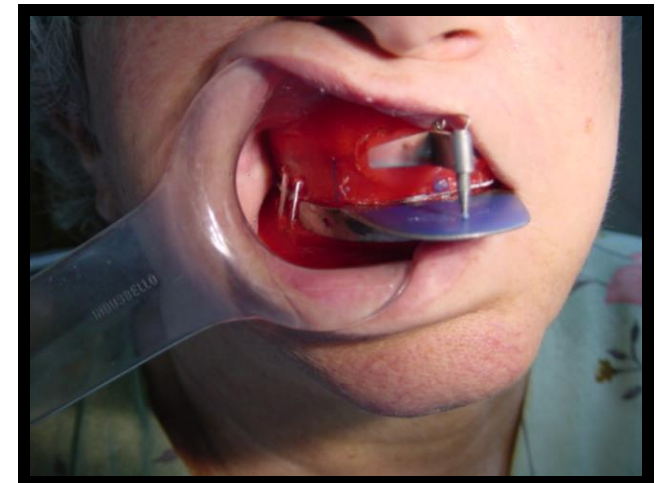
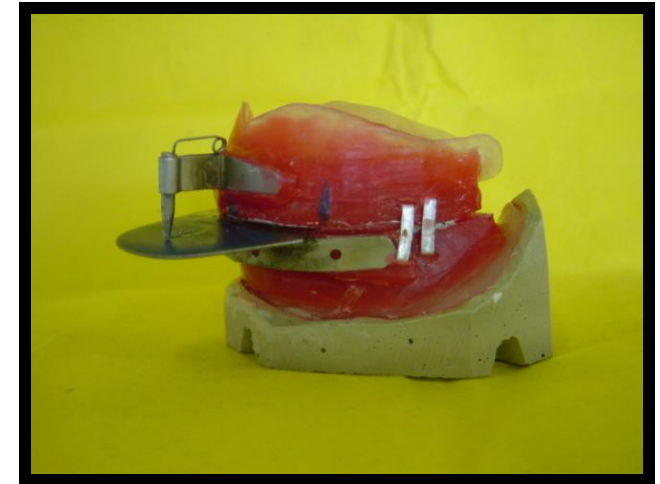
Typical



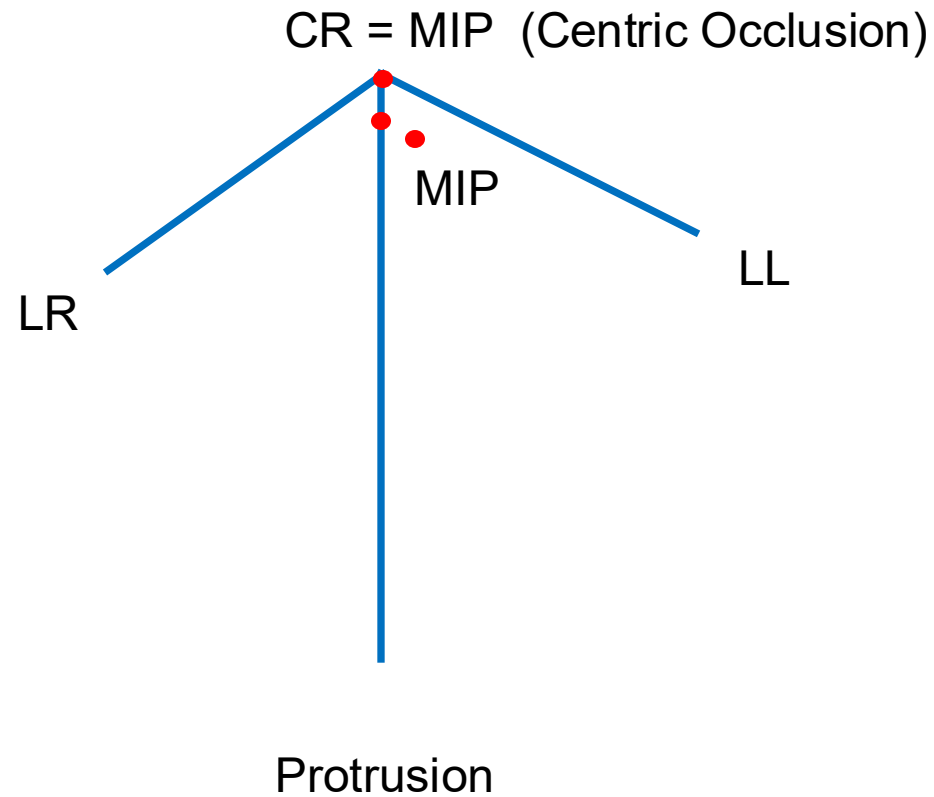
Asymmetric



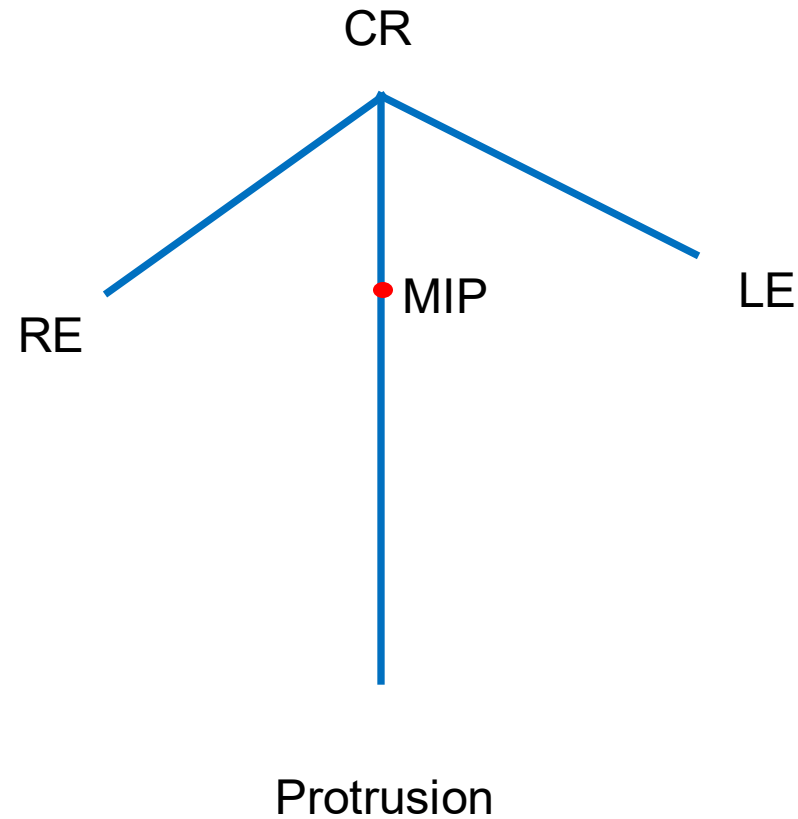
Flat



## Gothic Arch Tracing (Gysi)

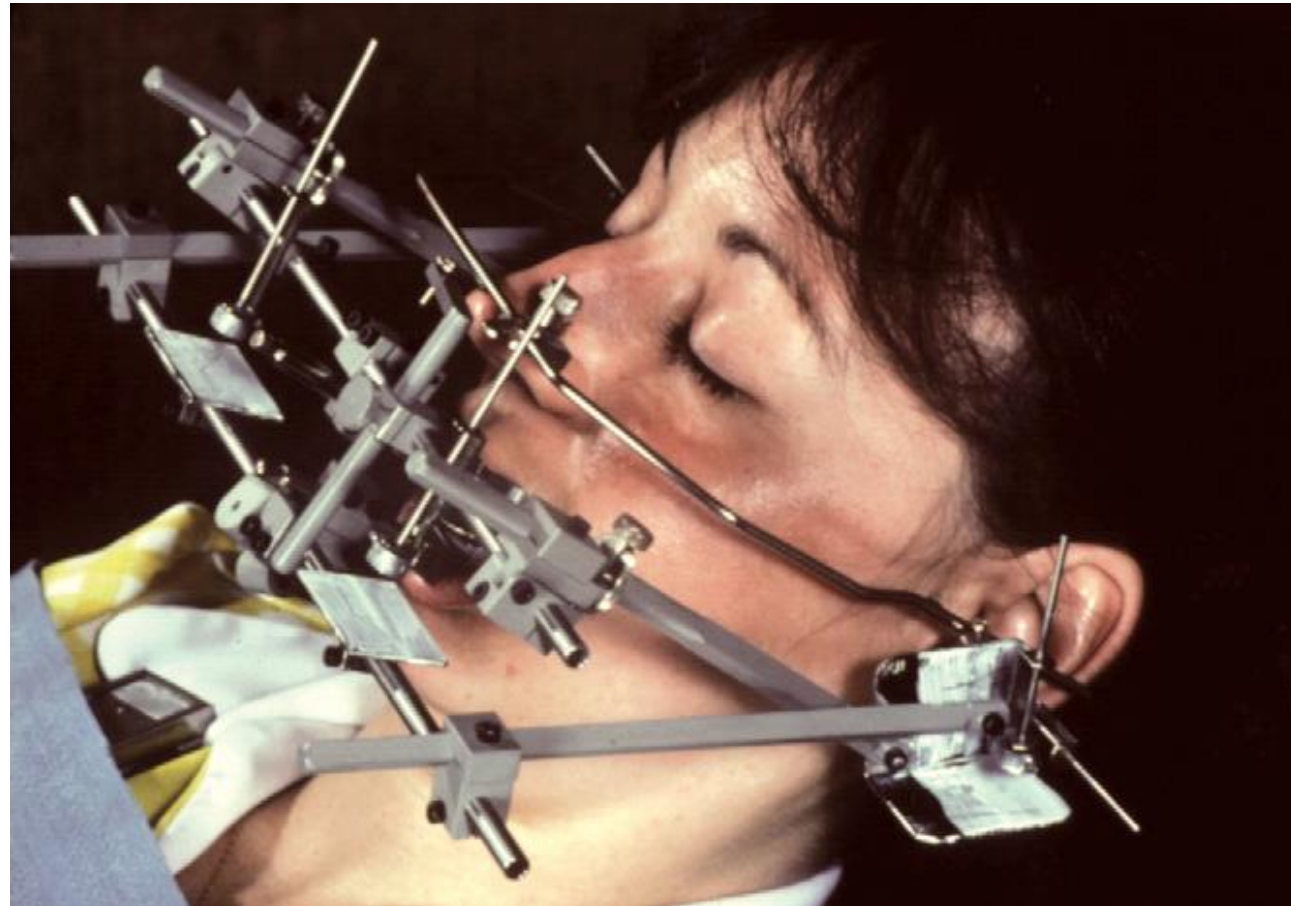


## Gothic Arch Tracing (Gysi)



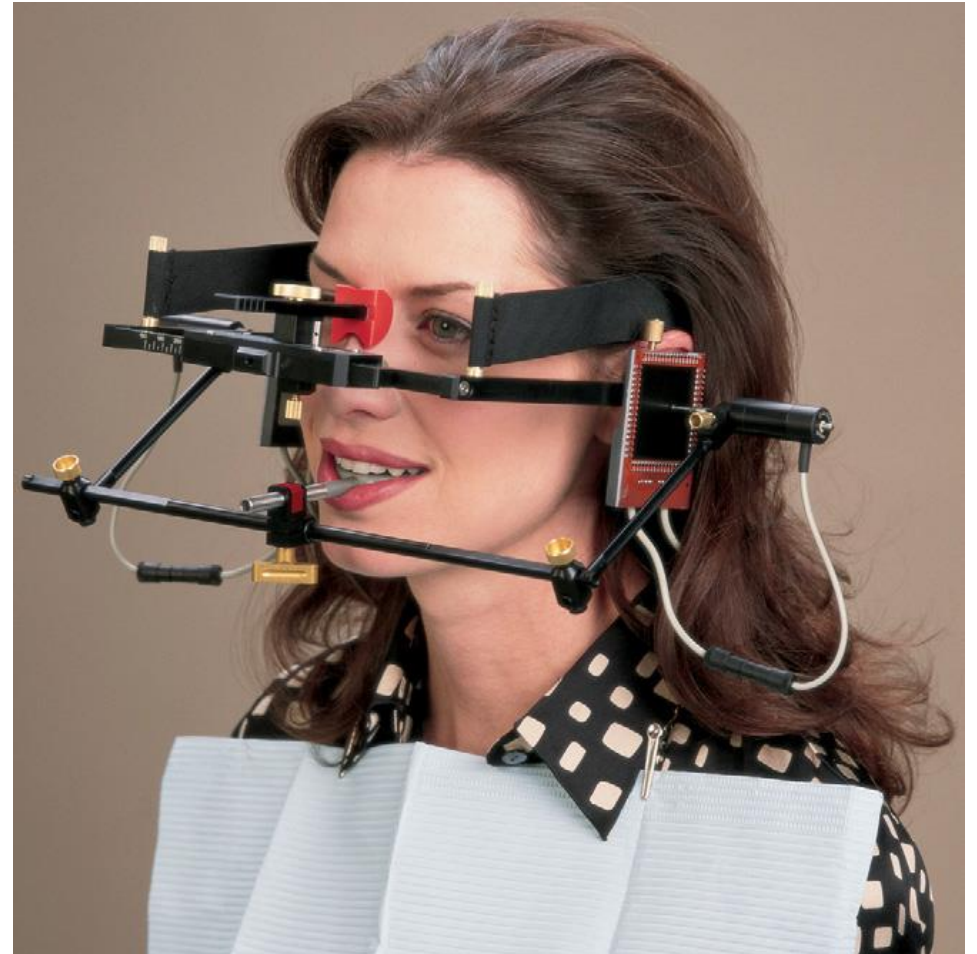
## Pantograph

- Pantographic tracing



## Digital Pantograph

- Designed to record and measure functional and border movements
- Possible to adjust digital articulators automatically



<https://www.youtube.com/watch?v=xwGjY-jOsf8>

# MANDIBULAR BORDER MOVEMENTS

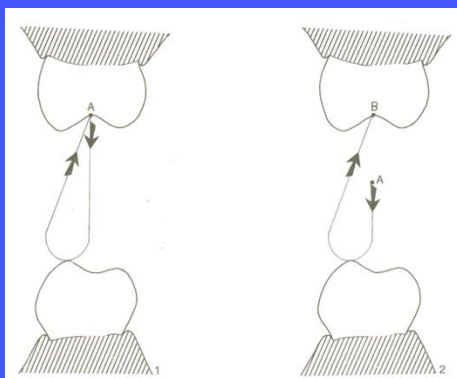
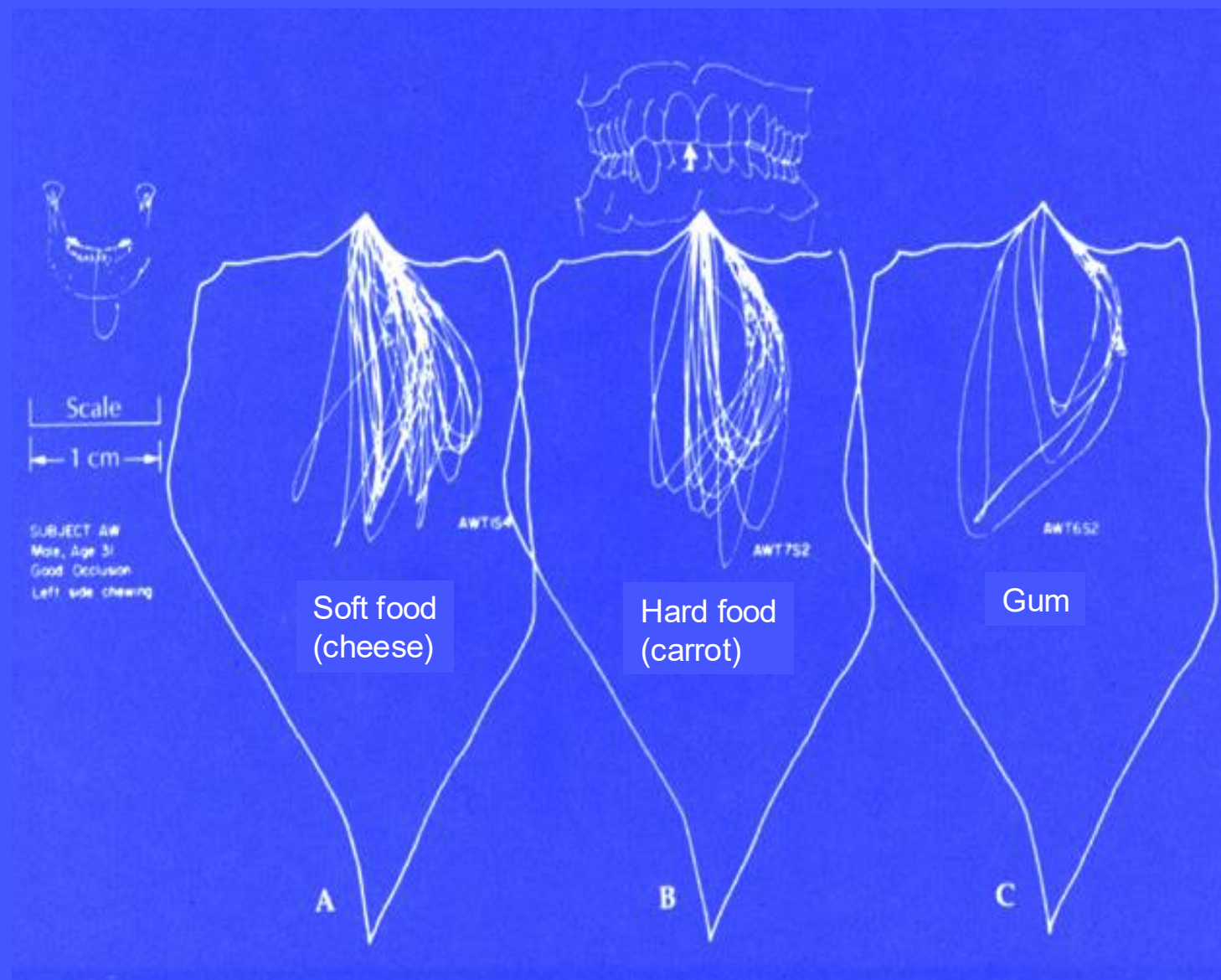


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Frontal plane



# MANDIBULAR BORDER MOVEMENTS

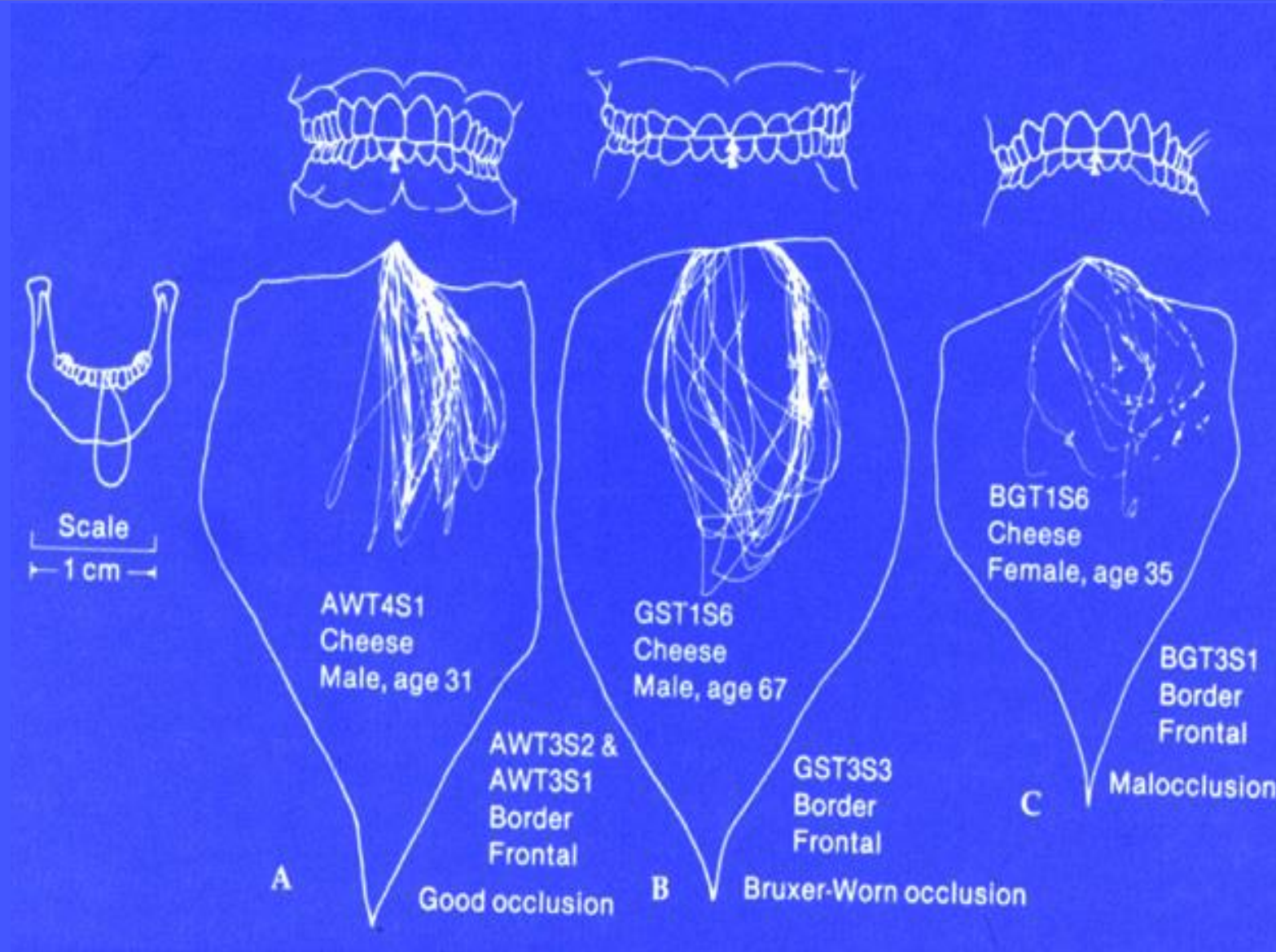


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Frontal plane



# MANDIBULAR MOVEMENTS

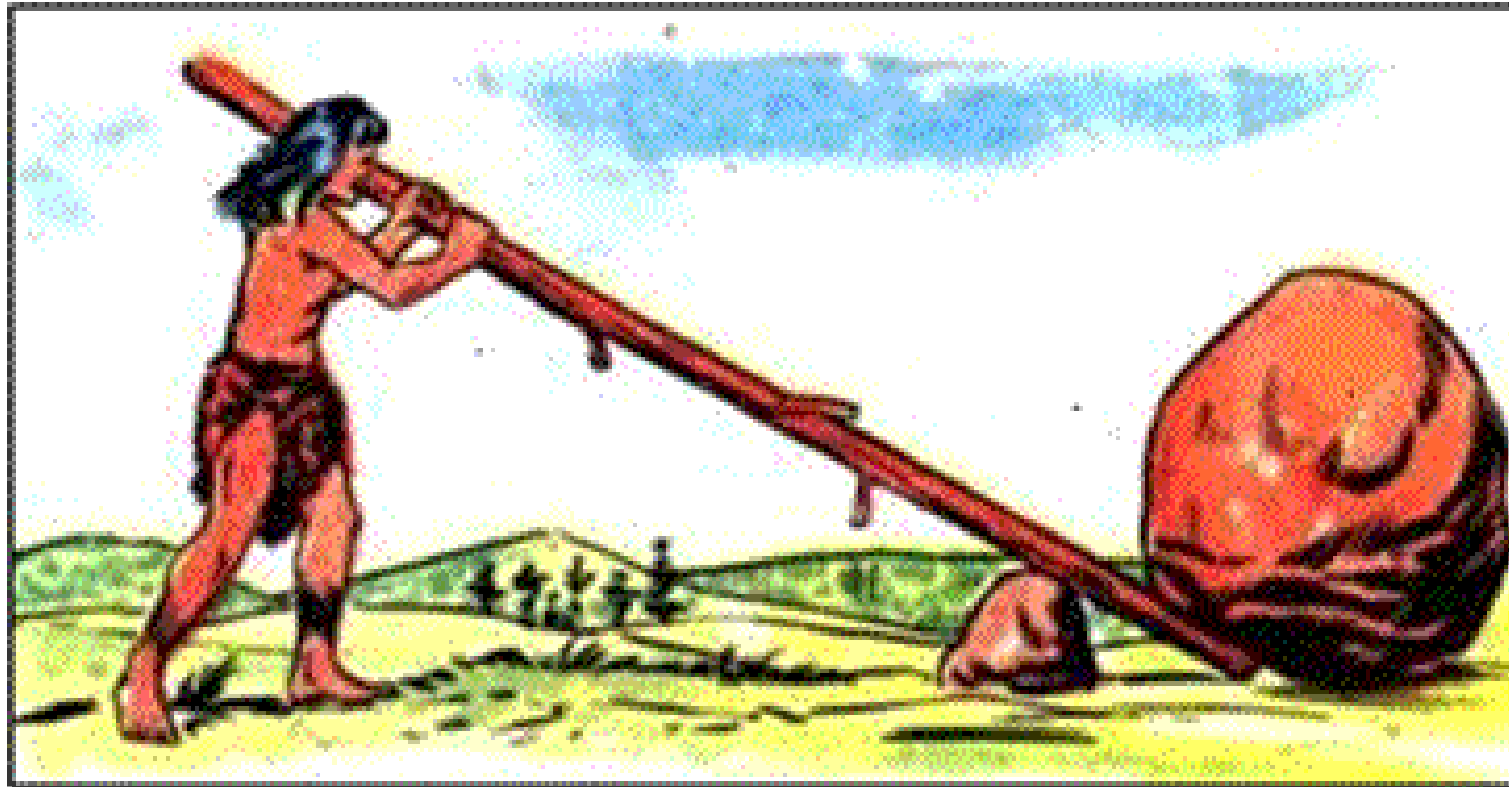


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## LEVERS

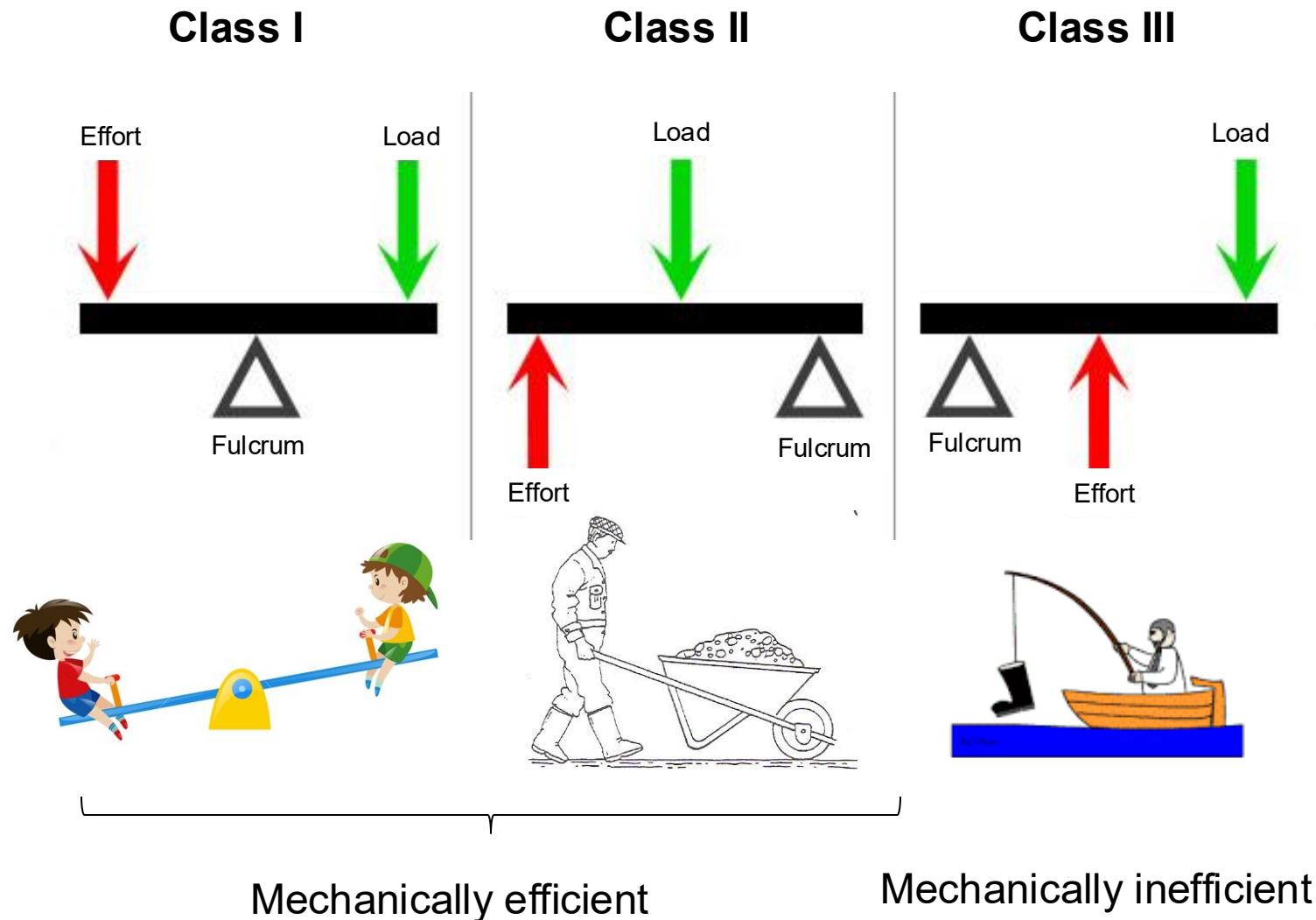


# MANDIBULAR MOVEMENTS



## CLASSES OF LEVER

- According to the location of the load and effort



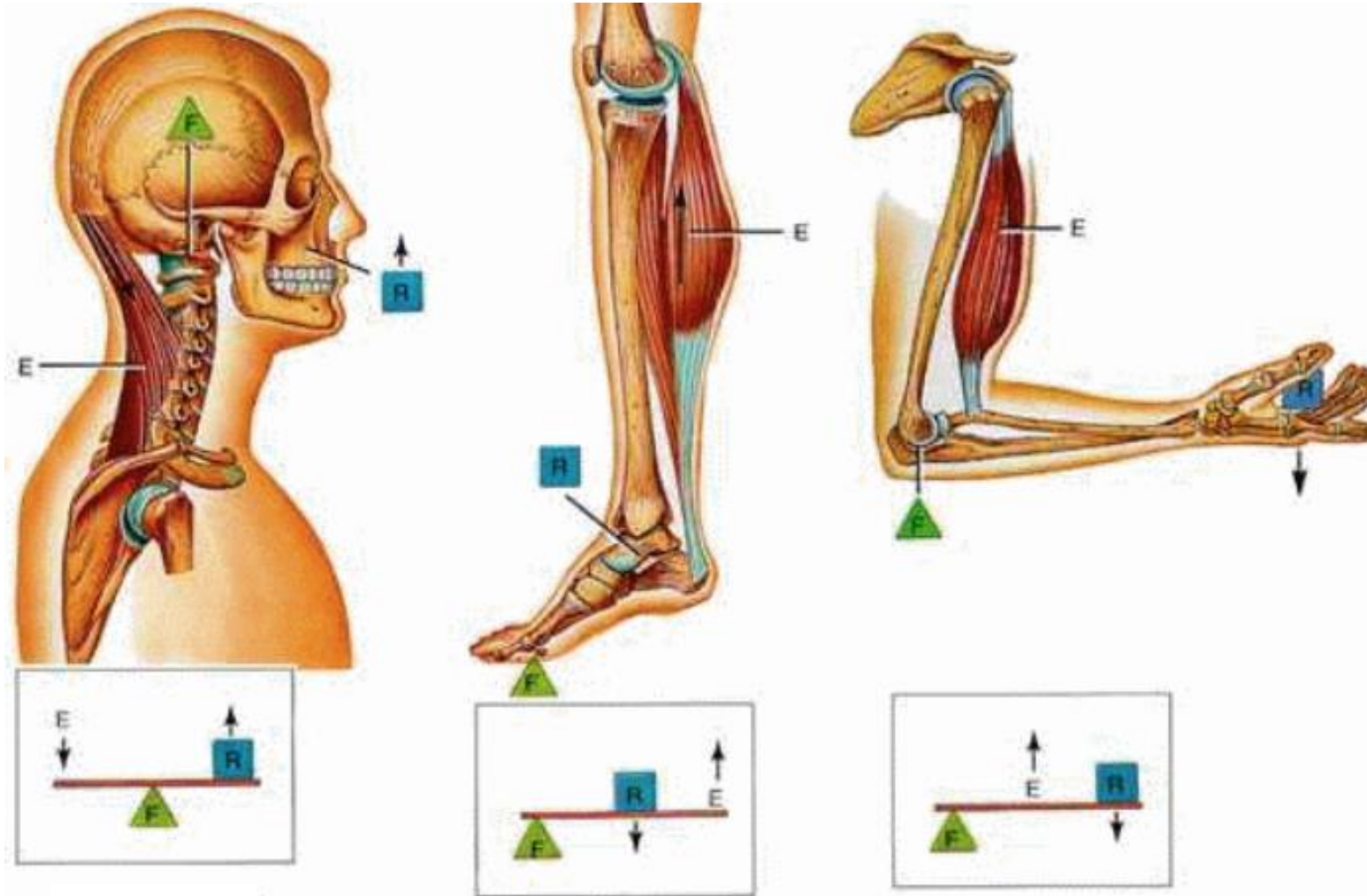
# MANDIBULAR MOVEMENTS



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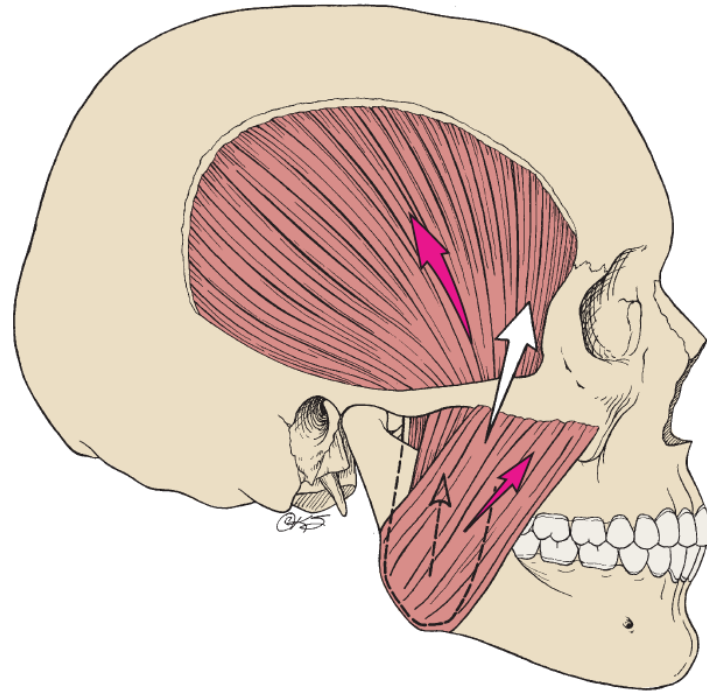
# MANDIBULAR MOVEMENTS



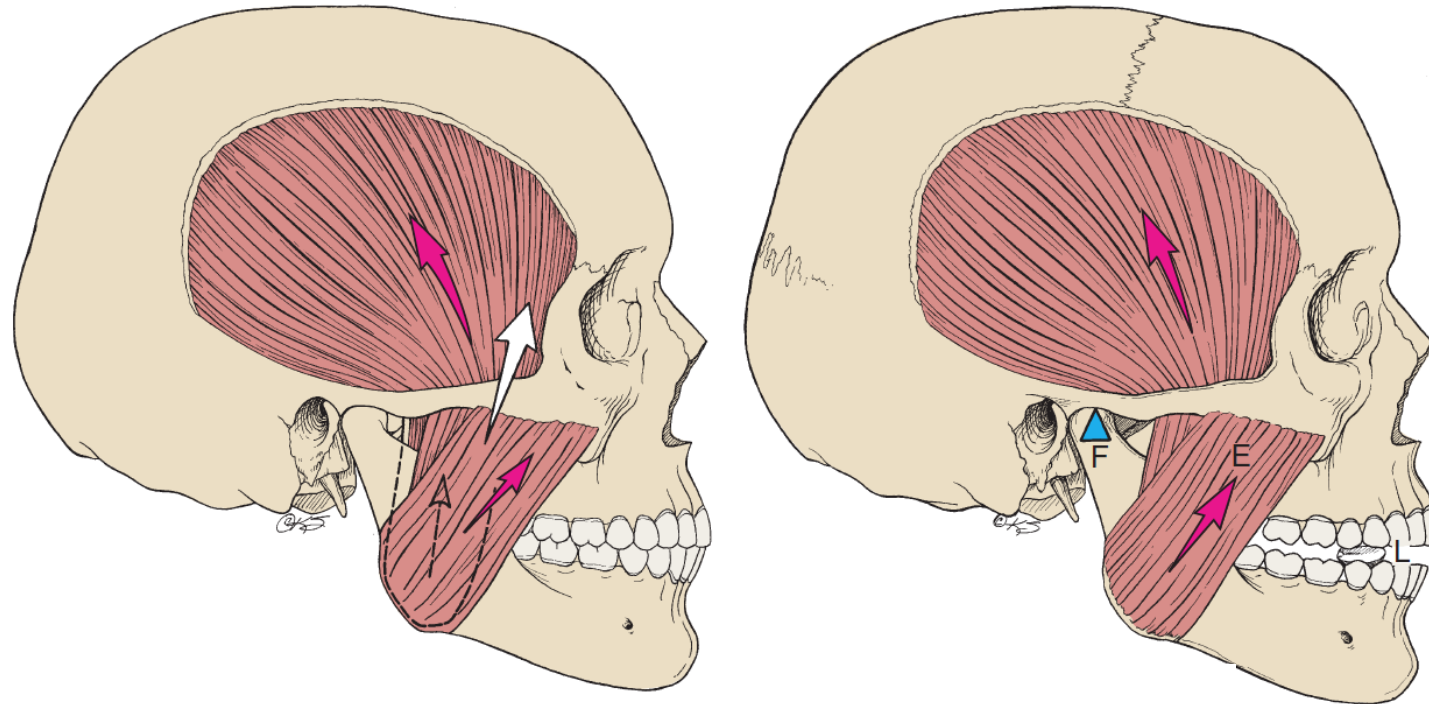
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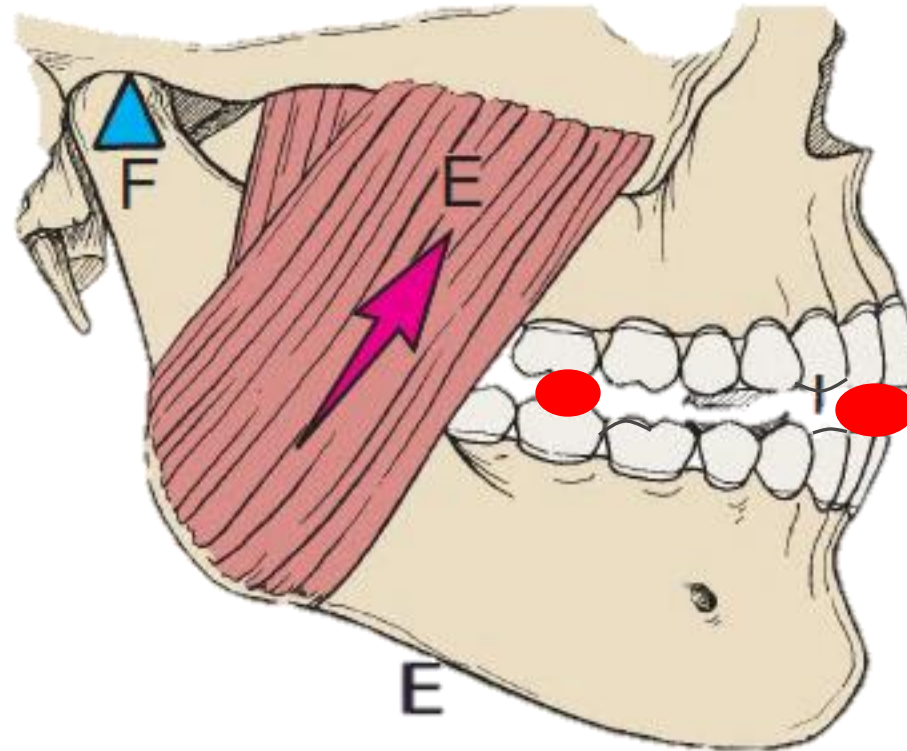


## Lever Class III

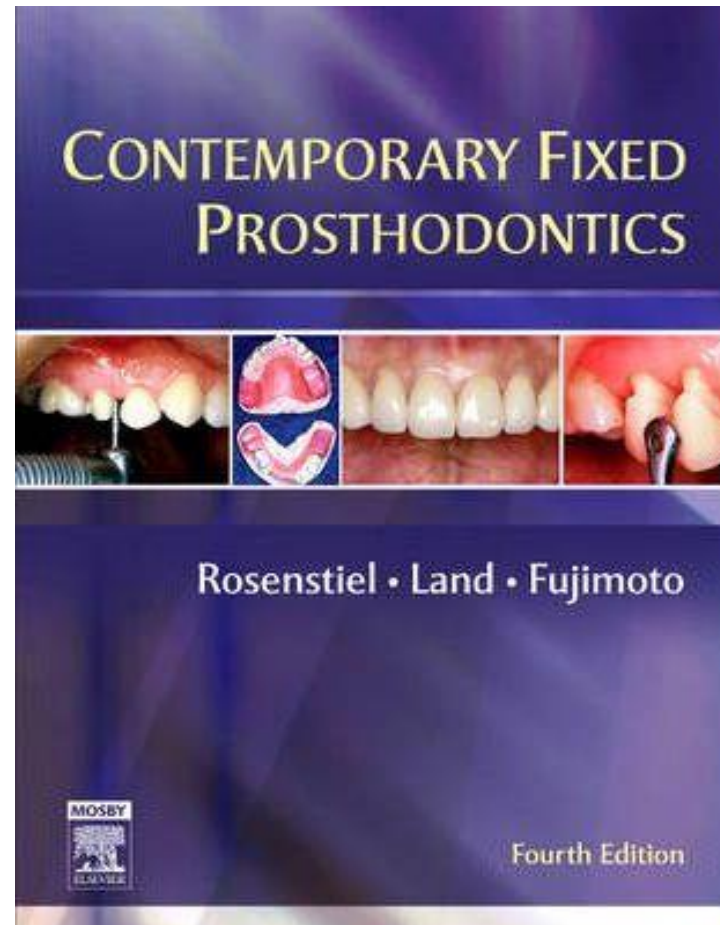
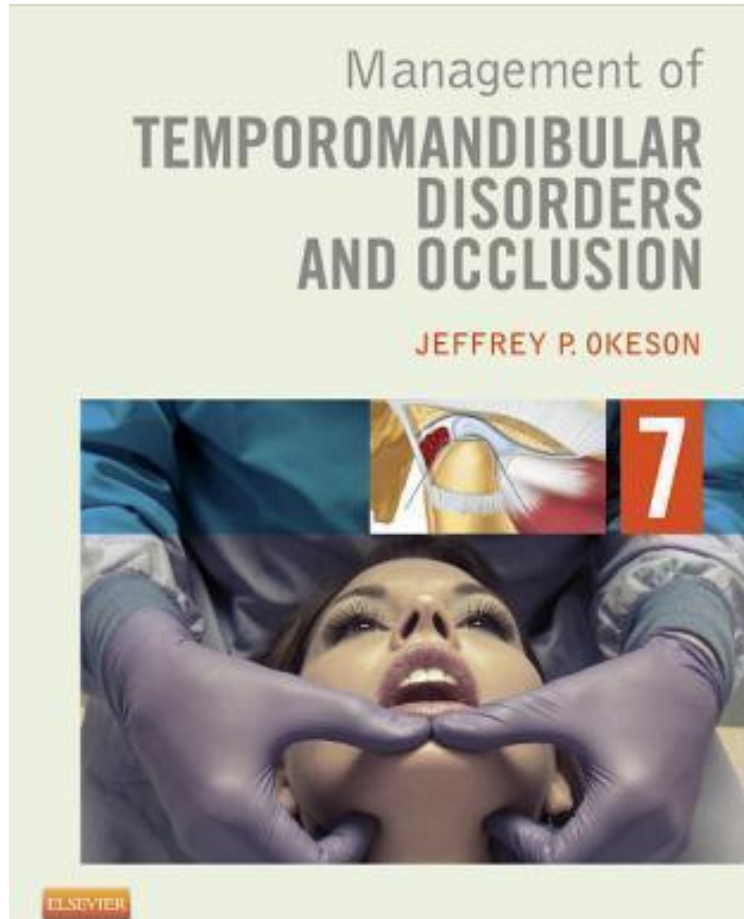


## Lever Class III

Protection of TMJ and teeth



Food is more easily crushed as it is placed farther back in the mouth.



Thank you