

Masticatory system

- Functional unit of the body
- Primarily responsible for: chewing/mastication, speaking, and swallowing

Components of the masticatory system

- Dentition, periodontium, jaws, TMJ, muscles
- Lip-tongue-cheek system
- Salivary system
- Neuromuscular and vascular system

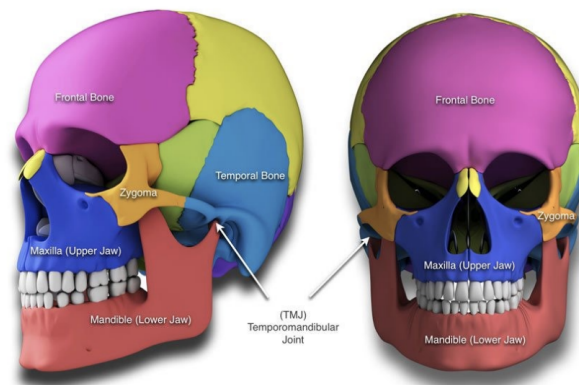
Periodontium

- Gingiva
- Periodontal ligament
- Cementum
- Surrounding alveolar bone

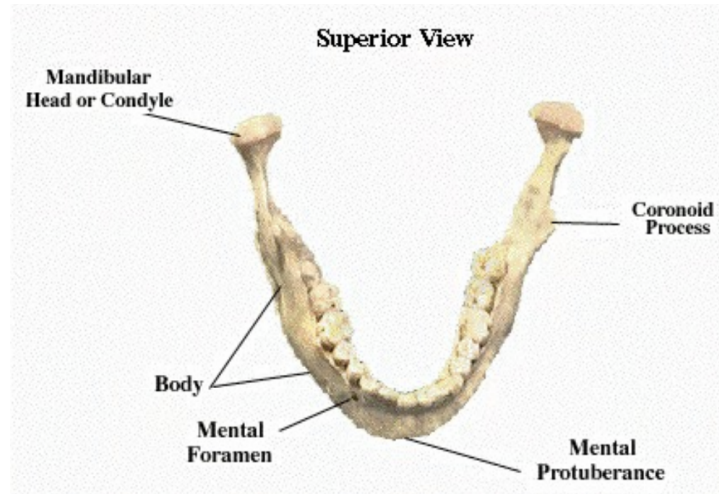
Tooth components (review)

- Enamel- no formation after crown formed
- Dentin- continued to be laid down if there is viable pulp (primary, secondary, tertiary)
- Pulp
- Cementum- continued to be laid down- continuous eruption of tooth; passive eruption/ supraeruption or supereruption
- Supraeruption- movement of a tooth or teeth, along with the tooth-supporting structures, in discontinuity with the normal occlusal plane

Skeletal components



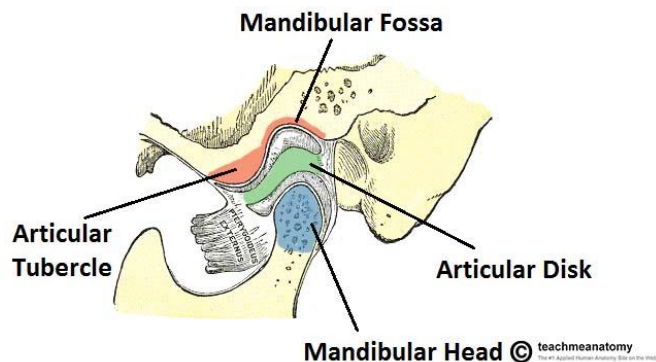
- Maxilla
 - Fixed stationary
 - Develops from 2 bones
 - Fuse at midpalatal suture
 - Extends superiorly: to form floor of nasal cavity + floor of each orbit
 - Inferiorly: form palate and alveolar ridges (which supports teeth)
- Mandible
 - No bony attachment to skull
 - Suspended by muscles, ligaments, and other soft tissue
 - U shaped
 - Supports lower teeth



- Temporal bone
 - Supports mandible where it articulates with the cranium (at squamous portion of temporal bone)
 - Concave mandibular fossa: glenoid fossa

TMJ- where the craniomandibular articulation occurs

- Complex joint → ginglymoarthrodial joint
 - Ginglymoid= hinging
 - Arthroidal= gliding



- Articular eminence
- Mandibular fossa (glenoid fossa)
- Squamotympanic fissure- a fissure in the temporal bone that runs from the temporomandibular joint to the tympanic cavity
- Considered compound joint- requires presence of at least 3 bones
 - TMJ made of only 2 bones (consider the articular disk at the “third” bone)
- Functionally articular disc serves as non-ossified bone
 - Articular disc= dense fibrous connective tissue- devoid of blood vessels or nerves (extreme periphery slightly innervated)

Terminology: dentitions

- Diphyodont: 2 dentitions- Deciduous and permanent
- Heterodont: Different types of teeth morphologically- Anterior, Premolar, Molar

Terminology: types of attachments

- Fibrous- sharks- rapid teeth replacements
- Hinged- fish- hold prey in
- Ankylosis- dentin to bone- some fish, eels, frogs, pythons
- Gomphosis- socketed- root in alveolar bone; specialized tissues for attachment- pdl, cementum

Head and Neck Planes

- Coronal/frontal
- Sagittal
- Occlusal/horizontal

Form and function

- Crown anatomy
 - Concavities/self cleansing surfaces
 - Contact areas and embrasures
- Root anatomy
 - Periodontium will tolerate reasonable forces
 - Root anatomy- determine support
 - Attachment area- root length, number of roots, concavities, cross-sectional diameter

Anchorage determined by root anatomy

- Positive
 - Surface area related to length, shape, taper
 - Number and configuration of roots
 - Divergent vs convergent (M3)
 - Divergent- increase stability, more interradicular bone support
 - Concavities, curvatures, depressions
- Negative
 - Grooves and presence of enamel (enamel pearls)
 - Enamel pearls:
 - Localized masses of enamel
 - Develop ectopically, typically over the root surface (close to cemento-enamel junction)
 - Caused by localized failure of Hertwig's epithelial root sheet to separate from dentin.
 - This prolonged contact with the dentin is thought to cause the odontogenic epithelium to secrete enamel (small quantity) and prevent normal deposition of cementum by adjacent cementoblasts.
 - Lined with reduced enamel epithelium
 - Epithelial cell rests can be seen close to the normally formed adjacent cementum

Shape and length of root

- Apical half- 38% of root surface
- Cervical half- 61% of root surface

Cross sections

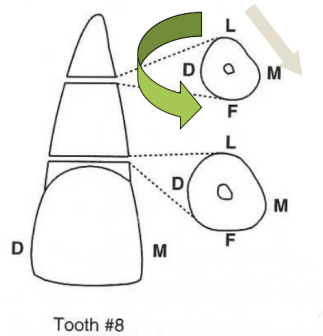
X sec cervix

- TRIANGULAR

M root: flat / slt dep

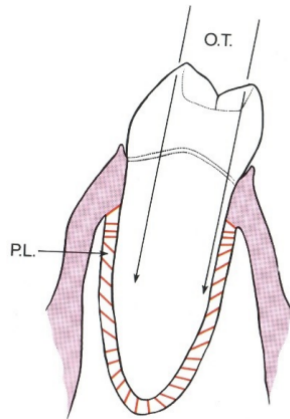
D root: convex

short, conical, little depression or bending of root = not good anchorage

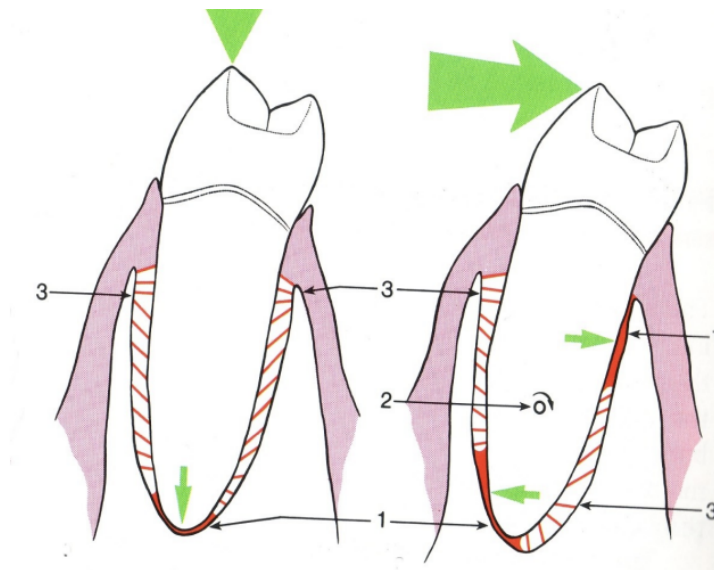


Factors and forces

- Lip-tongue-cheek system
 - Lip and cheeks: constant forces- light- lingually directed forces
- Tongue- facially directed forces
- When forces equal→ neutral space/position
- Proximal surfaces- contact areas
 - Help maintain normal alignment
 - Stabilize tooth within bony socket
 - Prevent food impaction
 - Protects interdental papilla- interdental col
 - Lack of contacts- mesial migration or mesial drift
 - Caries- mesial drift
 - During mastication- slight buccolingual and vertical movement of teeth→ interproximal wear- as areas wear→ mesial drift
 - Size of contact increases throughout life
- Sequelae
 - Mesial migration
 - Distal migration/tilting
 - Supereruption
- Occlusal contact- which prevents extrusion or supereruption of teeth (maintenance of arch stability)

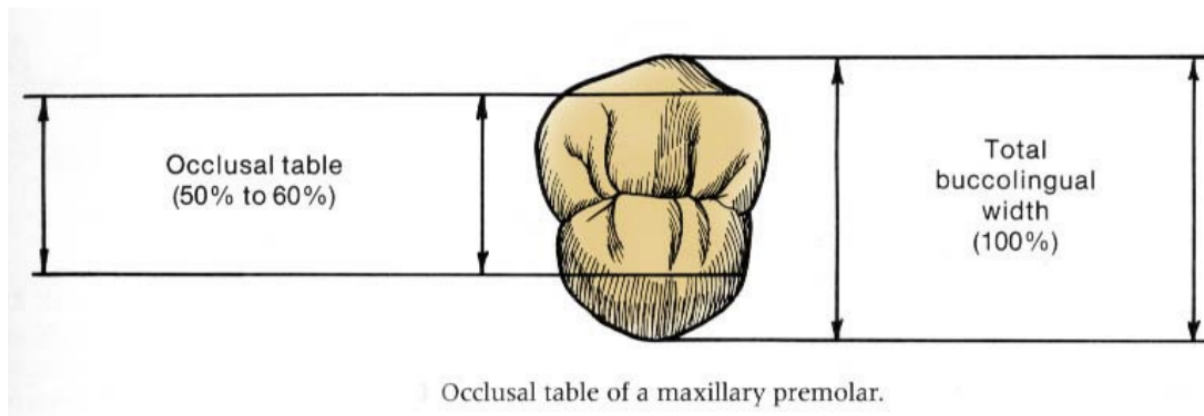


- Forces and the periodontium
 - Occlusal table located over root
 - Forces are transmitted axially along root axis line (vertical forces)
 - Resistance to tooth displacement is directly related to amount of principal fibers available for stretch



- Vertical pressure → minimum compression of perio fibers
 - Zone of crush is decreased
 - Zone of stretch increased
- Horizontal force
 - Fulcrum- pivot point created- tooth rotates
 - Zone of crush increased
 - Zone of stretch decreased
 - Horizontal forces not well tolerated

The occlusal table represents 50-60% of the FL dimension

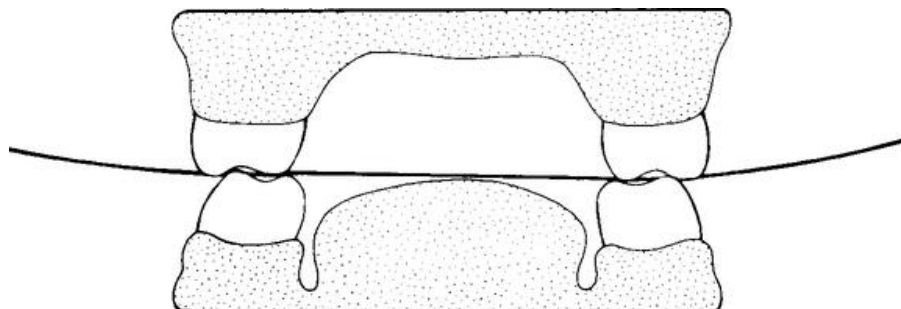


Intrarch tooth alignment- relationship of teeth within the dental arch

- Plane of occlusion- a plane determined by imaginary line connecting buccal and lingual cusp tips and incisal edges of mandibular teeth
 - Not a flat plane
 - The curvature of the occlusal plane is determined by the inclinations of the teeth
- Curve of Spee- anatomical curvature of the occlusal alignment of teeth, beginning at the tip of the lower canine, following the buccal cusps of the posterior teeth, continuing to the terminal molar

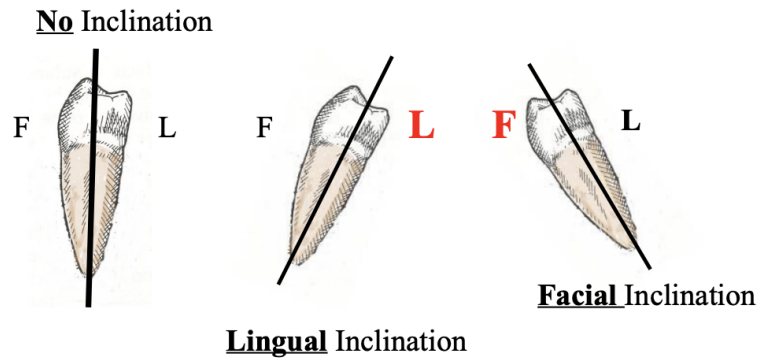


- Viewed from the sagittal plane
- The posterior teeth have a mesial inclination in general
- Curve of Wilson- a mediolateral curve that contacts the buccal and lingual cusp tips of each side of the arch

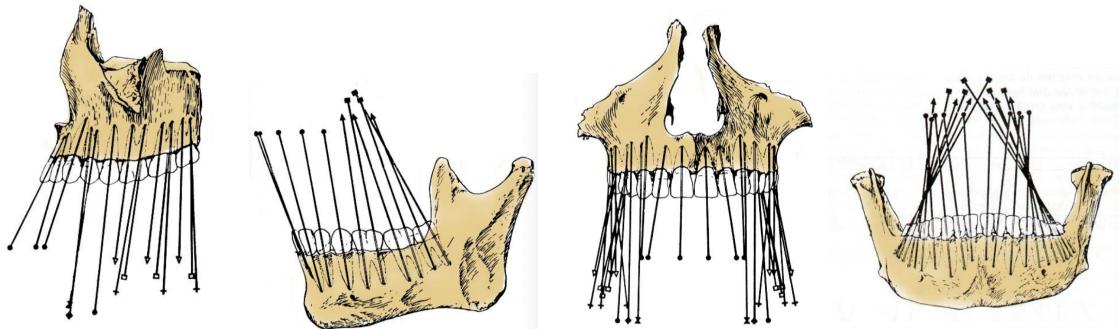


- Viewed from the coronal/frontal view
- The mandibular posteriors have a lingual inclination

Tooth angulation: M/D or F/L based on crown position as opposed to root



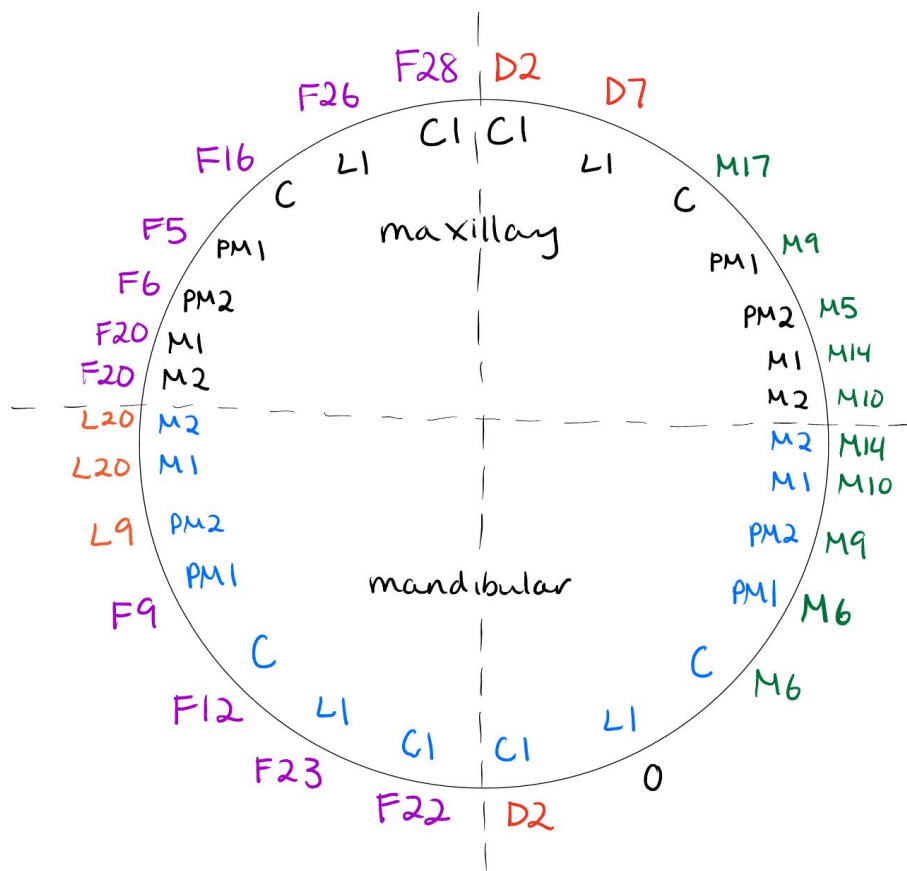
- Alignment of teeth



- Sagittal view
 - Anterior teeth- facial/lingual
 - Posterior teeth- mesial/distal
- Coronal view
 - Anterior teeth- mesial/distal
 - Posterior teeth- facial/lingual

Summary of Tooth Angulations

Facial-Lingual | Mesial-Distal

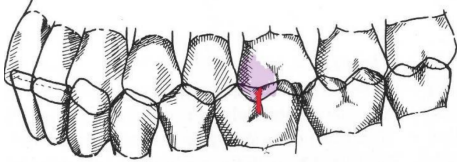
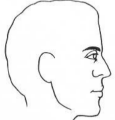
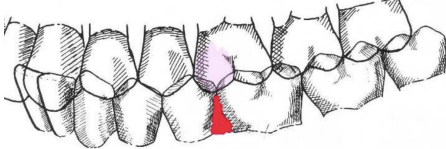
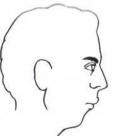
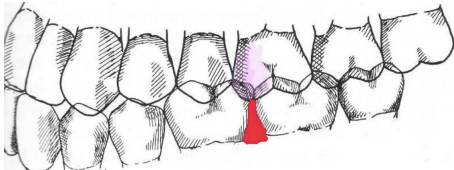


Inter-arch tooth alignment- the relationship of teeth in one arch with teeth in the opposing arch

- When 2 arches come into contact (mandible closes), you have an occlusal relationship

Interarch tooth alignment: Molar Relationships

- Reference- MF cusp of Max 1st Molar

	Max M1 relationship	Image	Corresponding profile
Class I	MF cusp of Max M1 rests on the MF groove of Mand M1		Class I 72%  Orthognathic profile
Class II	MF cusp of Max M1 rests on the facial embrasure between Mand PM2 and M1		Class II 22%  Retrognathic profile
Class III	MF cusp of Max M1 rests on the facial embrasure between Mand M1 and M2		Class III 6%  Prognathic profile

Arch length- distance from the distal of the 3rd molar, going mesially through proximal contacts, to the distal surface of the opposite 3rd molar.

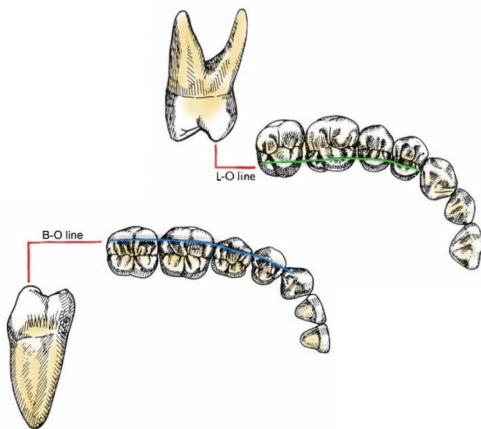
- Upper and lower are similar in size- lower slightly smaller (128-126 mm average)

Inter-arch tooth alignment

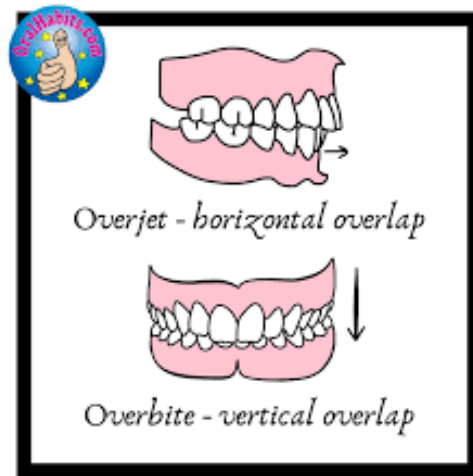
- Arch width- the distance across the arch
 - Mandibular is slightly less than maxillary
 - When arches occlude→
 - Max teeth are facial to mandibular teeth
 - This relationship protects cheeks, lips, and tongue

- Supporting cusps- maxillary lingual and mandibular facial cusps
 - Support vertical dimension
 - Important for mastication
 - Contact on inner and outer aspects
 - Broad and rounded
 - Located 1/3rd the FL distance from facial surface
- Guiding cusps- maxillary facial and mandibular lingual cusps
 - Relatively sharp
 - Located 1/6th the FL distance from lingual surface
 - Only inner incline has potential for contact
 - Assists in mastication- guides, minimize tissue impingement, maintain bolus on occlusal table, and helps shear

L-O vs. B-O lines



Overlaps



- Horizontal overlap overjet- the incisal edges of maxillary teeth labial to mandibular teeth
- Vertical overlap overbite- the incisal edges of maxillary teeth extend below incisal edges of mandibular teeth
- Normal overbite
 - If 3-5 mm overbite
 - #24/25 about 9 mm
 - About half of the tooth is visible

Incisal Guidance

- A measurement of movement
- The angle at which lower incisors and mandible must move from the overlapping position to edge in relation with maxillary incisors
- Anterior guidance
 - VO constant, HO increases → flatter anterior guidance
 - HO constant, VO increases → steeper anterior guidance

Cross-bite

- The maxillary buccal cusps rest on opposing teeth
- The mandibular lingual cusps rest on opposing teeth

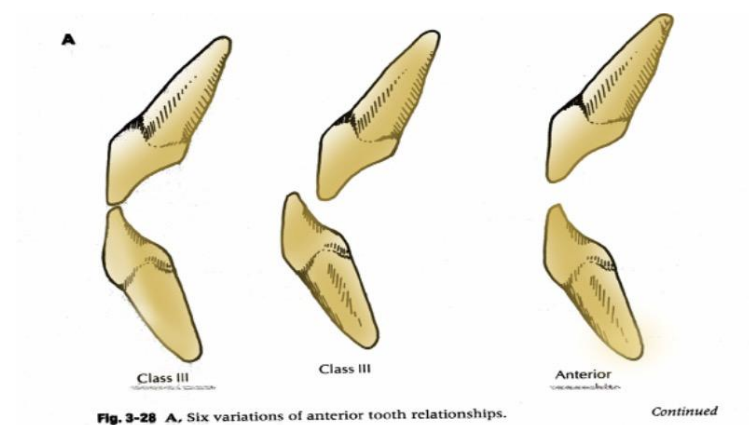


Fig. 3-28 A. Six variations of anterior tooth relationships.

For each of the three drawings:

1. Vertical: zero; Horizontal: zero; Anterior guidance: 0
2. Vertical: zero; Horizontal: negative; Anterior guidance: 0
3. Vertical: negative; Horizontal: zero; Anterior guidance: 0

Movements:

- Symmetrical- open/close; protrude- and see relationship of anterior and incisal guidance
- Asymmetrical- lateral excursion- move to right or left and see relationship of canine guidance

Incisal guidance angle- a measurement of movement; the angle at which the lower incisors and mandible must move from overlapping position to edge to edge relationship with maxillary incisors

TMJ is a ginglymoarthrodial joint

- Ginglymoid= hinging
- Arthrodial= gliding

Types of movement

- Mandibular movement
- "Complex series of interrelated 3D rotational and translational" movements
- Determined by: TMJ activity (combined activity of both)
- Rotational, translational, or combination of the two

Head and neck planes: coronal/frontal, sagittal, and occlusal/horizontal

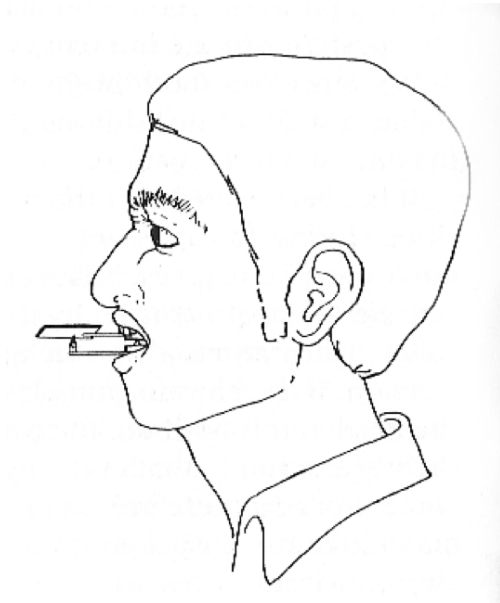
- Coronal- can see curve of Wilson
 - Rotates on the sagittal axis
 - Translation: very little side to side movement of the mandible
- Sagittal- can see curve of Spee
 - Can see anterior guidance, but not canine guidance
 - Rotates on the horizontal axis
 - Translation is protrusive (meaning it moves forward)
- Horizontal
 - Rotates on the vertical axis
 - Translation: protrusive is translational; lateral excursion is mostly rotational

Types of movements

- Functional- near maximum intercuspation (teeth close each other "tap tap" teeth, chewing, incising)
- Border- extreme movements (yawning)- the furthest the jaw is able to move to?
 - Described in 3 planes
 - Envelope of motion
 - You can see maximum opening in every plane except horizontal plane

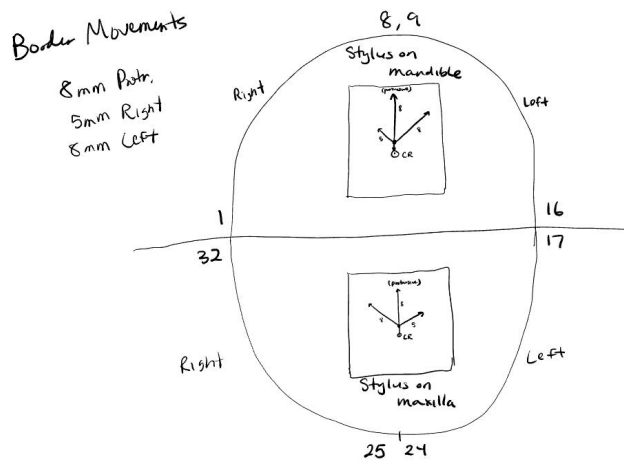
Border movements: horizontal plane

- Jig to max and mandible
- Stylus (pencil-like) point attached to mandible
- Paper/flat board to maxilla



11/3 Border Movements continued (last lecture)

Started class with some helpful videos



Range of border movements- limited or determined

- For posterior and anterior opening
 - Ligaments
 - Morphology of TMJ
- Superior contact movements
 - Occlusal/incisal surfaces of teeth
 - Functional movements- neuromuscular system

When you move your mandible back (border movement) the position is called the centric relation.

Lateral excursions

- The right lateral pterygoid allows you to have a left lateral excursion.
- The left lateral pterygoid allows you to have a right lateral excursion.
- Always refers to the mandible moving, and maxilla is the reference.

Horizontal plane terminology

- Working side- the side you are moving the jaw towards; rotating condyle
- Non-working side- the side you are moving the jaw away from; orbiting condyle

Lateral Jaw Movements (differences between hygiene and dental students most likely from gender)

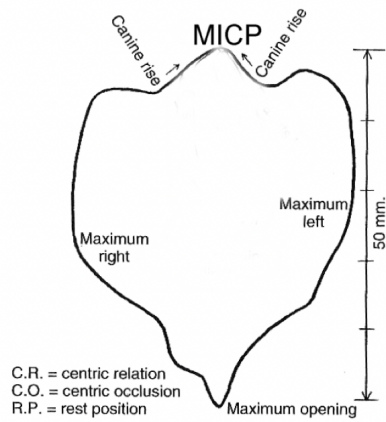
- Right
 - Hygiene students: 8
 - Dental students: 9
- Left
 - Hygiene students: 8
 - Dental students: 9
- Protrusive
 - Hygiene: 8
 - Dental: 8

Border movements: coronal plane

- Shield- to be described
- Start MICP
- Lateral movement to left
- Inferior concave path
- Determined:
 - Primarily by teeth
 - Secondarily by:
 - Condyle-disc-fossa
 - Morphology of working side TMJ
- From max left lateral, make a opening movement of mandible
 - As maximum opening occurs, ligaments tighten and produce medial directed movement, and shift to midline.
- Return to MICP
- Lateral movement to right
- From maximum right lateral opening continued

Maximum opening mm: 51 mm

Note canine guidance- there is a canine rise from lateral to the MICP. Maximum canine guidance angle is 56 degrees.



Patient A has no canine guidance:

