

**Reading Assignment:** Read Chapter 8, Physiology of Articulation (p. 369-385); Read the clinical boxes assigned as homework and answer the questions. Supplemental reading: Chapter 4 of Dr. Hill's Lecture Notes available at my BU web site (**recommended reading online, not printing as it is long**). You may search for specific terms or topics using the Adobe Acrobat Reader search tool (binoculars).

## I. Overview – control and coordination of articulators

### A. Speech function:

Say the word "tube"

What are the series of articulations involved? How are these achieved?

### B. Introduction to theories for control of articulators

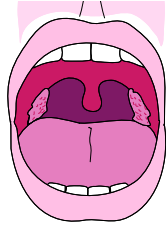
Associated chain theory

Central control theory

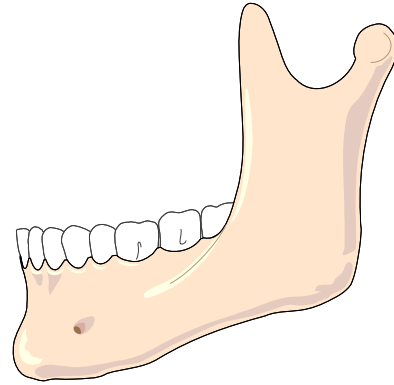
Dynamic or action theory

## II. Physiological Function of Articulators

### A. Lips



**B. Mandible**



Close your eyes, place forefinger and thumb on the upper jaw and lower jaw respectively, count to 20; what happened?

Repeat count to 20 while biting on a pen/pencil. What does this demonstrate?

## C. Tongue

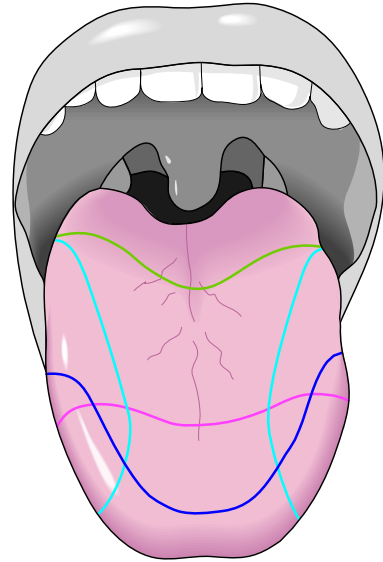
### 1) Review of the musculature

#### Extrinsic muscles:

- Genioglossus
- Hyoglossus
- Styloglossus
- Palatoglossus

#### Intrinsic muscles:

- Longitudinal (sup. & inf.)
- Transverse
- Vertical



See Table 8-1 for a summary of muscles of tongue movement, p. 373 of your text.

### 2) Actions and muscular coordination

a) Tongue tip elevation:

b) Tongue tip depression:

c) Tongue tip deviation, left and right

d) Relaxation of lateral margins

e) Tongue Narrowing

f) Central tongue grooving

g) Tongue protrusion

h) Tongue retraction

i) Posterior tongue elevation

j) Tongue body depression

3) Velum (soft palate)

a) The velopharyngeal port as a **binary element**:

Should we treat the velopharyngeal port as a binary element? Explain.

b) Muscular control of the velopharyngeal port during articulation:

c) Feedback from the hard and soft palate during articulation –

d) Inappropriate nasal resonance:

hypernasality –

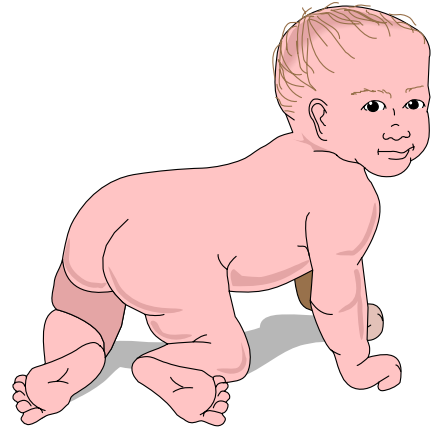
hyponasality –

### **III. Development of articulatory ability**

Overview of the process –

**Three major stages of development:**

1) Reflexive responses –



2) Gross motor control –

3) Fine (graded) motor control –

#### **IV. Coordinated Articulation**

##### **A. Overview –**

##### **B. Three hierarchical elements of speech –**

1) Conceptual system

2) Phonological system

3) Muscular system

##### **C. Theories for coordinated articulation**

1) Associated chain theory

2) Central control theory

3) Dynamic or action theory

**HOMEWORK ASSIGNMENT:** Read the following clinical boxes in Chapter 8 of your text book and answer the questions below.

**Unilateral tongue weakness, p. 374:**

What is the function of an oral-peripheral examination?

What conditions may it reveal?

**Tongue deviation on protrusion, p. 375**

What is meant by the phrase, “the tongue points toward the lesion?”

**Effects of neuromuscular disease on velopharyngeal function, p. 378:**

List two diseases that might produce muscular weakness in the velum:

What speech symptoms signal muscular weakness in the velum?

**Phonological Development and Motor Control, p. 380:**

Which speech sounds occur early in child development?

What articulatory movements can a child of two or three normally perform?

When does controlled production of stops normally occur in child development?

**Apraxia, p. 383:**

Define each of the following terms:

Apraxia –

Oral apraxia –

Verbal apraxia –

**Reading Assignment:** Read Chapter 9, Physiology of Mastication and Deglutition (p. 391-425); Pages 406-418 will be summarized quickly. Read the clinical boxes assigned as homework and answer the questions. Supplemental reading: Chapter 4 of Dr. Hill's Lecture Notes available at my BU web site (**recommended reading online, not printing as it is long**). You may search for specific terms or topics using the Adobe Acrobat Reader search tool (binoculars).

## I. Overview of Mastication and Deglutition

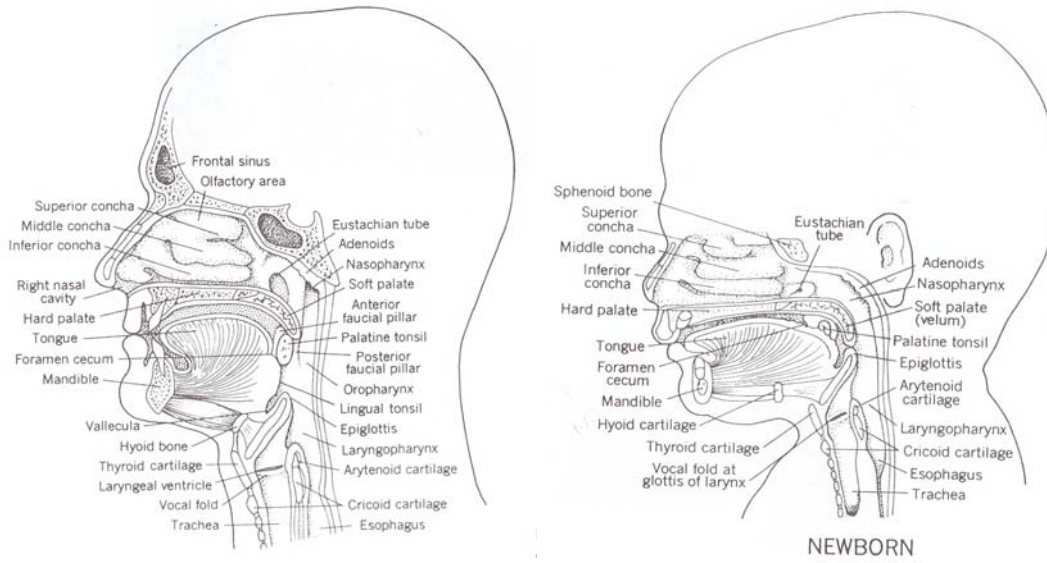
Mastication –

Deglutition –

Bolus –

How are these physiological events related to communication disorders?

II. Comparison of adult and newborn oral, pharyngeal, and laryngeal structure

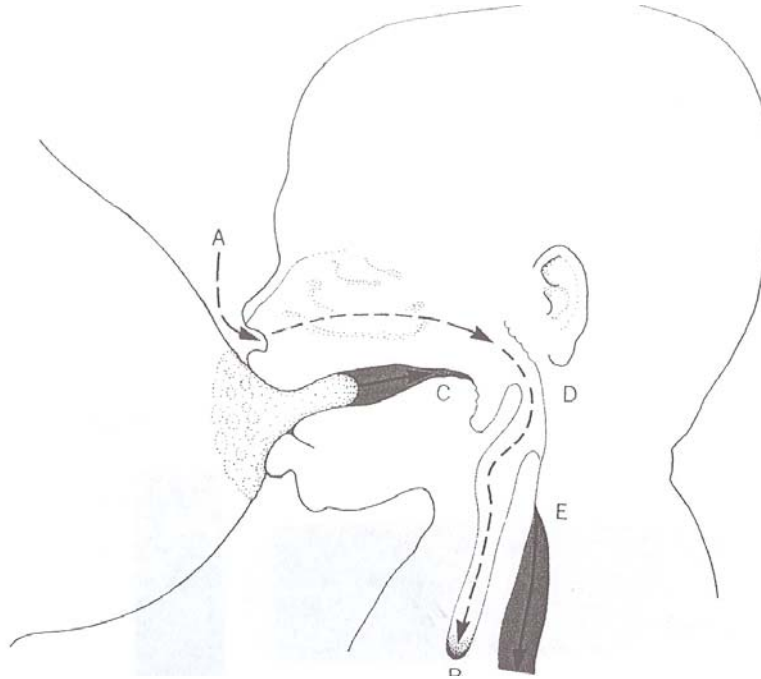


ADULT	NEWBORN

Rooting Reflex –

Suckling Reflex –

III. Development of structures and reflexes associated with the oral cavity, pharynx, and larynx



A. Swallow pattern of a neonate –

B. Development of dentition at 6 months –

"Mouth breather facies" –

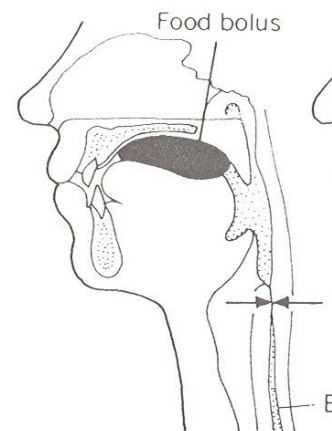
#### IV. Adult pattern of swallowing (mastication and deglutition reflexes)

Overview –

##### A. Mastication (=oral preparatory phase) –

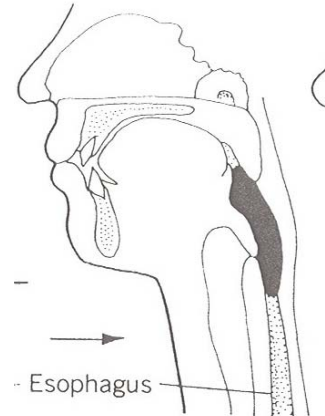
##### B. Deglutition (=swallowing in three phases) –

##### 1) Oral (buccal) stage –



Oral transit time –

2) Pharyngeal stage –

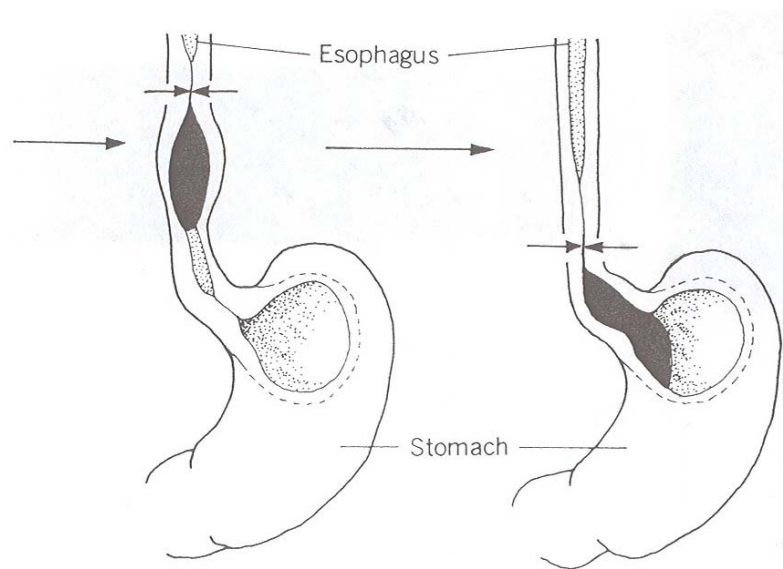


Pharyngeal transit time –

Esophageal reflux –

Nasal regurgitation –

3) Esophageal stage



Peristalsis –

Esophageal transit time –

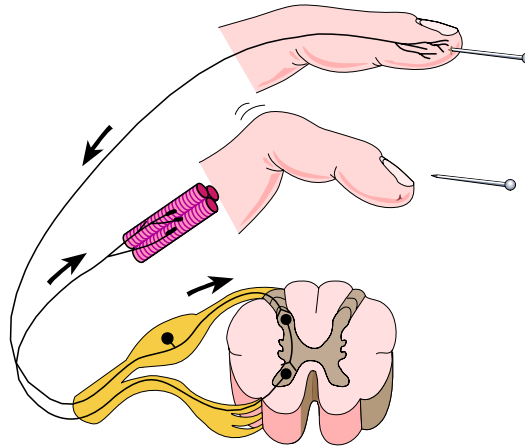
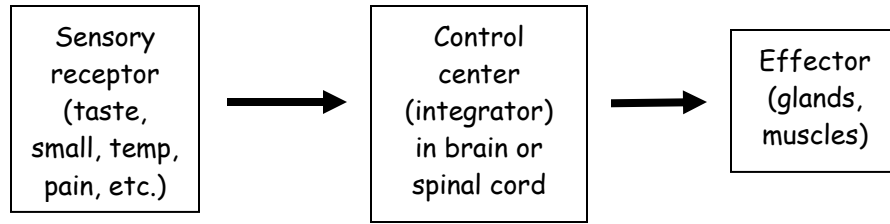
C. Sensation associated with mastication and deglutition

Sensation	Description
Gustation (taste)	<p>The diagram illustrates the neural pathways for taste. It shows the VII nerve (facial) and IX nerve (glossopharyngeal) originating from the brainstem. The VII nerve passes through the Geniculate ganglion and gives off the Greater superficial petrosal nerve, which joins the Otic ganglion. The VII nerve also carries the Chorda tympani nerve, which joins the Lingual nerve. The IX nerve passes through the Petrosal ganglion. The Lingual nerve and the IX nerve (via the Glossopharyngeal nerve) carry taste information from the Tongue.</p>
Olfaction (smell)	
Thermal stimulation (temperature)	
Nociception (pain)	
Salivation	

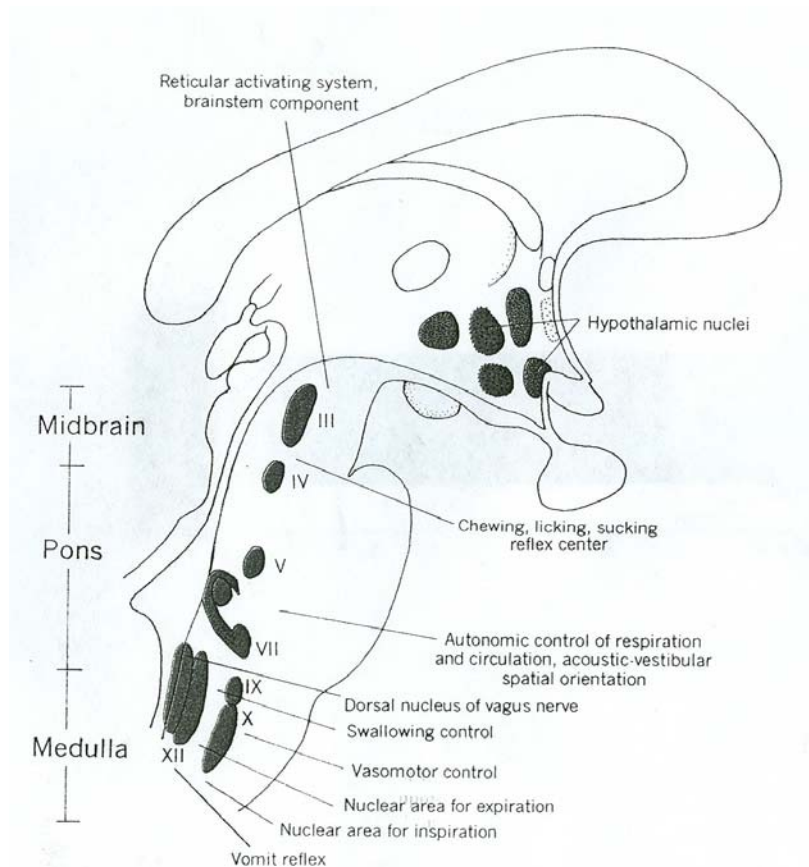
D. Reflex Centers and Reflexes

Reflex –

Reflex arc:

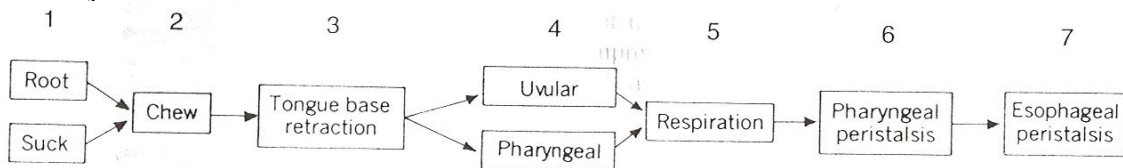


Control Centers



Reflex	Stimulus	Response
Chewing		
Rooting/sucking		
Uvular		
Gag		
Retch/vomit		
Cough		
Tongue base retraction/elevation		
Pain		
Respiration		

Summary of reflexes:



**HOMEWORK ASSIGNMENT:** Read the following clinical boxes and answer the questions that follow. See me if you have any questions.

**Deficits of the Esophageal Stage, p 404:**

What is GERD?

What complications can arise from GERD?

What is a hiatal hernia?

What complications can develop from a hiatal hernia?

**Mouth Breathing, p 415:**

What condition may cause mouth breathing?

What condition of the middle ear may develop from mouth breathing? Why?

How does mouth breathing affect the development of facial and oral structures?

## REVIEW QUESTIONS

### Lecture Guide

1. Describe theories for control of articulators: association chain theory, central control theory, dynamic action theory.
2. Describe the physiological function of each articulator: lips, mandible, tongue, velum.
3. How does the ability to articulate develop in a young child? At what age does the child have reflexive control only? Gross motor control? Fine motor control?
4. What are the three hierarchical elements of speech? Describe each of the elements.
5. What is unilateral weakness? What does it reveal about a patient?
6. What is meant by the phrase “the tongue points toward the lesion?”
7. What diseases can produce muscular weakness in the velum? What speech symptoms signal muscular weakness in the velum?
8. Describe the development of speech sounds in the young child. What speech sounds can be performed a before 2-3 years? At 2-3 years? At 6 years?
9. Define: Apraxia, oral apraxia, verbal apraxia.
10. Define: mastication, deglutition, bolus.
11. What physiological events are related to communication disorders?
12. How are the oral, pharyngeal, and laryngeal structures of the newborn and adult different?
13. What is the rooting reflex? Suckling reflex?
14. Describe the swallow pattern of a neonate.
15. What is the mouth breather facies?
16. Describe the adult pattern of swallowing: oral preparatory phase, oral stage, pharyngeal phase, esophageal phase.
17. Define: oral transit time, pharyngeal transit time, esophageal transit time, peristalsis.
18. Describe how each of the senses are related to mastication and deglutition: gestation, olfaction, thermal stimulation, nociception, salivation.
19. What is a reflex? A reflex arc? Describe each of the components of the reflex arc.
20. Where are the control centers for chewing, licking, sucking? Swallowing? Vomiting? Breathing?
21. What are the stimuli and responses associated with each of the reflexes: chewing, rooting/sucking, uvular, gag, retch/vomit, cough, tongue base retraction/elevation, pain, respiration.
22. What is GERD? Describe a hiatal hernia? What complications can develop from each of these conditions?
23. How does mouth breathing develop? What conditions can develop from mouth breathing?

### Chapter 8 Study Questions (p. 386)

Questions 1-8

Anatesse CD-ROM: all lessons.

### Chapter 9 Study Questions (p. 426-428)

Questions 1-16, 19-45

Anatesse CD-ROM: all lessons except detailed information regarding the sensory receptors.