Lesson 4: Articulatory System

Course: English for Speech and Language Pathology III
Program: Third-Year Bachelor's in Speech and Language Pathology (Orthophonia)
Duration: 90 minutes

Learning Outcomes

By the end of this lecture, students will be able to:

1. Define the articulatory system and explain its role in speech production.
2. Identify the skeletal framework involved in articulation.
3. Describe the muscles responsible for movements of the lips, tongue, jaw, soft palate, and velopharyngeal mechanism.
4. Explain how articulatory structures produce speech sounds.
5. Distinguish between active and passive articulators.
6. Recognize common articulatory disorders associated with structural or neurological abnormalities.
7. Apply anatomical knowledge to Speech-Language Pathology assessment and intervention.

1. Introduction

Speech production depends on the coordinated interaction of the respiratory, phonatory, and articulatory systems. While the respiratory system provides airflow and the larynx generates voice, the articulatory system shapes this sound into recognizable speech by modifying the vocal tract (Seikel et al., 2023).

The articulatory system consists of movable and fixed structures that alter the airflow to produce vowels and consonants. Accurate articulation requires precise coordination of muscles, bones, and nerves (Kent & Read, 2018).

2. The Articulatory System

The articulatory system comprises the structures that modify the sound produced by the larynx into speech.

Its primary functions include:

- Producing speech sounds.
- Modifying resonance.
- Controlling airflow.
- Forming consonants and vowels.
- Supporting swallowing and oral functions.

Major articulators include:

- Lips
- Tongue
- Teeth
- Alveolar ridge
- Hard palate
- Soft palate (velum)
- Mandible (jaw)

3. Skeletal Framework of Articulation

A. Maxilla (Upper Jaw)

Functions:

- Supports the upper teeth.
- Forms the hard palate.
- Serves as a stable articulatory surface.

Clinical importance:

Abnormal maxillary growth may affect speech intelligibility.

B. Mandible (Lower Jaw)

Functions:

- Supports the lower teeth.
- Moves during speech and chewing.
- Controls mouth opening.

Speech requires rapid mandibular movements during connected speech.

C. Hard Palate

The hard palate forms the anterior roof of the mouth.

Functions:

- Separates oral and nasal cavities.
- Provides an articulatory surface for the tongue.
- Important for palatal and alveopalatal sounds.

D. Hyoid Bone

The hyoid is a U-shaped bone suspended in the neck.

Functions:

- Supports the tongue.
- Anchors muscles involved in swallowing and speech.
- Stabilizes the larynx.

4. Muscular Framework of Articulation

A. Lip Muscles

Principal muscle:

Orbicularis oris

Functions:

- Lip closure
- Lip rounding
- Bilabial sound production (/p/, /b/, /m/)

Other facial muscles include:

- Buccinator
- Levator labii superioris
- Depressor labii inferioris
- Zygomaticus major

B. Tongue Muscles

The tongue is the most important articulator.

Intrinsic muscles

- Superior longitudinal
- Inferior longitudinal
- Transverse
- Vertical

Functions:

- Change tongue shape.
- Produce precise articulatory movements.

Extrinsic muscles

- Genioglossus
- Hyoglossus
- Styloglossus
- Palatoglossus

Functions:

- Move the tongue forward, backward, upward, and downward.

C. Jaw Muscles

Primary muscles:

- Masseter
- Temporalis
- Medial pterygoid
- Lateral pterygoid

Functions:

- Elevation
- Depression
- Protrusion
- Retraction
- Lateral movement

D. Soft Palate (Velum)

Functions:

- Raises during oral speech.
- Closes the velopharyngeal port.
- Prevents nasal air escape.

Main muscles:

- Levator veli palatini
- Tensor veli palatini
- Palatopharyngeus
- Musculus uvulae

5. Major Articulators

Lips

Produce:

- /p/
- /b/
- /m/
- /w/

Movements:

- Closure

- Rounding
- Spreading

Tongue

Produces most consonants and all vowels.

Regions:

- Tip
- Blade
- Front
- Back
- Root

Teeth

Provide contact for:

- /f/
- /v/
- Dental sounds (/θ/, /ð/)

Alveolar Ridge

Located behind the upper front teeth.

Used for:

- /t/
- /d/
- /n/
- /s/
- /z/
- /l/

Hard Palate

Important for:

- /ʃ/
- /ʒ/
- /tʃ/
- /dʒ/
- /j/

Soft Palate (Velum)

Raised:

Oral sounds

Lowered:

Nasal sounds

- /m/
- /n/
- /ŋ/

6. Active and Passive Articulators

Active Articulators	Passive Articulators
Tongue	Teeth
Lower lip	Hard palate
Soft palate	Alveolar ridge
Mandible	Upper lip

Active articulators move toward passive articulators to produce speech sounds.

7. Coordination of Articulation During Speech

Speech requires precise timing between:

- Respiration
- Phonation
- Jaw movement
- Tongue movement
- Lip movement
- Velopharyngeal closure

Adults typically produce 12–15 speech sounds per second during conversational speech (Kent & Read, 2018).

8. Clinical Applications in Speech-Language Pathology

Common articulatory disorders include:

Cleft Palate

Characteristics:

- Hypernasality
- Nasal air emission
- Compensatory articulation

Intervention:

- Surgical repair
- Speech therapy
- Velopharyngeal management

Dysarthria

Cause:

Neurological impairment

Characteristics:

- Weak articulatory movements
- Slow speech
- Reduced intelligibility

Treatment:

- Oral motor exercises (where appropriate)
- Speech pacing
- Compensatory strategies

Childhood Apraxia of Speech

Characteristics:

- Difficulty planning speech movements
- Inconsistent errors
- Poor sequencing

Treatment:

- Motor-based speech therapy
- Repetitive practice
- Multisensory cueing

Structural Abnormalities

Examples:

- Malocclusion
- Macroglossia
- Tongue-tie (ankyloglossia)

These conditions may interfere with normal articulation and require interdisciplinary management.

9. Essential Vocabulary

Term	Definition
Articulation	Production of speech sounds
Articulator	Structure involved in speech production
Velum	Soft palate
Mandible	Lower jaw
Maxilla	Upper jaw
Tongue	Primary articulator
Bilabial	Produced with both lips
Alveolar	Produced at the alveolar ridge
Velopharyngeal Closure	Separation of oral and nasal cavities during speech
Dysarthria	Motor speech disorder
Apraxia of Speech	Motor planning disorder
Hypernasality	Excessive nasal resonance

10. Practical Activities

Activity 1 – Identify the Articulator

Speech Sound Main Articulator

/p/ _____

/t/ _____

/k/ _____

/f/ _____

/m/ _____

Activity 2 – Multiple Choice

1. Which muscle is primarily responsible for closing the lips?

a) Masseter

b) Genioglossus

c) Orbicularis oris

d) Buccinator

2. Which articulator produces the greatest variety of speech sounds?

a) Teeth

b) Tongue

c) Lips

d) Hard palate

3. During production of oral sounds, the velum is:

a) Lowered

b) Raised

c) Relaxed

d) Immobile

Activity 3 – Fill in the Blanks

Use the following words:

- tongue
- velum
- mandible
- lips
- hard palate

1. The _____ is the primary articulator in speech.
2. The _____ separates the oral and nasal cavities during speech.
3. The _____ supports lower teeth and moves during articulation.
4. Bilabial sounds are produced using the _____.
5. The _____ provides a stable articulatory surface.

Activity 4 – Case Study

A 6-year-old child produces excessive nasal resonance and nasal air escape during speech following repair of a cleft palate.

Questions

1. Which articulatory structure is most likely involved?
2. What speech characteristics would you expect?
3. Which assessment procedures should an SLP perform?
4. Suggest two appropriate intervention strategies.

11. Summary

The articulatory system transforms voiced airflow into intelligible speech through the coordinated action of the lips, tongue, jaw, palate, and associated muscles. Precise control of active and passive articulators allows the production of consonants and vowels, while integration with the respiratory and phonatory systems ensures fluent communication. Knowledge of articulatory anatomy and physiology is fundamental for speech-language pathologists in assessing and treating speech disorders associated with structural, neurological, and developmental conditions.

12. Review Questions

1. Define the articulatory system.
2. Name the principal articulators involved in speech production.
3. Distinguish between active and passive articulators.
4. Describe the functions of the tongue in speech production.
5. Explain the role of the soft palate in oral and nasal speech.
6. Identify the major muscles responsible for lip movement.
7. Describe the functions of the mandible during articulation.
8. Explain how the articulatory system interacts with the respiratory and phonatory systems.
9. Describe three speech disorders associated with articulatory dysfunction.
10. Why is knowledge of articulatory anatomy essential for speech-language pathologists?

References

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