

LIN103

GENERAL PHONETICS



Course video is available on our app

Course code: LIN 103
Course title: General Phonetics
Course credit load: 3 Units

Series 1: Foundations of Phonetics in Linguistics

Series 2: Speech Production and Perception Mechanisms

Series 3: Recognition, Reproduction, and Transcription of Sounds

Series 4: Non-Segmental Features: Tone, Stress, and Intonation

Series 5: Applied Phonetics and Laboratory Practice

Proposed Outline for Series 1

Part .1 Introduction to Phonetics

- 1.1.1 Definition and Scope of Phonetics
- 1.1.2 Relationship between Phonetics and Linguistics
- 1.1.3 Importance of Phonetics in Language Study

Part .2 Branches of Phonetics

- 1.2.1 Articulatory Phonetics
- 1.2.2 Acoustic Phonetics
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Part .3 Speech-Producing Mechanism (Overview)

- 1.3.1 Organs of Speech
- 1.3.2 Basic Functions of Speech Organs
- 1.3.3 Interaction of Speech Organs in Sound Production

Part .4 Phonetic Transcription and Symbols

- 1.4.1 International Phonetic Alphabet (IPA)
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Part .5 Phonetics in Linguistic Research and Application

- 1.5.1 Role of Phonetics in Language Teaching
- 1.5.2 Phonetics in Speech Therapy and Communication Studies
- 1.5.3 Phonetics as a Foundation for Further Linguistic Studies



Introduction

Human communication relies heavily on spoken language, and the study of phonetics provides the tools to decode, analyse, and reproduce speech sounds with accuracy. As the foundation of linguistic study, phonetics equips learners with the ability to recognise how sounds are produced, perceived, and transcribed. This Series sets the stage for your journey into General Phonetics, offering the essential concepts and practices that will support your progress in later parts of the course.

The aim of this Series is to introduce you to the fundamental principles of phonetics within linguistics and to equip you with the skills needed to describe, classify, and transcribe speech sounds systematically.

We shall commence this Series by exploring the definition and scope of phonetics, as well as its relationship with linguistics. Next, we will examine the three main branches of phonetics: articulatory, acoustic, and auditory. Following that, we will consider the speech-producing mechanism, focusing on the organs of speech and their functions. Moving on, we will study phonetic transcription and the use of the International Phonetic Alphabet. Finally, we will wrap up by discussing the role of phonetics in linguistic research and its practical applications in areas such as language teaching and speech therapy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 1.1** define phonetics and explain its scope within linguistics,
- **SLO 1.2** describe the relationship between phonetics and other areas of linguistic study,
- **SLO 1.3** identify and distinguish the three main branches of phonetics: articulatory, acoustic, and auditory,
- **SLO 1.4** explain the basic functions of the organs of speech in sound production,
- **SLO 1.5** demonstrate the use of phonetic symbols in transcription using the International Phonetic Alphabet (IPA), and
- **SLO 1.6** analyse the role of phonetics in practical applications such as language teaching, speech therapy, and further linguistic research.

1.1 Introduction to Phonetics

1.1.1 Definition and scope of phonetics



Phonetics is the branch of linguistics that deals with the study of speech sounds. It focuses on how sounds are produced by the human vocal apparatus, how they are transmitted through the air as sound waves, and how they are perceived by the ear and processed by the brain. The scope of phonetics therefore covers three main dimensions: production, transmission, and perception.

Phonetics is essential because it provides the scientific basis for describing and analysing the sounds of any language. Without phonetics, it would be difficult to explain why certain sounds are distinct, how they are classified, and how they can be transcribed accurately.

Fill in the blank: Phonetics is the branch of linguistics that studies _____ sounds.

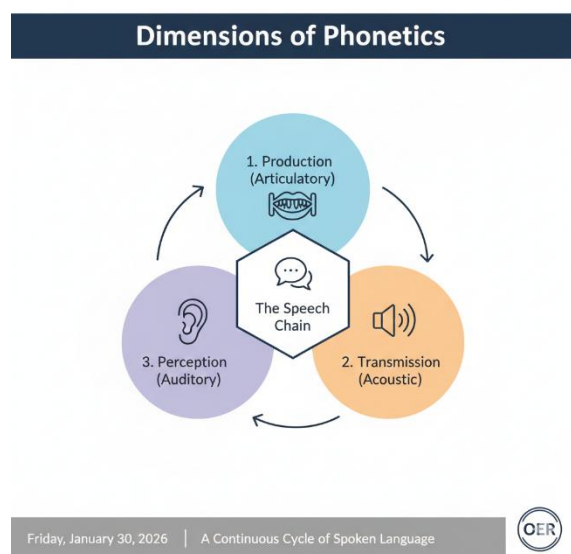


Figure 1.1: Dimensions of phonetics

1.1.2 Relationship between phonetics and linguistics

Phonetics is closely related to other areas of linguistics such as **phonology**, **morphology**, and **syntax**. **Phonology** is the study of how sounds function within a particular language system, while phonetics provides the raw description of the physical sounds themselves. In other words, phonetics describes the sounds, and phonology explains how those sounds are organised and used in communication.

Phonetics also supports language teaching, speech therapy, and computational linguistics by offering precise tools for sound analysis. For example, teachers rely on phonetic transcription to help learners pronounce words correctly, while speech therapists use phonetic knowledge to diagnose and treat speech disorders.

Fill in the blank: Phonetics describes the physical sounds, while _____ explains how those sounds are organised in a language.



Feature	Phonetics (The Physical)	Phonology (The Mental)
Definition	The study of the physical production, acoustic properties, and perception of sounds.	The study of how sounds are organized and used to create meaning within a specific language.
Focus	Universal: Looks at the actual sounds humans can make, regardless of the language.	Language-Specific: Looks at the rules governing sounds in a specific language (e.g., English or Swahili).
Unit of Analysis	Phone: Any distinct speech sound (written in square brackets, like [p]).	Phoneme: The smallest unit of sound that changes meaning (written in slashes, like /p/).
Key Question	How is this sound physically made by the mouth and vocal cords?	Does changing this sound change the meaning of the word?
Example	Analyzing the exact air pressure used to create the "p" sound in "pin."	Knowing that in English, replacing the /p/ in "pin" with a /b/ creates a different word ("bin").

Box 1.1: Phonetics and phonology compared

1.1.3 Importance of phonetics in language study

Phonetics plays a vital role in language study because it enables learners to decode words, pronounce them correctly, and transcribe them using standard symbols. Accurate transcription is particularly important in linguistic research, where scholars need to record and analyse speech data consistently.

Furthermore, phonetics helps learners to appreciate the diversity of human languages by showing how sounds vary across different speech communities. For instance, the same sound may be produced differently in English, Yoruba, or Hausa, yet phonetics provides a framework for describing these variations systematically.

Fill in the blank: Accurate _____ is essential in linguistic research to record and analyse speech data consistently.

Plate 1.1: Practising phonetic transcription



Image of a student practising phonetic transcription in a classroom setting. AI prompt suggestion: “Generate an image of a student writing phonetic symbols in a notebook during a linguistics class.” Search string: “phonetic transcription student practice OER image”

Pilot questions 1.1

1. Which branch of linguistics studies the physical production, transmission, and perception of speech sounds?
2. What is the main difference between phonetics and phonology?
3. Why is phonetics considered essential in language teaching?
4. Which three dimensions form the scope of phonetics?
5. How does phonetics contribute to linguistic research?

1.2 Branches of Phonetics

1.2.1 Articulatory phonetics

Articulatory phonetics is the study of how speech sounds are produced by the movement and interaction of the organs of speech. These organs include the tongue, lips, teeth, alveolar ridge, palate, and vocal cords. Each sound is created by a specific configuration and movement of these organs. For example, the sound /p/ is produced by closing the lips and releasing a burst of air.

Articulatory phonetics provides learners with a clear understanding of the physical processes behind sound production. By learning how sounds are formed, you can better recognise and reproduce them accurately.

Fill in the blank: The sound /p/ is produced by closing the _____ and releasing a burst of air.

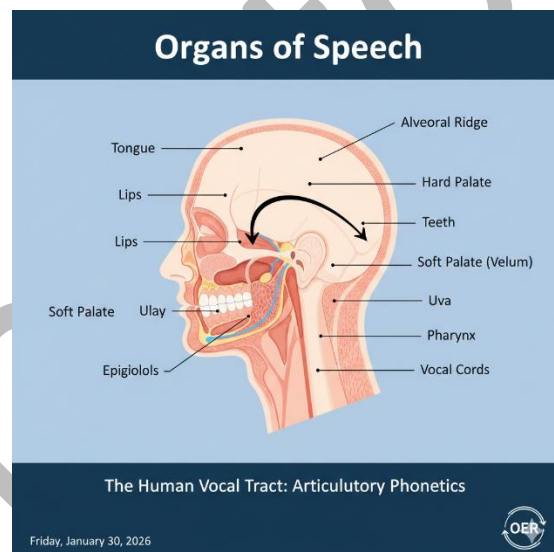


Figure 1.2: Organs of speech in articulatory phonetics



1.2.2 Acoustic phonetics

Acoustic phonetics is the study of the physical properties of speech sounds as they travel through the air. It focuses on sound waves, including their frequency, amplitude, and duration. For instance, vowels typically have a continuous waveform, while consonants often show abrupt changes in the acoustic signal.

Acoustic phonetics is important because it allows us to measure and analyse speech sounds using scientific instruments such as spectrograms. These visual representations help linguists to identify subtle differences between sounds that may not be easily heard.

Fill in the blank: Acoustic phonetics studies the physical properties of speech sounds as they travel through the _____.

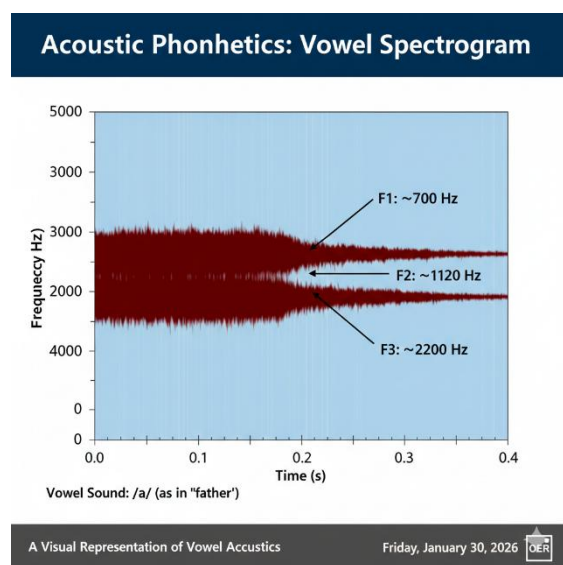


Figure 1.3: Spectrogram of a vowel sound

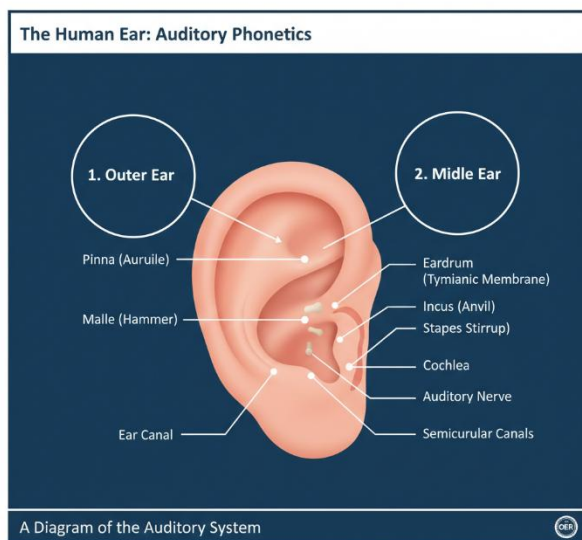
1.2.3 Auditory phonetics

Auditory phonetics is the study of how speech sounds are perceived by the ear and processed by the brain. It examines the physiological and psychological aspects of hearing, including how the ear detects sound waves and how the brain interprets them as meaningful speech.

Auditory phonetics is crucial for understanding communication because it explains why some sounds are easily distinguished while others may be confused. For example, learners of English may struggle to distinguish between /i:/ and /ɪ/, yet auditory phonetics provides insights into why these difficulties occur.

Fill in the blank: Auditory phonetics studies how speech sounds are perceived by the _____ and processed by the brain.





Friday, January 30, 2026

Plate 1.2: Human ear and auditory phonetics

Pilot questions 1.2

1. Which branch of phonetics studies the movement of the organs of speech?
2. What physical properties of sound are analysed in acoustic phonetics?
3. Which scientific tool is commonly used to visualise acoustic properties of speech sounds?
4. What does auditory phonetics focus on in relation to speech sounds?
5. Give one example of a sound distinction that learners may struggle to perceive

1.3 Speech-Producing Mechanism (Overview)

1.3.1 Organs of speech

Organs of speech are the parts of the human body involved in producing sounds. They include the lungs, vocal cords, tongue, lips, teeth, alveolar ridge, hard palate, soft palate, and nasal cavity. Each organ plays a specific role in shaping the sounds we produce. For example, the tongue is highly flexible and can create a wide range of sounds depending on its position.

Understanding the organs of speech is important because it allows us to describe how different sounds are formed and classified.

Fill in the blank: The _____ is highly flexible and can create a wide range of sounds depending on its position.



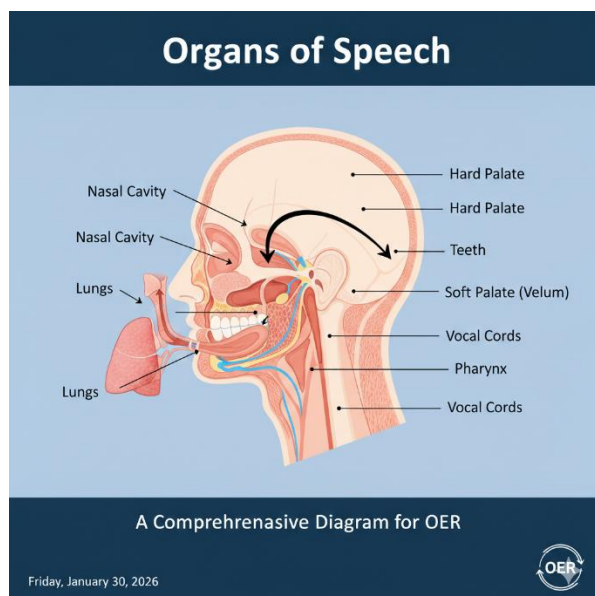


Figure 1.4: Organs of speech in the vocal tract

1.3.2 Basic functions of speech organs

Each organ of speech has a distinct function. The lungs provide the air stream, which is the basis of most speech sounds. The vocal cords vibrate to produce voiced sounds, while remaining open for voiceless sounds. The tongue shapes vowels and consonants by altering its position, and the lips can open, close, or round to modify sounds.

These functions work together to create the variety of sounds found in human languages.

Fill in the blank: The _____ cords vibrate to produce voiced sounds, while remaining open for voiceless sounds.

Organ of Speech	Primary Function in Articulation
Lungs	The Power Source: Provide the pulmonic egressive air stream necessary for almost all speech sounds.
Vocal Cords	The Vibrator: Located in the larynx; they vibrate to create "voiced" sounds (like [b] or [z]) or remain open for "voiceless" sounds (like [p] or [s]).
Tongue	The Primary Shaper: The most flexible organ; different parts (tip, blade, body, root) move to shape vowels and consonants.
Lips	The Modifiers: They can be rounded (for sounds like [u]), closed (for bilabials like [m]), or pressed against teeth (for [f]).



Organ of Speech	Primary Function in Articulation
Teeth	The Passive Articulators: Act as a contact point for the tongue or lips to create dental and labiodental sounds (like "th" or "f").
Alveolar Ridge	The Contact Point: The hard bony ridge behind the upper teeth used for sounds like [t], [d], and [n].
Nasal Cavity	The Resonator: When the velum (soft palate) is lowered, air escapes through the nose to create nasal sounds like [m], [n], and [ŋ].

Table 1.1: Functions of major organs of speech

1.3.3 Interaction of speech organs in sound production

Speech sounds are produced through the coordinated interaction of multiple organs. For instance, the lungs push air through the vocal cords, which may vibrate to create voicing. The tongue and lips then shape the sound into a specific vowel or consonant. This coordination is what makes human speech possible and diverse.

By studying these interactions, learners can analyse how different sounds are produced and why certain sounds are more difficult for speakers of particular languages.

Fill in the blank: Speech sounds are produced through the coordinated _____ of multiple organs.

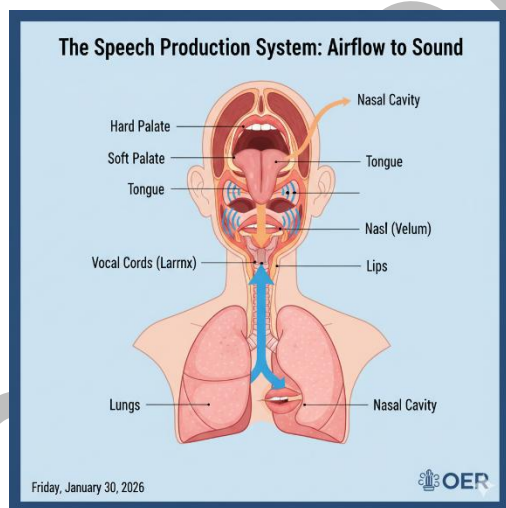


Figure 1.5: Interaction of organs in sound production

Pilot questions 1.3

1. Name three organs of speech involved in sound production.



2. What role do the lungs play in speech?
3. Which organ vibrates to produce voiced sounds?
4. How do the lips modify speech sounds?
5. Why is the interaction of speech organs important in sound production?

1.4 Phonetic Transcription and Symbols

1.4.1 International Phonetic Alphabet (IPA)

The **International Phonetic Alphabet (IPA)** is a system of symbols designed to represent the sounds of all human languages. Each symbol corresponds to a single sound, making it possible to transcribe speech accurately regardless of the language. For example, the English word *cat* can be transcribed as /kæt/, where each symbol represents a distinct sound.

The IPA is important because it provides a universal standard for linguists, teachers, and students to record and analyse speech. Without it, describing sounds across different languages would be inconsistent and confusing.

Fill in the blank: The IPA is a system of _____ designed to represent the sounds of all human languages.

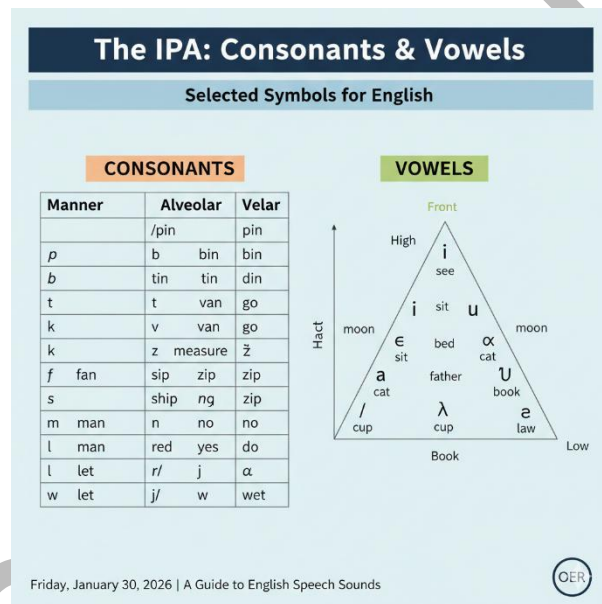


Figure 1.6: Sample of IPA symbols

1.4.2 Principles of phonetic transcription

Phonetic transcription is the practice of writing down speech sounds using phonetic symbols. It follows certain principles: each symbol represents one sound, transcription must be consistent, and



it should reflect the actual pronunciation rather than spelling. For instance, the English word *though* is transcribed as /ðʊ/, which differs from its spelling but matches its pronunciation.

Phonetic transcription helps learners to decode words and pronounce them correctly. It also allows linguists to compare sounds across languages in a systematic way.

Fill in the blank: Phonetic transcription reflects the actual _____ of words rather than their spelling.

Word	Spelling Quirk	Phonetic Transcription
Cat	Standard	[kæt]
City	'c' sounds like 's'	[sɪti]
Chorus	'ch' sounds like 'k'	[kɔːrəs]
Knife	Silent 'k' and 'e'	[naɪf]

Box 1.2: Principles of phonetic transcription

1.4.3 Practical exercises in transcription

Practical exercises in transcription involve listening to speech sounds and writing them using IPA symbols. Learners may begin with simple words and gradually move to longer sentences. For example, the word *school* can be transcribed as /sku:l/. By practising transcription, learners develop accuracy in recognising and recording sounds.

These exercises also improve pronunciation, since learners become more aware of how sounds are produced and represented.

Fill in the blank: The word *school* can be transcribed as _____ using IPA symbols.



Plate 1.3: Students working with IPA transcription



Pilot questions 1.4

1. What does the International Phonetic Alphabet represent?
2. Why is the IPA considered a universal standard?
3. What is the main principle of phonetic transcription?
4. How does phonetic transcription differ from spelling?
5. Give an example of a word transcribed using IPA symbols.

1.5 Phonetics in Linguistic Research and Application

1.5.1 Role of phonetics in language teaching

Language teaching benefits greatly from phonetics because it provides learners with tools to pronounce words accurately and consistently. Teachers use phonetic transcription to show learners how words should sound, which helps to reduce confusion caused by irregular spelling systems. For example, the English word *knight* is pronounced /naɪt/, and phonetics makes this clear despite the complex spelling.

Phonetics also supports learners in distinguishing between similar sounds, such as /s/ and /ʃ/, which can otherwise be difficult to separate.

Fill in the blank: The English word *knight* is pronounced _____, which phonetics makes clear despite its spelling.

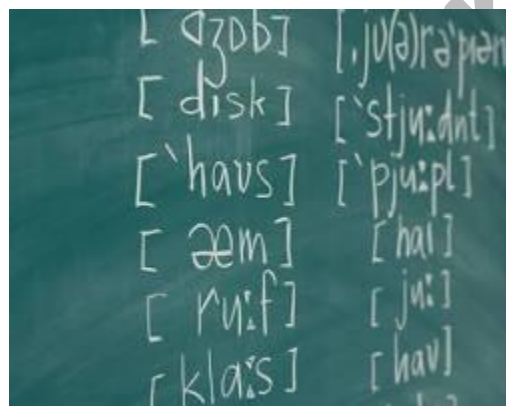


Plate 1.4: Teaching pronunciation with phonetics

1.5.2 Phonetics in speech therapy and communication studies

Speech therapy relies on phonetics to diagnose and treat speech disorders. By analysing how sounds are produced and perceived, therapists can identify difficulties such as misarticulation or stammering. Phonetics provides a framework for designing exercises that help patients improve their speech.



In **communication studies**, phonetics is used to analyse accents, dialects, and variations in speech. This helps researchers to understand how language functions in different social contexts and how communication can be improved.

Fill in the blank: Speech therapy relies on phonetics to diagnose and treat _____ disorders.



Figure 1.7: Phonetics in speech therapy

1.5.3 Phonetics as a foundation for further linguistic studies

Phonetics serves as the foundation for advanced areas of linguistics such as phonology, sociolinguistics, and psycholinguistics. By mastering phonetics, learners gain the competence to extend their knowledge into these fields. For example, phonology builds on phonetics by studying how sounds function within a language system, while sociolinguistics examines how sounds vary across social groups.

Phonetics therefore acts as a gateway to deeper linguistic research and ensures that learners can analyse language scientifically.

Fill in the blank: Phonetics serves as the foundation for advanced areas of linguistics such as _____ and sociolinguistics.

Field	Key Area of Focus	Reliance on Phonetics
Phonology	Systems & Rules	Uses phonetic "features" to define sound groups.
Sociolinguistics	Variation & Society	Uses phonetic "acoustic data" to track dialect shifts.



Field	Key Area of Focus	Reliance on Phonetics
Psycholinguistics	Mental Processing	Uses phonetic "stimuli" to test brain response times.

Box 1.3: Phonetics as a foundation for linguistic studies

Pilot questions 1.5

1. How does phonetics support language teaching?
2. Why is phonetic transcription important in teaching pronunciation?
3. In what way does phonetics assist speech therapists?
4. Which fields of communication studies benefit from phonetic analysis?
5. Name two advanced areas of linguistics that build on phonetics.

Series Summary

This Series has introduced you to the fundamentals of phonetics as the scientific study of speech sounds, highlighting its relevance as the foundation of linguistic analysis and application. We began by defining phonetics and examining its scope within linguistics, then moved on to explore the three main branches: articulatory, acoustic, and auditory phonetics. Following that, we considered the organs of speech, their functions, and how they interact to produce sounds. We continued with phonetic transcription, focusing on the International Phonetic Alphabet and the principles of accurate representation, before concluding with the role of phonetics in language teaching, speech therapy, and further linguistic research.

By completing this Series, you should now be able to define phonetics and explain its scope (SLO 1.1), describe its relationship with other areas of linguistics (SLO 1.2), identify and distinguish its three branches (SLO 1.3), explain the functions of the organs of speech (SLO 1.4), demonstrate transcription using IPA symbols (SLO 1.5), and analyse the role of phonetics in practical applications (SLO 1.6). These outcomes provide you with a strong foundation for progressing into more advanced aspects of phonetics and linguistics.

Glossary of Terms

- **Acoustic phonetics:** The branch of phonetics that studies the physical properties of speech sounds as they travel through the air, focusing on aspects such as frequency, amplitude, and duration.
- **Articulatory phonetics:** The branch of phonetics concerned with how speech sounds are produced by the movement and interaction of the organs of speech, such as the tongue, lips, and vocal cords.



- **Auditory phonetics:** The branch of phonetics that examines how speech sounds are perceived by the ear and processed by the brain, including the physiological and psychological aspects of hearing.
- **International Phonetic Alphabet (IPA):** A universal system of symbols used to represent the sounds of all human languages, ensuring accurate transcription regardless of spelling.
- **Organs of speech:** The parts of the human body involved in producing sounds, including the lungs, vocal cords, tongue, lips, teeth, alveolar ridge, palate, and nasal cavity.
- **Phonetics:** The branch of linguistics that studies speech sounds, focusing on their production, transmission, and perception.
- **Phonetic transcription:** The practice of writing down speech sounds using phonetic symbols, usually from the International Phonetic Alphabet, to reflect actual pronunciation rather than spelling.
- **Phonology:** A related branch of linguistics that studies how sounds function and are organised within a particular language system, distinct from phonetics which describes the physical sounds themselves.
- **Speech therapy:** A field of practice that uses phonetic knowledge to diagnose and treat speech disorders, helping individuals improve their communication abilities.
- **Spectrogram:** A visual representation of the acoustic properties of speech sounds, showing frequency, amplitude, and duration over time.

Concept Check Questions [Series 1]

Objective questions

1. Which branch of phonetics studies how speech sounds are produced by the organs of speech? (Linked to SLO 1.3)
2. The International Phonetic Alphabet (IPA) represents: a) spelling of words b) sounds of all human languages c) grammar rules d) sentence structures (Linked to SLO 1.5)
3. Which organ of speech provides the air stream necessary for sound production? (Linked to SLO 1.4)
4. Acoustic phonetics focuses on: a) perception of sounds b) organisation of sounds in a language c) physical properties of sounds d) spelling systems (Linked to SLO 1.3)
5. Phonetics contributes to speech therapy by: a) analysing spelling errors b) diagnosing and treating speech disorders c) teaching grammar rules d) organising vocabulary lists (Linked to SLO 1.6)

Short-answer questions

1. Define phonetics and explain its scope within linguistics. (Linked to SLO 1.1)
2. Describe the relationship between phonetics and phonology. (Linked to SLO 1.2)
3. Give one example of how phonetic transcription differs from spelling. (Linked to SLO 1.5)
4. Identify two practical applications of phonetics in everyday life. (Linked to SLO 1.6)
5. Name three organs of speech and state their functions. (Linked to SLO 1.4)

Long-answer questions



1. Analyse the importance of phonetics in language teaching, with examples of how it helps learners pronounce words correctly. (Linked to SLO 1.6)
2. Evaluate the role of the three branches of phonetics in linguistic research, explaining how each contributes to a fuller understanding of speech. (Linked to SLO 1.3)
3. Demonstrate how the International Phonetic Alphabet can be used to transcribe words from English or another familiar language, and explain why transcription is necessary. (Linked to SLO 1.5)

Answers to Concept Check Questions [Series 1]

Objective questions

1. Articulatory phonetics.
2. b) sounds of all human languages.
3. Lungs.
4. c) physical properties of sounds.
5. b) diagnosing and treating speech disorders.

Short-answer questions

1. Phonetics is the branch of linguistics that studies speech sounds, focusing on their production, transmission, and perception. Its scope includes articulatory, acoustic, and auditory dimensions.
2. Phonetics describes the physical sounds themselves, while phonology studies how those sounds are organised and function within a language system.
3. Example: The word *though* is spelled with several letters but transcribed as /ðʊ/, reflecting actual pronunciation.
4. Applications include language teaching (helping learners pronounce words correctly) and speech therapy (diagnosing and treating speech disorders).
5. Tongue: shapes vowels and consonants; lips: modify sounds by opening, closing, or rounding; vocal cords: vibrate to produce voiced sounds.

Long-answer questions

1. *Basic response:* Phonetics is important in language teaching because it helps learners pronounce words accurately. Teachers use phonetic transcription to show correct pronunciation, reducing confusion caused by irregular spelling. *Value-added response:* Beyond classroom teaching, phonetics also supports learners in distinguishing subtle sound differences, improves listening skills, and aids in second language acquisition by providing a scientific framework for pronunciation practice.
2. *Basic response:* Articulatory phonetics explains how sounds are produced, acoustic phonetics analyses their physical properties, and auditory phonetics studies how they are perceived. Together, they provide a complete picture of speech. *Value-added response:* In research, articulatory phonetics helps classify sounds, acoustic phonetics allows precise measurement using spectrograms, and auditory phonetics explains perception difficulties.



across languages. This integration supports advanced studies in phonology, sociolinguistics, and psycholinguistics.

3. *Basic response*: The IPA can be used to transcribe words such as *cat* as /kæt/, ensuring accurate representation of sounds. Transcription is necessary because spelling often does not reflect pronunciation. *Value-added response*: Transcription also enables cross-linguistic comparison, supports computational linguistics, and helps preserve endangered languages by recording their sounds systematically. It is a vital tool for both teaching and research.

Answers to Pilot Questions [Series 1]

Pilot questions 1.1

1. Phonetics.
2. Phonology.
3. It helps learners decode words and pronounce them correctly.
4. Production, transmission, and perception.
5. It allows linguists to record and analyse speech data consistently.

Pilot questions 1.2

1. Articulatory phonetics.
2. Frequency, amplitude, and duration.
3. Spectrogram.
4. Auditory phonetics.
5. Distinction between /i:/ and /ɪ/.

Pilot questions 1.3

1. Tongue, lips, vocal cords.
2. The lungs provide the air stream.
3. Vocal cords.
4. By opening, closing, or rounding.
5. Because coordinated interaction produces distinct speech sounds.

Pilot questions 1.4

1. The sounds of all human languages.
2. It provides a universal standard for transcription.
3. One symbol represents one sound.
4. It reflects pronunciation rather than spelling.
5. Example: *cat* transcribed as /kæt/.

Pilot questions 1.5

1. It helps learners pronounce words accurately.



2. It shows correct pronunciation despite irregular spelling.
3. By diagnosing and treating speech disorders.
4. Accents, dialects, and variations in speech.
5. Phonology and sociolinguistics.

References and Attributions [Series 1]

This section compiles all references and illustration attributions used or suggested in Series 1: *Fundamentals of Phonetics in Linguistics*. References are presented in APA style for clarity and consistency.

General References

- International Phonetic Association. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge University Press.
- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Cengage Learning.
- Ashby, M. (2011). *Speech sounds*. Routledge.
- Clark, J., Yallop, C., & Fletcher, J. (2007). *An introduction to phonetics and phonology* (3rd ed.). Wiley-Blackwell.

Illustrations

- *Figure 1.1: Dimensions of phonetics* Attribution: Suggested as AI-generated. Prompt: “Create a simple labelled diagram showing three dimensions of phonetics: production, transmission, perception.” Suggested OER search string: “phonetics production transmission perception diagram OER”.
- *Box 1.1: Phonetics and phonology compared* Attribution: Suggested as AI-generated. Prompt: “Create a text box comparing phonetics and phonology with definitions and examples.” Suggested OER search string: “phonetics vs phonology comparison OER”.
- *Plate 1.1: Practising phonetic transcription* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a student writing phonetic symbols in a notebook during a linguistics class.” Suggested OER search string: “phonetic transcription student practice OER image”.
- *Figure 1.2: Organs of speech in articulatory phonetics* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the human vocal tract highlighting tongue, lips, teeth, alveolar ridge, palate, and vocal cords.” Suggested OER search string: “diagram of human vocal tract articulatory phonetics OER”.
- *Figure 1.3: Spectrogram of a vowel sound* Attribution: Suggested as AI-generated. Prompt: “Generate a spectrogram image showing frequency and amplitude of a vowel sound.” Suggested OER search string: “spectrogram vowel sound acoustic phonetics OER”.



- *Plate 1.2: Human ear and auditory phonetics* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a human ear with labels showing outer, middle, and inner ear.” Suggested OER search string: “human ear diagram auditory phonetics OER”.
- *Figure 1.4: Organs of speech in the vocal tract* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the human vocal tract showing lungs, vocal cords, tongue, lips, teeth, alveolar ridge, palate, and nasal cavity.” Suggested OER search string: “human vocal tract diagram organs of speech OER”.
- *Table 1.1: Functions of major organs of speech* Attribution: Suggested as AI-generated. Prompt: “Generate a simple table listing organs of speech and their functions.” Suggested OER search string: “functions of organs of speech table OER”.
- *Figure 1.5: Interaction of organs in sound production* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing airflow from lungs through vocal cords, shaped by tongue and lips.” Suggested OER search string: “speech production airflow diagram OER”.
- *Figure 1.6: Sample of IPA symbols* Attribution: Suggested as AI-generated. Prompt: “Generate a chart showing IPA consonant and vowel symbols with examples.” Suggested OER search string: “IPA chart consonants vowels OER”.
- *Box 1.2: Principles of phonetic transcription* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing principles of phonetic transcription with examples.” Suggested OER search string: “principles of phonetic transcription OER”.
- *Plate 1.3: Students working with IPA transcription* Attribution: Suggested as AI-generated. Prompt: “Generate an image of students using IPA charts to transcribe words in a classroom.” Suggested OER search string: “students practising IPA transcription OER image”.
- *Plate 1.4: Teaching pronunciation with phonetics* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a teacher writing IPA symbols on a classroom board to explain pronunciation.” Suggested OER search string: “phonetics teaching IPA classroom OER image”.
- *Figure 1.7: Phonetics in speech therapy* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing how phonetics supports diagnosis, treatment, and improvement in speech therapy.” Suggested OER search string: “speech therapy phonetics diagram OER”.
- *Box 1.3: Phonetics as a foundation for linguistic studies* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing advanced areas of linguistics that build on phonetics.” Suggested OER search string: “phonetics foundation for phonology sociolinguistics psycholinguistics OER”.



Course code: LIN 103
Course title: General Phonetics
Course credit load: 3 Units

Series 1: Foundations of Phonetics in Linguistics

Series 2: Speech Production and Perception Mechanisms

Series 3: Recognition, Reproduction, and Transcription of Sounds

Series 4: Non-Segmental Features: Tone, Stress, and Intonation

Series 5: Applied Phonetics and Laboratory Practice

Proposed Outline for Series 2

Part .1 The Speech-Producing Mechanism

- 2.1.1 Respiratory system and its role in speech
- 2.1.2 Phonation and the function of the vocal cords
- 2.1.3 Articulators and their contribution to sound shaping

Part .2 Processes of Speech Production

- 2.2.1 Initiation of the air stream
- 2.2.2 Voicing and voicelessness
- 2.2.3 Manner and place of articulation

Part .3 Acoustic Properties of Speech Sounds

- 2.3.1 Frequency, amplitude, and duration
- 2.3.2 Spectrograms and visual analysis of sounds
- 2.3.3 Distinguishing vowels and consonants acoustically

Part .4 Mechanisms of Speech Perception

- 2.4.1 The auditory system and hearing process
- 2.4.2 Perceptual cues for distinguishing sounds
- 2.4.3 Challenges in speech perception across languages

Part .5 Integration of Production and Perception



- 2.5.1 Feedback mechanisms in speech
- 2.5.2 Role of perception in refining pronunciation
- 2.5.3 Applications in language learning and therapy

Introduction

In the last Series, we explored the fundamentals of phonetics, focusing on its scope, branches, transcription, and applications. Building on that foundation, this Series turns to the actual processes that make speech possible, examining how sounds are produced by the human body and how they are perceived by the ear and brain. Understanding these mechanisms is crucial because they form the bridge between the physical act of speaking and the cognitive act of listening, both of which are central to communication.

The aim of this Series is to equip you with a clear understanding of the physiological and acoustic processes involved in speech production, as well as the perceptual mechanisms that allow us to interpret sounds. By the end, you will be able to analyse how speech is generated, transmitted, and perceived, and apply this knowledge to practical and academic contexts.

We shall commence this Series by studying the speech-producing mechanism, focusing on the respiratory system, phonation, and articulators. Next, we will examine the processes of speech production, including initiation of the air stream, voicing, and articulation. Following that, we will explore the acoustic properties of speech sounds, with attention to frequency, amplitude, and spectrogram analysis. Moving on, we will consider the mechanisms of speech perception, looking at the auditory system and perceptual cues. Finally, we will wrap up by integrating production and perception, highlighting feedback mechanisms and practical applications in language learning and therapy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 2.1** describe the role of the respiratory system, phonation, and articulators in the speech-producing mechanism,
- **SLO 2.2** explain the processes involved in speech production, including initiation of the air stream, voicing, and articulation,
- **SLO 2.3** analyse the acoustic properties of speech sounds by identifying frequency, amplitude, duration, and spectrographic features,
- **SLO 2.4** demonstrate how the auditory system perceives speech sounds and explain the perceptual cues used to distinguish them, and
- **SLO 2.5** evaluate the integration of production and perception mechanisms, highlighting feedback processes and their applications in language learning and therapy.



2.1 The Speech-Producing Mechanism

2.1.1 Respiratory system and its role in speech

The **respiratory system** refers to the organs responsible for breathing, including the lungs, trachea, and diaphragm. In speech production, the respiratory system provides the **air stream**, which serves as the energy source for most sounds. Without a steady flow of air, speech would not be possible. The lungs push air upward through the trachea, and the diaphragm controls the pressure and flow of this air.

Fill in the blank: The _____ provides the air stream that serves as the energy source for speech sounds.

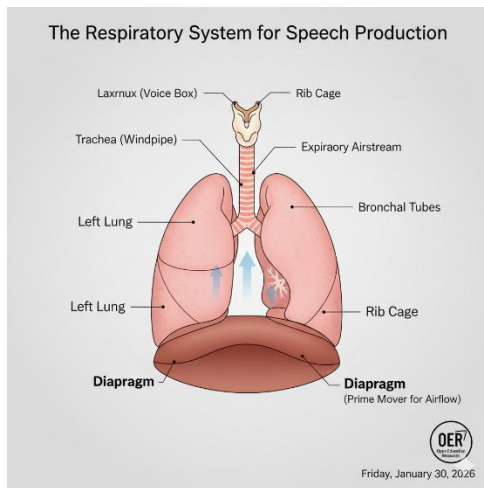


Figure 2.1: Respiratory system in speech production

2.1.2 Phonation and the function of the vocal cords

Phonation is the process by which the **vocal cords** (also called vocal folds) vibrate to produce sound. When air passes through the vocal cords, they can either vibrate to create **voiced sounds** (such as /b/ and /d/) or remain open to produce **voiceless sounds** (such as /p/ and /t/). The pitch and quality of the voice depend on the tension and length of the vocal cords.

Phonation is central to speech because it determines whether a sound carries vibration or not, which is a key distinction in many languages.

Fill in the blank: When the vocal cords vibrate, they produce _____ sounds.



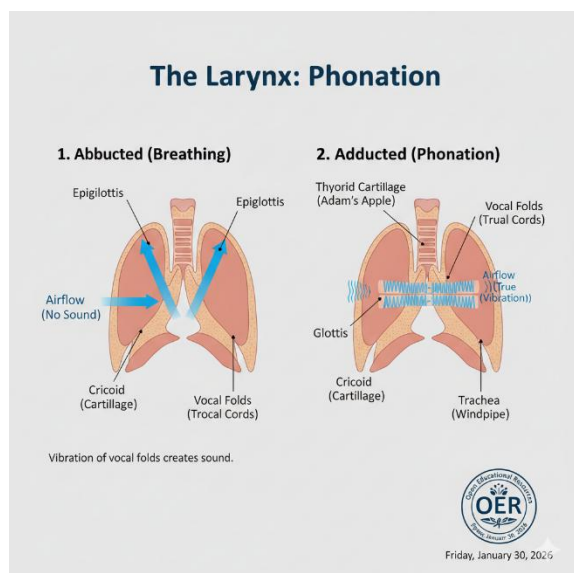


Figure 2.2: Vocal cords and phonation process

2.1.3 Articulators and their contribution to sound shaping

Articulators are the movable and immovable parts of the vocal tract that shape the air stream into distinct sounds. Movable articulators include the tongue, lips, and soft palate, while immovable articulators include the teeth, alveolar ridge, and hard palate. By adjusting their position and movement, articulators create different speech sounds. For example, the tongue touching the alveolar ridge produces sounds like /t/ and /d/.

Articulators are essential because they give speech its variety and allow languages to have unique sound systems.

Fill in the blank: The tongue touching the _____ ridge produces sounds such as /t/ and /d/.

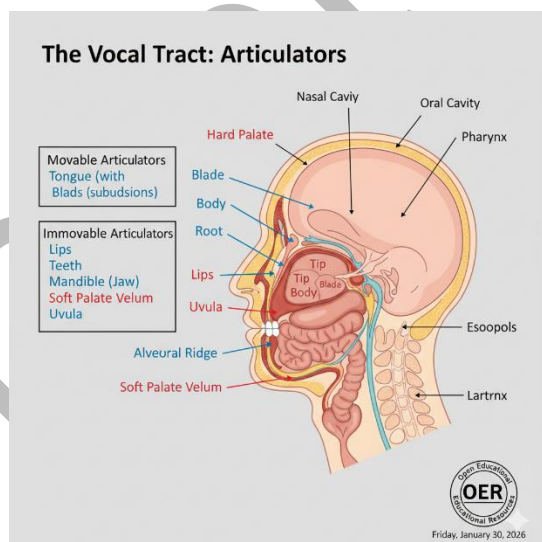


Figure 2.3: Articulators in speech production

Pilot questions 2.1

1. Which system provides the air stream necessary for speech production?
2. What is the process called when vocal cords vibrate to produce sound?
3. Give two examples of voiced sounds.
4. Name two movable and two immovable articulators.
5. Which articulator is involved in producing the sounds /t/ and /d/?

2.2 Processes of Speech Production

2.2.1 Initiation of the air stream

Initiation refers to the process of starting the flow of air that is required for speech. In most languages, this air stream is **pulmonic**, meaning it originates from the lungs. The diaphragm and intercostal muscles control the pressure and release of air, which then travels upward through the vocal tract. Some languages also use non-pulmonic initiation, such as clicks, which rely on suction created in the mouth.

Fill in the blank: In most languages, the air stream used for speech is _____, meaning it originates from the lungs.

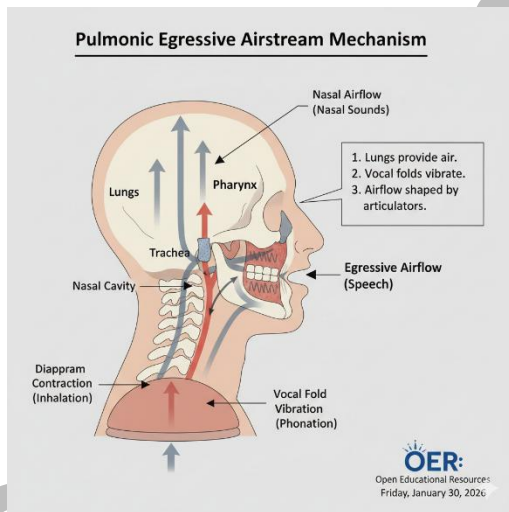


Figure 2.4: Pulmonic air stream initiation

2.2.2 Voicing and voicelessness

Voicing occurs when the vocal cords vibrate as air passes through them, producing sounds such as /z/ and /v/. **Voicelessness** occurs when the vocal cords remain open, allowing air to pass without



vibration, producing sounds such as /s/ and /f/. The distinction between voiced and voiceless sounds is fundamental in phonetics and is used to classify consonants across languages.

Fill in the blank: When the vocal cords remain open and do not vibrate, the resulting sounds are described as _____.

Feature	Voiced Consonants	Voiceless Consonants
Vocal Fold Action	Vibrating	Still / Open
Examples (Plosives)	/b/, /d/, /g/	/p/, /t/, /k/
Examples (Fricatives)	/v/, /z/, /ð/ (th)	/f/, /s/, /θ/ (th)
Examples (Affricates)	/dʒ/ (judge)	/tʃ/ (church)

Table 2.1: Examples of voiced and voiceless consonants

2.2.3 Manner and place of articulation

Manner of articulation describes how the air stream is modified to produce different sounds. For example, in a stop consonant like /p/, the air is completely blocked and then released, while in a fricative like /f/, the air is forced through a narrow passage creating friction.

Place of articulation refers to where in the vocal tract the sound is produced. For instance, /t/ is articulated at the alveolar ridge, while /k/ is produced at the velum. Together, manner and place of articulation provide a systematic way to classify consonants.

Fill in the blank: The sound /k/ is produced at the _____, which is located at the back of the mouth.

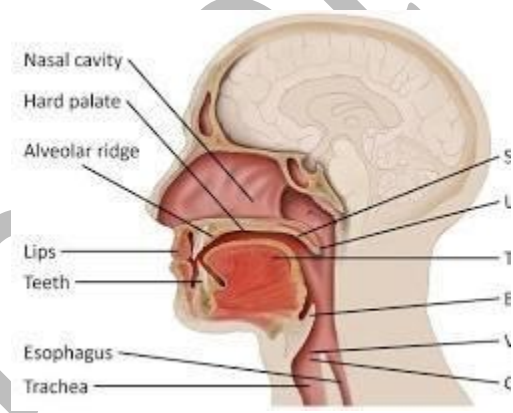


Figure 2.5: Places of articulation in the vocal tract

Pilot questions 2.2



1. What is the most common type of air stream initiation in human languages?
2. Give two examples of voiced sounds and two examples of voiceless sounds.
3. What happens to the vocal cords during voicing?
4. Define manner of articulation and give one example.
5. Where is the sound /t/ articulated in the vocal tract?

2.3 Acoustic Properties of Speech Sounds

2.3.1 Frequency, amplitude, and duration

Frequency refers to the number of vibrations per second of a sound wave, measured in Hertz (Hz). It determines the pitch of a sound, with higher frequencies producing higher pitches. **Amplitude** is the strength or intensity of the sound wave, which corresponds to loudness. **Duration** is the length of time a sound is sustained. Together, these properties define the acoustic character of speech sounds.

Fill in the blank: The _____ of a sound wave determines its pitch, measured in Hertz (Hz).

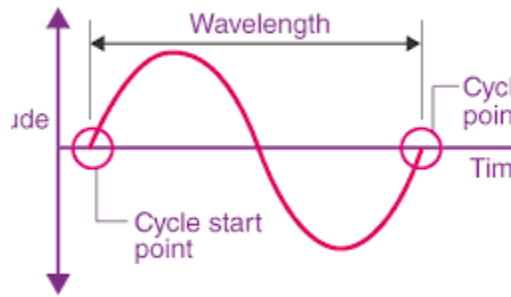


Figure 2.6: Acoustic properties of sound waves

2.3.2 Spectrograms and visual analysis of sounds

A **spectrogram** is a visual representation of the acoustic properties of speech sounds. It displays frequency on the vertical axis, time on the horizontal axis, and amplitude as variations in shading or colour. Spectrograms allow linguists to analyse subtle differences between sounds, such as distinguishing vowels or identifying consonant transitions.

Spectrograms are particularly useful in research and teaching because they make invisible sound properties visible and measurable.

Fill in the blank: A _____ displays frequency, time, and amplitude of speech sounds in a visual format.



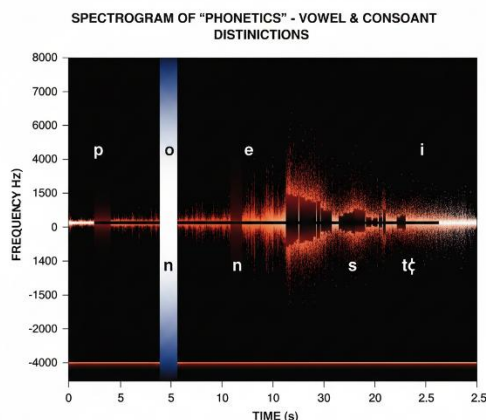


Figure 2.7: Spectrogram analysis of speech sounds

2.3.3 Distinguishing vowels and consonants acoustically

Vowels and consonants differ in their acoustic properties. **Vowels** typically have continuous, periodic waveforms with clear formant patterns (resonant frequencies of the vocal tract). **Consonants**, on the other hand, often show abrupt changes, interruptions, or noise-like qualities in spectrograms. These differences make it possible to classify sounds based on their acoustic features.

Fill in the blank: Vowels are characterised by clear _____ patterns, which are resonant frequencies of the vocal tract.

Feature	Vowels	Consonants
Waveform Appearance	Continuous & Periodic: Shows a regular, repeating pattern of vocal fold vibration.	Abrupt & Interrupted: Often looks like "noise" (fricatives) or a total silence followed by a burst (stops).
Formants	Clear Resonant Patterns: Defined horizontal bands (F ₁ , F ₂ , F ₃) that indicate tongue position.	Less Distinct: Formants are often absent, or only visible during the transition to a vowel.
Acoustic Quality	Smooth & Sustained: High energy and sonority; the "musical" part of speech.	Noise-like or Transient: Characterized by friction, pops, or rapid changes in airflow.

Table 2.2: Acoustic differences between vowels and consonants



Pilot questions 2.3

1. What property of a sound wave determines its pitch?
2. Which acoustic property corresponds to loudness?
3. What does a spectrogram display on its vertical and horizontal axes?
4. How do vowels differ from consonants acoustically?
5. What are formants in vowel sounds?

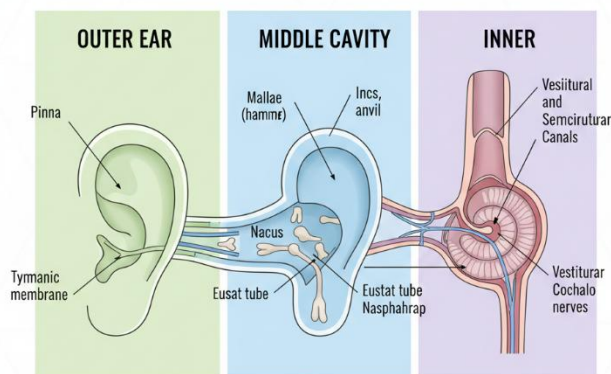
2.4 Mechanisms of Speech Perception

2.4.1 The auditory system and hearing process

The **auditory system** is the biological structure that enables us to hear and interpret sounds. It consists of the outer ear, middle ear, and inner ear. The outer ear collects sound waves, the middle ear amplifies them through the ossicles, and the inner ear (particularly the cochlea) converts them into electrical signals that are sent to the brain. This process allows speech sounds to be transformed from physical vibrations into meaningful information.

Fill in the blank: The _____ converts sound vibrations into electrical signals that are sent to the brain.

HUMAN EAR: STRUCTURE AND SECTIONS



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Figure 2.8: The auditory system in speech perception

2.4.2 Perceptual cues for distinguishing sounds



Perceptual cues are the features listeners rely on to differentiate speech sounds. These include pitch, loudness, duration, and formant patterns. For example, the difference between /i:/ and /ɪ/ in English is partly based on the distinct formant frequencies of the vowels. Listeners use these cues unconsciously to identify words and meanings in everyday communication.

Fill in the blank: Listeners rely on perceptual cues such as pitch, loudness, duration, and _____ patterns to distinguish sounds.

PERCEPTUAL CUES IN SPEECH PERCEPTION

Cue	Example
Pitch	Distinguishing high vs low tones
Loudness	Differentiating stressed vs unstressed syllables
Duration	Identifying long vs short vowels
Formants	Distinguishing vowel qualities /ie/ vs /i/

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Table 2.3: Examples of perceptual cues in speech perception

2.4.3 Challenges in speech perception across languages

Speech perception is not always straightforward. Learners often face challenges when distinguishing sounds that do not exist in their native language. For example, Japanese speakers may struggle to differentiate between /r/ and /l/ in English, while English speakers may find it difficult to perceive tonal differences in Mandarin. These challenges highlight the importance of phonetic training and exposure to diverse sound systems.

Fill in the blank: English speakers often struggle to perceive tonal differences in _____.





Plate 2.1: Learners practising speech perception

Pilot questions 2.4

1. Which part of the auditory system converts vibrations into electrical signals?
2. Name two perceptual cues used to distinguish speech sounds.
3. What is the difference between /i:/ and /ɪ/ based on acoustic features?
4. Why might Japanese speakers struggle with English /r/ and /l/?
5. Give one example of a challenge faced by English speakers in perceiving another language.

2.5 Integration of Production and Perception

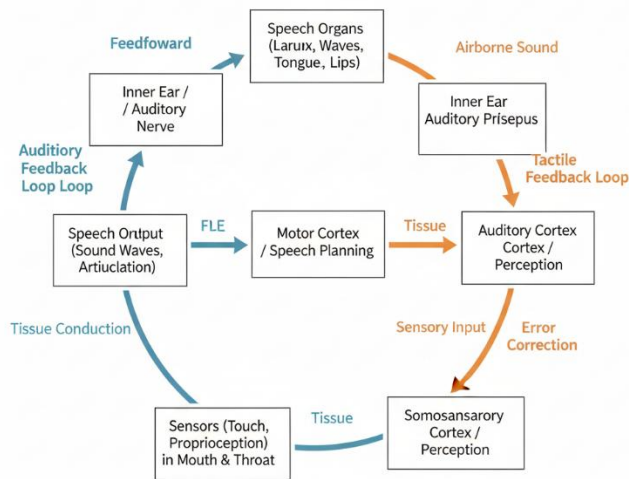
2.5.1 Feedback mechanisms in speech

Feedback mechanisms refer to the ways speakers monitor and adjust their own speech during communication. This involves both **auditory feedback** (listening to oneself while speaking) and **tactile feedback** (sensing the position and movement of articulators). These mechanisms help speakers correct errors, maintain fluency, and adapt to different speaking environments.

Fill in the blank: Listening to oneself while speaking is an example of _____ feedback.



SPEECH PRODUCTION: AUDITORY & TACTILE FEEDBACK LOOPS



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Figure 2.9: Feedback mechanisms in speech

2.5.2 Role of perception in refining pronunciation

Perception plays a vital role in improving pronunciation. Learners rely on their ability to hear and distinguish sounds in order to reproduce them accurately. For example, distinguishing between /θ/ and /s/ in English requires careful listening before correct articulation can be achieved. Phonetic training often combines listening exercises with production practice to refine pronunciation.

Fill in the blank: Distinguishing between /θ/ and /s/ requires careful _____ before correct articulation can be achieved.





Plate 2.2: Learners refining pronunciation through perception

2.5.3 Applications in language learning and therapy

The integration of production and perception has practical applications in both **language learning** and **speech therapy**. In language learning, students improve pronunciation by combining listening with speaking practice. In speech therapy, patients are trained to monitor their own speech and adjust it based on auditory feedback. This integration ensures that communication is both accurate and effective.

Fill in the blank: In speech therapy, patients are trained to monitor their own speech using _____ feedback.

Field	Application & Integration
Language Learning	Combining listening and speaking practice so learners can perceive phonetic nuances before replicating them.
Speech Therapy	Monitoring and adjusting speech through real-time auditory and tactile feedback loops.
Communication Studies	Analyzing how perception influences production in social contexts (e.g., matching a partner's speech rate).
Audiology	Using hearing technology to restore the perceptual link, allowing for better self-monitoring of one's own voice.

Box 2.1: Applications of production–perception integration



Pilot questions 2.5

1. What are feedback mechanisms in speech?
2. Give one example of auditory feedback.
3. How does perception help learners refine pronunciation?
4. Why is the integration of production and perception important in speech therapy?
5. List two practical applications of integrating production and perception.

Series Summary

This Series has focused on the mechanisms that make speech possible, highlighting both the physiological processes of production and the perceptual processes of interpretation. We began by examining the speech-producing mechanism, including the respiratory system, phonation, and articulators. Then we explored the processes of speech production, such as initiation of the air stream, voicing, and articulation. Following that, we considered the acoustic properties of speech sounds, looking at frequency, amplitude, duration, and spectrogram analysis. We continued with the mechanisms of speech perception, focusing on the auditory system, perceptual cues, and cross-linguistic challenges. Finally, we integrated production and perception, emphasising feedback mechanisms and their applications in language learning and therapy.

By completing this Series, you should now be able to describe the role of the respiratory system, phonation, and articulators (SLO 2.1), explain the processes of speech production (SLO 2.2), analyse the acoustic properties of speech sounds (SLO 2.3), demonstrate how the auditory system perceives speech and explain perceptual cues (SLO 2.4), and evaluate the integration of production and perception mechanisms in practical contexts (SLO 2.5). These outcomes provide you with a comprehensive understanding of how speech is generated and interpreted, preparing you for deeper study in phonetics and related fields.

Glossary of Terms

- **Amplitude:** The strength or intensity of a sound wave, which corresponds to how loud a sound is.
- **Articulators:** The movable and immovable parts of the vocal tract that shape the air stream into speech sounds, such as the tongue, lips, teeth, alveolar ridge, and palate.
- **Auditory system:** The biological structure that enables hearing, consisting of the outer ear, middle ear, and inner ear, including the cochlea.
- **Duration:** The length of time a sound is sustained during speech.
- **Feedback mechanisms:** Processes by which speakers monitor and adjust their own speech, including auditory feedback (listening to oneself) and tactile feedback (sensing articulator movement).
- **Formants:** Resonant frequencies of the vocal tract that characterise vowel sounds and help distinguish them acoustically.
- **Frequency:** The number of vibrations per second of a sound wave, measured in Hertz (Hz), which determines the pitch of a sound.



- **Initiation:** The process of starting the flow of air needed for speech, usually originating from the lungs (pulmonic initiation).
- **Manner of articulation:** The way in which the air stream is modified to produce different sounds, such as stops, fricatives, or nasals.
- **Perceptual cues:** Features such as pitch, loudness, duration, and formant patterns that listeners use to distinguish speech sounds.
- **Phonation:** The process by which the vocal cords vibrate to produce voiced sounds.
- **Place of articulation:** The location in the vocal tract where a sound is produced, such as the alveolar ridge, velum, or lips.
- **Respiratory system:** The organs involved in breathing, including the lungs, trachea, and diaphragm, which provide the air stream for speech.
- **Spectrogram:** A visual representation of speech sounds showing frequency, time, and amplitude, often used to analyse vowels and consonants.
- **Voiced sounds:** Speech sounds produced when the vocal cords vibrate, such as /b/ and /z/.
- **Voiceless sounds:** Speech sounds produced when the vocal cords remain open and do not vibrate, such as /p/ and /s/.

Concept Check Questions [Series 2]

Objective questions

1. Which organ provides the air stream necessary for speech production? (Linked to SLO 2.1)
2. Voiced sounds are produced when: a) the vocal cords remain open b) the vocal cords vibrate c) the tongue touches the alveolar ridge d) the lips are rounded (Linked to SLO 2.2)
3. The property of a sound wave that determines pitch is: (Linked to SLO 2.3)
4. A spectrogram displays: a) spelling patterns b) frequency, time, and amplitude c) grammar rules d) articulator positions (Linked to SLO 2.3)
5. Which part of the auditory system converts vibrations into electrical signals? (Linked to SLO 2.4)

Short-answer questions

1. Define phonation and explain its role in speech production. (Linked to SLO 2.1)
2. Give two examples of voiced sounds and two examples of voiceless sounds. (Linked to SLO 2.2)
3. What are formants, and why are they important in distinguishing vowels? (Linked to SLO 2.3)
4. Identify two perceptual cues used in speech perception. (Linked to SLO 2.4)
5. Explain one practical application of integrating production and perception in speech therapy. (Linked to SLO 2.5)

Long-answer questions

1. Analyse the role of the respiratory system, phonation, and articulators in producing speech sounds. (Linked to SLO 2.1)



2. Evaluate the distinction between voiced and voiceless sounds, giving examples and explaining their importance in language. (Linked to SLO 2.2)
3. Demonstrate how spectrograms can be used to analyse vowels and consonants, and explain why this analysis is useful. (Linked to SLO 2.3)
4. Discuss the challenges learners face in perceiving speech sounds across languages, with examples. (Linked to SLO 2.4)
5. Assess the importance of feedback mechanisms in refining pronunciation, with reference to language learning and therapy. (Linked to SLO 2.5)

Answers to Concept Check Questions [Series 2]

Objective questions

1. Lungs.
2. b) the vocal cords vibrate.
3. Frequency.
4. b) frequency, time, and amplitude.
5. Cochlea (inner ear).

Short-answer questions

1. Phonation is the vibration of the vocal cords to produce voiced sounds. It is essential for distinguishing between voiced and voiceless sounds.
2. Voiced: /b/, /z/; Voiceless: /p/, /s/.
3. Formants are resonant frequencies of the vocal tract that characterise vowels. They are important because they allow listeners to distinguish vowel qualities.
4. Pitch and duration (other possible answers: loudness, formant patterns).
5. In speech therapy, patients use auditory feedback to monitor and adjust their speech, improving clarity and accuracy.

Long-answer questions

1. *Basic response:* The respiratory system provides the air stream, phonation involves vocal cord vibration, and articulators shape the sounds. *Value-added response:* Together, these mechanisms form a coordinated system. The lungs supply energy, the vocal cords add voicing, and articulators create distinctions between sounds, enabling the diversity of human languages.
2. *Basic response:* Voiced sounds involve vocal cord vibration (e.g., /b/, /d/), while voiceless sounds do not (e.g., /p/, /t/). *Value-added response:* This distinction is crucial for meaning in language. For example, “bat” and “pat” differ only in voicing. Such contrasts are fundamental to phonological systems across languages.
3. *Basic response:* Spectrograms show frequency, time, and amplitude, allowing analysis of vowels and consonants. *Value-added response:* Spectrograms reveal formant patterns in vowels and noise bursts in consonants, making them invaluable for linguistic research, teaching pronunciation, and diagnosing speech disorders.



4. *Basic response*: Learners struggle with sounds absent in their native language, such as Japanese speakers with English /r/ and /l/. *Value-added response*: These challenges arise from perceptual biases shaped by native language. For example, English speakers may struggle with Mandarin tones. Phonetic training helps overcome these difficulties by retraining perception.
5. *Basic response*: Feedback mechanisms allow speakers to monitor and adjust their pronunciation. *Value-added response*: In language learning, auditory feedback helps refine pronunciation, while in therapy, tactile and auditory feedback are used to correct speech disorders. This integration ensures effective communication and supports long-term improvement.

Answers to Pilot Questions [Series 2]

Pilot questions 2.1

1. The respiratory system (lungs).
2. Phonation.
3. /b/ and /d/.
4. Movable: tongue, lips; Immovable: teeth, alveolar ridge.
5. The alveolar ridge.

Pilot questions 2.2

1. Pulmonic air stream initiation.
2. Voiced: /z/, /v/; Voiceless: /s/, /f/.
3. The vocal cords vibrate.
4. Manner of articulation describes how the air stream is modified, e.g., a stop consonant like /p/.
5. At the alveolar ridge.

Pilot questions 2.3

1. Frequency.
2. Amplitude.
3. Frequency on the vertical axis and time on the horizontal axis.
4. Vowels have continuous waveforms and clear formant patterns, while consonants show abrupt changes or noise-like qualities.
5. Resonant frequencies of the vocal tract.

Pilot questions 2.4

1. The cochlea.
2. Pitch and formant patterns (other valid answers: loudness, duration).
3. They differ in formant frequencies.
4. Because their native language does not distinguish these sounds.
5. Perceiving tonal differences in Mandarin.

Pilot questions 2.5



1. Processes by which speakers monitor and adjust their own speech.
2. Listening to oneself while speaking.
3. By enabling learners to hear distinctions before reproducing them accurately.
4. It helps patients monitor and adjust their speech for clarity.
5. Language learning and speech therapy.

References and Attributions [Series 2]

This section compiles all references and illustration attributions used or suggested in *Series 2: Mechanisms of Speech Production and Perception*. References are presented in APA style for clarity and consistency.

General References

- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Cengage Learning.
- Ashby, M. (2011). *Speech sounds*. Routledge.
- Clark, J., Yallop, C., & Fletcher, J. (2007). *An introduction to phonetics and phonology* (3rd ed.). Wiley-Blackwell.
- International Phonetic Association. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge University Press.

Illustrations

- *Figure 2.1: Respiratory system in speech production* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the respiratory system highlighting lungs, trachea, and diaphragm for speech production.” Suggested OER search string: “respiratory system diagram speech production OER”.
- *Figure 2.2: Vocal cords and phonation process* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the larynx showing vocal cords and airflow during phonation.” Suggested OER search string: “larynx vocal cords phonation diagram OER”.
- *Figure 2.3: Articulators in speech production* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the vocal tract showing movable and immovable articulators.” Suggested OER search string: “vocal tract diagram articulators OER”.
- *Figure 2.4: Pulmonic air stream initiation* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram showing airflow from lungs through diaphragm and vocal tract for speech.” Suggested OER search string: “pulmonic air stream diagram speech OER”.
- *Table 2.1: Examples of voiced and voiceless consonants* Attribution: Suggested as AI-generated. Prompt: “Generate a simple table listing examples of voiced and voiceless consonants.” Suggested OER search string: “voiced vs voiceless consonants table OER”.
- *Figure 2.5: Places of articulation in the vocal tract* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the vocal tract showing places of



articulation such as alveolar ridge, velum, lips.” Suggested OER search string: “places of articulation diagram phonetics OER”.

- *Figure 2.6: Acoustic properties of sound waves* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of a sound wave showing frequency, amplitude, and duration.” Suggested OER search string: “sound wave diagram frequency amplitude duration OER”.
- *Figure 2.7: Spectrogram analysis of speech sounds* Attribution: Suggested as AI-generated. Prompt: “Generate a spectrogram image showing vowel and consonant differences in speech.” Suggested OER search string: “spectrogram analysis speech sounds OER”.
- *Table 2.2: Acoustic differences between vowels and consonants* Attribution: Suggested as AI-generated. Prompt: “Generate a table comparing acoustic properties of vowels and consonants.” Suggested OER search string: “acoustic differences vowels consonants table OER”.
- *Figure 2.8: The auditory system in speech perception* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the human ear showing outer, middle, and inner ear with cochlea.” Suggested OER search string: “human ear diagram auditory system OER”.
- *Table 2.3: Examples of perceptual cues in speech perception* Attribution: Suggested as AI-generated. Prompt: “Generate a table listing perceptual cues in speech perception with examples.” Suggested OER search string: “perceptual cues speech perception table OER”.
- *Plate 2.1: Learners practising speech perception* Attribution: Suggested as AI-generated. Prompt: “Generate an image of students wearing headphones practising listening exercises in a language class.” Suggested OER search string: “speech perception language learners OER image”.
- *Figure 2.9: Feedback mechanisms in speech* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing auditory and tactile feedback loops in speech production.” Suggested OER search string: “speech production feedback mechanisms diagram OER”.
- *Plate 2.2: Learners refining pronunciation through perception* Attribution: Suggested as AI-generated. Prompt: “Generate an image of students practising pronunciation with listening and speaking drills in class.” Suggested OER search string: “language learners pronunciation listening drills OER image”.
- *Box 2.1: Applications of production–perception integration* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing applications of integrating speech production and perception.” Suggested OER search string: “applications of speech production and perception integration OER”.



Course code: LIN 103
Course title: General Phonetics
Course credit load: 3 Units

Series 1: Foundations of Phonetics in Linguistics

Series 2: Speech Production and Perception Mechanisms

Series 3: Recognition, Reproduction, and Transcription of Sounds

Series 4: Non-Segmental Features: Tone, Stress, and Intonation

Series 5: Applied Phonetics and Laboratory Practice

Proposed Outline for Series 3

Part .1 Recognition of Speech Sounds

- 3.1.1 Identifying vowels and consonants in context
- 3.1.2 Distinguishing voiced and voiceless sounds
- 3.1.3 Recognising suprasegmental features (stress, intonation, rhythm)

Part .2 Reproduction of Speech Sounds

- 3.2.1 Techniques for accurate articulation
- 3.2.2 Practising vowel and consonant contrasts
- 3.2.3 Exercises for suprasegmental reproduction

Part .3 Phonetic Transcription Using IPA

- 3.3.1 Principles of phonetic transcription
- 3.3.2 Transcribing words and short sentences
- 3.3.3 Common challenges and strategies for accuracy

Part .4 Applied Practice in Recognition and Transcription

- 3.4.1 Listening and transcription drills
- 3.4.2 Peer and self-evaluation of transcription accuracy
- 3.4.3 Applications in language learning and speech therapy



Introduction

In the last Series, we examined how speech is produced and perceived, focusing on the physiological and acoustic mechanisms that make communication possible. Building on that foundation, this Series turns to the practical skills of recognising, reproducing, and transcribing speech sounds. These abilities are essential for learners of linguistics, language teachers, and speech therapists, as they provide the tools to analyse and represent spoken language with precision.

The aim of this Series is to enable you to identify speech sounds accurately, reproduce them with confidence, and transcribe them using the International Phonetic Alphabet (IPA). By the end, you will be equipped with practical skills that connect theoretical knowledge of phonetics to real-world applications in language learning and professional practice.

We shall commence this Series by focusing on the recognition of speech sounds, including vowels, consonants, and suprasegmental features such as stress and intonation. Next, we will move on to the reproduction of sounds, where you will practise articulation and refine contrasts between vowels and consonants. Following that, we will explore phonetic transcription using the IPA, considering its principles, applications, and common challenges. Finally, we will wrap up with applied practice in recognition and transcription, where listening drills and evaluation exercises will help consolidate your skills and highlight their relevance in language learning and therapy.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 3.1** identify vowels, consonants, and suprasegmental features such as stress and intonation in spoken language,
- **SLO 3.2** demonstrate accurate reproduction of vowel and consonant contrasts through articulation practice,
- **SLO 3.3** apply techniques for reproducing suprasegmental features including rhythm and intonation patterns,
- **SLO 3.4** explain the principles of phonetic transcription using the International Phonetic Alphabet (IPA),
- **SLO 3.5** transcribe words and short sentences using IPA with accuracy.

3.1 Recognition of Speech Sounds

3.1.1 Identifying vowels and consonants in context

Vowels are speech sounds produced without significant obstruction of the air stream in the vocal tract. They are characterised by resonance and formant patterns. **Consonants**, on the other hand, are produced with varying degrees of obstruction, such as closure or narrowing of the vocal tract.



Recognising vowels and consonants in context involves listening carefully to how they function within words and sentences. For example, vowels often form the nucleus of syllables, while consonants typically occur at the margins.

Fill in the blank: Vowels are produced without significant _____ of the air stream in the vocal tract.

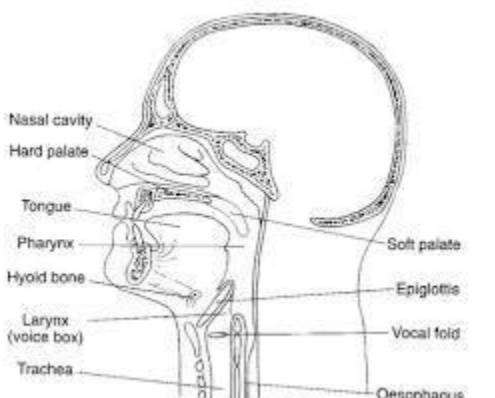


Figure 3.1: Vowel and consonant production in the vocal tract

3.1.2 Distinguishing voiced and voiceless sounds

Voiced sounds are produced when the vocal cords vibrate as air passes through them, such as /b/, /d/, and /z/. **Voiceless sounds** occur when the vocal cords remain open and do not vibrate, producing sounds like /p/, /t/, and /s/. Recognising the difference between voiced and voiceless sounds is fundamental in phonetics, as many languages use this contrast to distinguish meaning.

Fill in the blank: The sound /z/ is an example of a _____ consonant because the vocal cords vibrate.

Type	Mechanism	Examples (IPA)
Voiced	Vocal cords are close together and vibrate as air passes through.	/b/, /d/, /g/, /v/, /ð/, /z/, /ʒ/, /dʒ/
Voiceless	Vocal cords are pulled apart, letting air flow freely without vibration.	/p/, /t/, /k/, /f/, /θ/, /s/, /ʃ/, /tʃ/

Table 3.1: Examples of voiced and voiceless consonants

3.1.3 Recognising suprasegmental features (stress, intonation, rhythm)

Suprasegmental features are aspects of speech that extend beyond individual sounds. They include **stress** (emphasis placed on certain syllables), **intonation** (variation in pitch across an



utterance), and **rhythm** (the pattern of timing and emphasis in speech). These features are crucial for recognising meaning, emotion, and sentence type. For example, rising intonation at the end of a sentence often signals a question in English.

Fill in the blank: Rising _____ at the end of a sentence often signals a question in English.

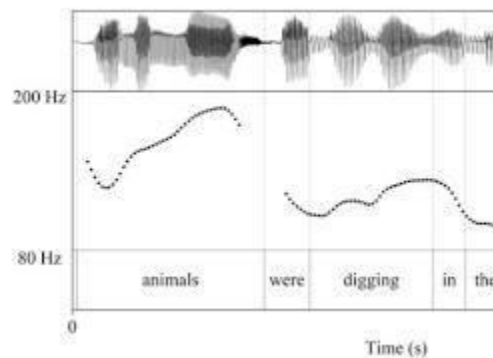


Plate 3.1: Visual representation of suprasegmental features

Pilot questions 3.1

1. How are vowels produced in the vocal tract?
2. Give two examples of voiced sounds and two examples of voiceless sounds.
3. What is the difference between vowels and consonants in terms of obstruction?
4. Which suprasegmental feature involves variation in pitch across an utterance?
5. What does rising intonation at the end of a sentence usually indicate in English?

3.2 Reproduction of Speech Sounds

3.2.1 Techniques for accurate articulation

Articulation refers to the movement and positioning of the speech organs (such as the tongue, lips, and palate) to produce distinct sounds. Accurate articulation requires awareness of how these organs interact with the air stream. For example, producing the sound /p/ involves closing the lips completely and then releasing the air. Learners can improve articulation by practising minimal pairs (words that differ by only one sound, such as “pat” and “bat”).

Fill in the blank: Producing the sound /p/ involves closing the _____ completely and then releasing the air.



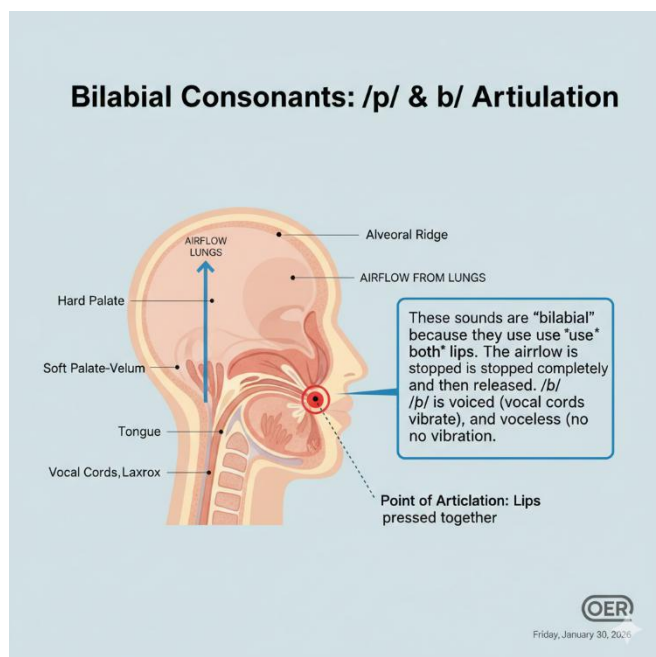


Figure 3.2: Articulation of bilabial sounds

3.2.2 Practising vowel and consonant contrasts

Vowel contrasts involve differences in tongue height, tongue position, and lip rounding. For example, the contrast between /i:/ (as in “seat”) and /ɪ/ (as in “sit”) depends on tongue height and tension. **Consonant contrasts** are based on voicing, place, and manner of articulation. Practising these contrasts helps learners distinguish and reproduce sounds more accurately.

Fill in the blank: The contrast between /i:/ and /ɪ/ depends on tongue _____ and tension.

Contrast Type	Example	Distinguishing Feature	Explanation
Vowel	/i:/ (bead) vs /ɪ/ (bid)	Height & Tension	/i:/ is "high" and "tense," while /ɪ/ is slightly lower and "lax."
Consonant	/t/ (ten) vs /d/ (den)	Voicing	The mouth position is identical, but the vocal cords vibrate only for /d/.
Consonant	/p/ (pat) vs /k/ (cat)	Place of Articulation	/p/ is made at the lips (bilabial); /k/ is made at the back of the mouth (velar).
Consonant	/s/ (sip) vs /t/ (tip)	Manner of Articulation	/s/ is a continuous stream of air (fricative); /t/ is a complete stop of air (plosive).



Contrast Type	Example	Distinguishing Feature	Explanation
Vowel	/u:/ (pool) vs /ʌ:/ (palm)	Rounding & Backness	/u:/ is back and rounded; /ʌ:/ is back but unrounded (open mouth).

Table 3.2: Examples of vowel and consonant contrasts

3.2.3 Exercises for suprasegmental reproduction

Suprasegmental reproduction involves practising features such as stress, intonation, and rhythm. Stress can change meaning, as in “record” (noun) versus “record” (verb). Intonation patterns convey attitudes or sentence types, while rhythm ensures natural flow in speech. Exercises may include repeating sentences with varied stress, mimicking intonation patterns, and clapping syllables to practise rhythm.

Fill in the blank: Stress can change meaning, as in the word “record” when used as a _____ compared to a verb.



Plate 3.2: Learners practising suprasegmental reproduction

Pilot questions 3.2

1. What is articulation, and how does it help in producing speech sounds?
2. Give one example of a minimal pair used to practise articulation.
3. Which features distinguish the vowel sounds /i:/ and /ɪ/?
4. What is the difference between /t/ and /d/ in terms of voicing?
5. How can stress change the meaning of the word “record”?

3.3 Phonetic Transcription Using IPA

3.3.1 Principles of phonetic transcription



Phonetic transcription is the practice of representing speech sounds visually using symbols from the **International Phonetic Alphabet (IPA)**. The IPA provides a standardised system that allows linguists and learners to record sounds accurately, regardless of spelling or language. Transcription is essential because written orthographies often fail to capture the exact pronunciation of words. For example, the English word “knight” is pronounced /naɪt/, which differs significantly from its spelling.

Fill in the blank: The IPA provides a _____ system that allows sounds to be recorded accurately across languages.

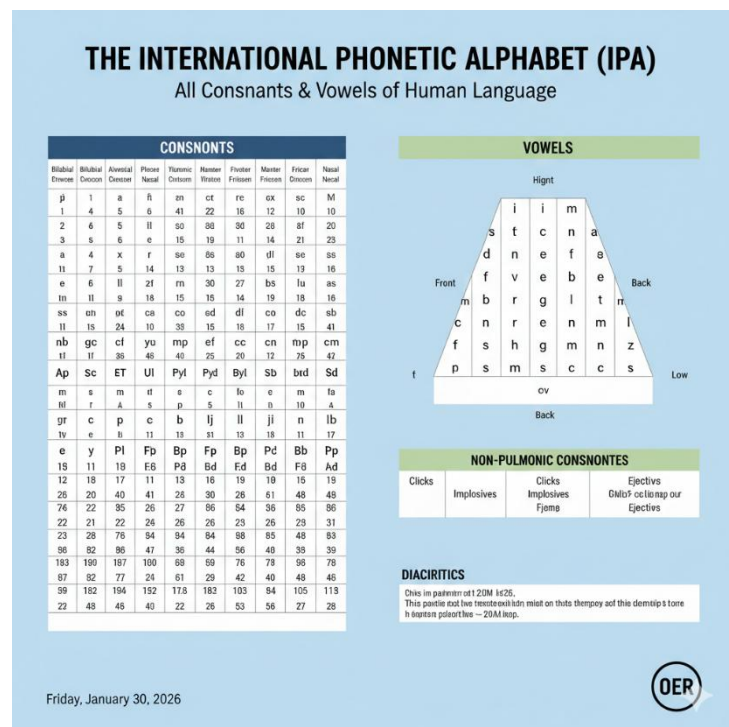


Figure 3.3: IPA chart for phonetic transcription

3.3.2 Transcribing words and short sentences

Transcribing involves listening carefully to speech and writing down the sounds using IPA symbols. For example, the word “school” is transcribed as /sku:l/. Short sentences can also be transcribed, such as “The cat sat on the mat” → /ðə kæt sæt ɒn ðə mæt/. Practising transcription helps learners connect listening skills with accurate representation of sounds.

Fill in the blank: The word “school” is transcribed in IPA as _____.



Word	IPA Transcription	Phonetic Insight
School	/sku:l/	Shows the "ch" is a [k] sound and the "oo" is a long [u:].
Knight	/naɪt/	Reveals that the "k" and "gh" are completely silent.
Record (noun)	** /'rekɔ:d/**	The stress is on the first syllable (e.g., "Keep a record").
Record (verb)	/rɪ'kɔ:d/	The stress shifts to the second syllable (e.g., "Please record this").
Though	/ðəʊ/	Simplifies the complex "ough" spelling into a simple diphthong.
Thought	/θɔ:t/	Demonstrates a different "th" sound (voiceless) and a different vowel than "though."

Table 3.3: Examples of English words and their IPA transcriptions

3.3.3 Common challenges and strategies for accuracy

Learners often face challenges in transcription, such as confusing similar sounds, mishearing suprasegmental features, or mixing up IPA symbols. For instance, /i:/ and /ɪ/ may be difficult to distinguish without careful listening. Strategies for accuracy include repeated listening, practising minimal pairs, and checking transcriptions against IPA charts. Over time, learners develop confidence and precision in representing speech sounds.

Fill in the blank: A common challenge in transcription is confusing similar sounds such as /i:/ and ____.

Strategy	Actionable Tip
Active Listening	Listen to the target sounds repeatedly. If possible, use headphones to catch subtle releases of air or "voicing" at the end of words.
Minimal Pair Testing	Sharpen your distinctions by comparing words like <i>ship</i> vs. <i>sheep</i> or <i>pat</i> vs. <i>bat</i> . If the meaning changes, you've found the phoneme.
Visual Mapping	Keep an IPA Chart as a constant reference. It helps to visualize where your tongue is moving (e.g., high/front for /i/ vs. low/back for /ɑ/).



Strategy	Actionable Tip
Stress Marking	Always identify the primary stress (') first. In English, the stressed syllable is usually longer, louder, and higher in pitch.
Feedback Loops	Compare your transcription with a teacher's key or a peer's version. We often "hallucinate" sounds based on our own accents—feedback corrects this.

Box 3.1: Strategies for accurate phonetic transcription

Pilot questions 3.3

1. What is phonetic transcription, and why is it important?
2. Which system provides a standardised way of recording speech sounds?
3. Transcribe the word “knight” using IPA.
4. What is the IPA transcription of the word “record” when used as a verb?
5. Name one common challenge learners face in phonetic transcription and one strategy to overcome it.

3.4 Applied Practice in Recognition and Transcription

3.4.1 Listening and transcription drills

Listening drills are designed to sharpen your ability to recognise speech sounds accurately. These exercises often involve hearing minimal pairs, sentences, or passages and then transcribing them using the **International Phonetic Alphabet (IPA)**. By repeatedly listening and writing down what you hear, you strengthen both recognition and transcription skills. For example, distinguishing between /p/ and /b/ in words like “pat” and “bat” requires careful listening and precise transcription.

Fill in the blank: Listening drills help learners strengthen both recognition and _____ skills.





Plate 3.3: Learners engaged in transcription drills

3.4.2 Peer and self-evaluation of transcription accuracy

Evaluation is an important part of transcription practice. **Peer evaluation** involves comparing your transcription with that of a classmate, while **self-evaluation** requires checking your work against IPA charts or teacher-provided answers. These methods help identify errors and improve accuracy. Over time, learners develop confidence in their ability to represent speech sounds consistently.

Fill in the blank: Comparing your transcription with that of a classmate is called _____ evaluation.

Benefit	How it Works
Identifies Transcription Errors	By comparing versions, you spot "perceptual blind spots"—sounds you may have missed because they don't exist in your native language.
Reinforces Correct IPA Usage	Discussing which symbol to use for a specific sound (e.g., /ʃ/ vs /tʃ/) solidifies your technical knowledge of the IPA chart.
Builds Learner Confidence	Recognizing patterns of success and seeing improvement over time reduces the "intimidation factor" of complex phonetic symbols.
Encourages Collaboration	Learners often have different phonetic strengths; one may be better at vowels, while another excels at identifying consonant clusters.

Box 3.2: Benefits of peer and self-evaluation

3.4.3 Applications in language learning and speech therapy



Applied practice in recognition and transcription has real-world value. In **language learning**, students use transcription to refine pronunciation and improve listening comprehension. In **speech therapy**, transcription helps therapists diagnose speech disorders and track progress. These applications show that transcription is not just an academic skill but a practical tool for communication and professional practice.

Fill in the blank: In speech therapy, transcription helps therapists diagnose _____ disorders and track progress.

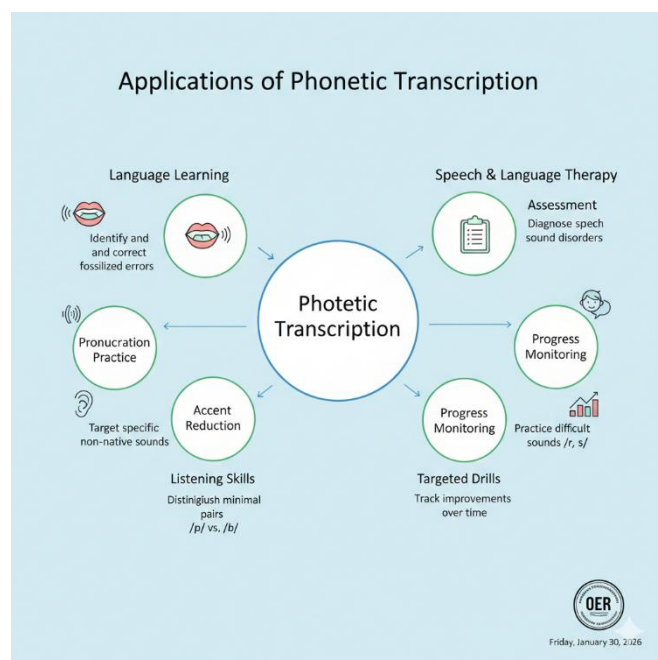


Figure 3.4: Applications of transcription practice

Pilot questions 3.4

1. What skills do listening drills strengthen?
2. What is the difference between peer evaluation and self-evaluation in transcription practice?
3. Name one benefit of peer evaluation.
4. How is transcription used in language learning?
5. Why is transcription important in speech therapy?

Series Summary

This Series has focused on the practical skills of recognising, reproducing, and transcribing speech sounds, building on the theoretical foundation established earlier. Its purpose has been to equip you with the ability to listen critically, articulate sounds accurately, and represent them consistently



using the International Phonetic Alphabet (IPA). These skills are central to phonetics and have direct applications in language learning, teaching, and speech therapy.

We began by exploring how to recognise vowels, consonants, and suprasegmental features such as stress and intonation. We then moved on to reproduction, where you practised articulation techniques and contrasts between sounds. Following that, we examined phonetic transcription, considering its principles, applications, and common challenges. Finally, we applied these skills through listening drills, transcription exercises, and evaluation methods. By completing this Series, you should now be able to identify speech sounds (SLO 3.1), reproduce them accurately (SLOs 3.2 and 3.3), explain and apply IPA transcription principles (SLOs 3.4 and 3.5), and evaluate transcription practice in applied contexts (SLO 3.6). These outcomes ensure you are well prepared to connect phonetic theory with practical communication skills.

Glossary of Terms

- **Articulation:** The movement and positioning of the speech organs, such as the tongue and lips, to produce distinct sounds.
- **Consonants:** Speech sounds produced with some degree of obstruction in the vocal tract, such as /p/, /t/, or /s/.
- **International Phonetic Alphabet (IPA):** A standardised system of symbols used to represent speech sounds accurately across different languages.
- **Listening drills:** Exercises where learners listen to speech sounds or sentences and practise transcribing them using IPA.
- **Minimal pairs:** Pairs of words that differ by only one sound, such as “pat” and “bat”, used to practise recognition and articulation.
- **Peer evaluation:** The process of comparing your transcription or practice work with that of a classmate to identify errors and improve accuracy.
- **Phonetic transcription:** The practice of writing down speech sounds using IPA symbols to show how words are pronounced.
- **Self-evaluation:** Checking your own transcription or practice work against IPA charts or teacher-provided answers to improve accuracy.
- **Stress:** The emphasis placed on a particular syllable in a word, which can change meaning, as in “record” (noun) versus “record” (verb).
- **Suprasegmental features:** Aspects of speech that go beyond individual sounds, including stress, intonation, and rhythm.
- **Transcription accuracy:** The degree to which a learner’s phonetic transcription matches the actual sounds produced in speech.
- **Vowels:** Speech sounds produced without significant obstruction of the air stream in the vocal tract, often forming the core of syllables.
- **Voiced sounds:** Speech sounds produced when the vocal cords vibrate, such as /b/ or /z/.
- **Voiceless sounds:** Speech sounds produced when the vocal cords remain open and do not vibrate, such as /p/ or /s/.

Concept Check Questions [Series 3]



Objective questions

1. Which speech sounds are produced without significant obstruction of the air stream? (Linked to SLO 3.1)
2. Voiced sounds occur when: a) the vocal cords remain open b) the vocal cords vibrate c) the tongue touches the alveolar ridge d) the lips are rounded (Linked to SLO 3.1)
3. The IPA provides a _____ system that allows sounds to be recorded accurately across languages. (Linked to SLO 3.4)
4. The word “school” is transcribed in IPA as: a) /sku:l/ b) /skul/ c) /skʊl/ d) /sko:l/ (Linked to SLO 3.5)
5. Rising intonation at the end of a sentence usually indicates what in English? (Linked to SLO 3.1)

Short-answer questions

1. Define articulation and explain its role in speech reproduction. (Linked to SLO 3.2)
2. Give two examples of minimal pairs and explain how they help in practising articulation. (Linked to SLO 3.2)
3. What is the difference between voiced and voiceless consonants? (Linked to SLO 3.1)
4. Transcribe the word “knight” using IPA. (Linked to SLO 3.5)
5. Identify one challenge learners face in phonetic transcription and suggest one strategy to overcome it. (Linked to SLO 3.6)

Long-answer questions

1. Analyse how vowels, consonants, and suprasegmental features can be recognised in speech. (Linked to SLO 3.1)
2. Evaluate the importance of practising vowel and consonant contrasts in language learning. (Linked to SLO 3.2)
3. Demonstrate the principles of phonetic transcription using IPA and explain why transcription is important. (Linked to SLO 3.4)
4. Discuss the role of listening drills and evaluation methods in improving transcription accuracy. (Linked to SLO 3.6)
5. Assess the applications of transcription practice in language learning and speech therapy. (Linked to SLO 3.6)

Answers to Concept Check Questions [Series 3]

Objective questions

1. Vowels.
2. b) the vocal cords vibrate.
3. Standardised.
4. a) /sku:l/.
5. A question.



Short-answer questions

1. Articulation is the movement and positioning of speech organs to produce sounds. It ensures clarity and accuracy in speech reproduction.
2. Examples: “pat” vs “bat”, “ship” vs “sheep”. They help learners practise distinctions between sounds.
3. Voiced consonants involve vocal cord vibration (e.g., /b/, /d/), while voiceless consonants do not (e.g., /p/, /t/).
4. /naɪt/.
5. Challenge: confusing similar sounds like /i:/ and /ɪ/. Strategy: practise minimal pairs and use IPA charts.

Long-answer questions

1. *Basic response:* Vowels are produced without obstruction, consonants with varying degrees of obstruction, and suprasegmental features include stress, intonation, and rhythm. *Value-added response:* Recognising these features allows learners to distinguish meaning, emotion, and sentence type, improving both comprehension and communication across languages.
2. *Basic response:* Practising contrasts helps learners distinguish sounds more clearly. *Value-added response:* These contrasts are vital for avoiding misunderstandings in communication. For example, distinguishing /i:/ from /ɪ/ ensures correct pronunciation of “seat” versus “sit”.
3. *Basic response:* Phonetic transcription uses IPA symbols to represent speech sounds accurately. *Value-added response:* Transcription is important because spelling often misrepresents pronunciation. It provides a universal system for linguists, teachers, and learners to analyse and compare languages.
4. *Basic response:* Listening drills and evaluation methods help learners improve transcription accuracy. *Value-added response:* Peer and self-evaluation encourage collaborative learning and confidence. These methods also highlight errors and reinforce correct IPA usage, making transcription practice more effective.
5. *Basic response:* Transcription is used in language learning to refine pronunciation and in therapy to diagnose speech disorders. *Value-added response:* In language learning, transcription supports listening comprehension and pronunciation practice. In therapy, it provides a systematic way to track progress and design interventions for speech improvement.

Answers to Pilot Questions [Series 3]

Pilot questions 3.1

1. Vowels are produced without significant obstruction of the air stream in the vocal tract.
2. Voiced: /b/, /z/; Voiceless: /p/, /s/.
3. Vowels are produced without obstruction, while consonants involve some degree of obstruction in the vocal tract.
4. Intonation.



5. A question.

Pilot questions 3.2

1. Articulation is the movement and positioning of speech organs to produce sounds; it ensures clarity in speech reproduction.
2. Example: “pat” vs “bat”.
3. Tongue height and tension.
4. /t/ is voiceless, while /d/ is voiced.
5. Stress changes meaning, as in “record” (noun) versus “record” (verb).

Pilot questions 3.3

1. Phonetic transcription is the representation of speech sounds using IPA symbols; it is important for accurate recording of pronunciation.
2. The International Phonetic Alphabet (IPA).
3. /naɪt/.
4. /rɪ'kɔ:d/.
5. Challenge: confusing similar sounds such as /i:/ and /ɪ/. Strategy: practise minimal pairs and use IPA charts.

Pilot questions 3.4

1. Recognition and transcription skills.
2. Peer evaluation involves comparing with a classmate, while self-evaluation involves checking against charts or answers.
3. Identifies transcription errors.
4. It helps learners refine pronunciation and improve listening comprehension.
5. It helps therapists diagnose speech disorders and track progress.

References and Attributions [Series 3]

This section compiles all references and illustration attributions used or suggested in *Series 3: Sound Recognition, Reproduction, and Transcription*. References are presented in APA style for clarity and consistency.

General References

- Ashby, M. (2011). *Speech sounds*. Routledge.
- Clark, J., Yallop, C., & Fletcher, J. (2007). *An introduction to phonetics and phonology* (3rd ed.). Wiley-Blackwell.
- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Cengage Learning.
- International Phonetic Association. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge University Press.

Illustrations



- *Figure 3.1: Vowel and consonant production in the vocal tract* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the vocal tract showing vowel resonance and consonant articulation points.” Suggested OER search string: “vocal tract diagram vowels consonants OER”.
- *Table 3.1: Examples of voiced and voiceless consonants* Attribution: Suggested as AI-generated. Prompt: “Generate a simple table listing examples of voiced and voiceless consonants.” Suggested OER search string: “voiced vs voiceless consonants table OER”.
- *Plate 3.1: Visual representation of suprasegmental features* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a speech waveform showing stress peaks and intonation patterns.” Suggested OER search string: “speech waveform stress intonation rhythm OER image”.
- *Figure 3.2: Articulation of bilabial sounds* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram of the vocal tract showing articulation points for /p/ and /b/.” Suggested OER search string: “bilabial articulation diagram phonetics OER”.
- *Table 3.2: Examples of vowel and consonant contrasts* Attribution: Suggested as AI-generated. Prompt: “Generate a table showing examples of vowel and consonant contrasts with features.” Suggested OER search string: “vowel consonant contrasts phonetics table OER”.
- *Plate 3.2: Learners practising suprasegmental reproduction* Attribution: Suggested as AI-generated. Prompt: “Generate an image of students practising intonation and rhythm exercises in a language learning class.” Suggested OER search string: “language learners intonation rhythm practice OER image”.
- *Figure 3.3: IPA chart for phonetic transcription* Attribution: Suggested as AI-generated. Prompt: “Create a labelled chart of the International Phonetic Alphabet showing consonants and vowels.” Suggested OER search string: “IPA chart phonetic transcription OER”.
- *Table 3.3: Examples of English words and their IPA transcriptions* Attribution: Suggested as AI-generated. Prompt: “Generate a table showing examples of English words with their IPA transcriptions.” Suggested OER search string: “IPA transcription examples English words OER”.
- *Box 3.1: Strategies for accurate phonetic transcription* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing strategies for accurate phonetic transcription.” Suggested OER search string: “phonetic transcription strategies IPA OER”.
- *Plate 3.3: Learners engaged in transcription drills* Attribution: Suggested as AI-generated. Prompt: “Generate an image of students wearing headphones while transcribing speech sounds in IPA.” Suggested OER search string: “language learners transcription drills IPA OER image”.
- *Box 3.2: Benefits of peer and self-evaluation* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing benefits of peer and self-evaluation in transcription”



practice.” Suggested OER search string: “peer self evaluation phonetic transcription OER”.

- *Figure 3.4: Applications of transcription practice* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing applications of transcription in language learning and speech therapy.” Suggested OER search string: “applications of phonetic transcription language learning therapy OER”.

Course code: LIN 103

Course title: General Phonetics

Course credit load: 3 Units

Series 1: Foundations of Phonetics in Linguistics

Series 2: Speech Production and Perception Mechanisms

Series 3: Recognition, Reproduction, and Transcription of Sounds

Series 4: Non-Segmental Features: Tone, Stress, and Intonation

Series 5: Applied Phonetics and Laboratory Practice

Proposed Outline for Series 4

Part .1 Tone in Speech

- 4.1.1 Definition and role of tone
- 4.1.2 Tone in tonal languages (e.g., Yoruba, Mandarin)
- 4.1.3 Challenges of tone perception and production

Part .2 Stress in Words and Sentences

- 4.2.1 Word stress and its functions
- 4.2.2 Sentence stress and emphasis
- 4.2.3 Stress shift and meaning differences

Part .3 Intonation Patterns

- 4.3.1 Rising and falling intonation
- 4.3.2 Intonation in questions, statements, and commands
- 4.3.3 Intonation and speaker attitude

Part .4 Applications of Tone, Stress, and Intonation

- 4.4.1 Role in effective communication



- 4.4.2 Applications in language learning and teaching
- 4.4.3 Applications in speech therapy and professional contexts

Introduction

In the last Series, we focused on recognising, reproducing, and transcribing speech sounds, which gave us the tools to represent spoken language with accuracy. However, speech is not only about individual sounds. The way we use **tone**, **stress**, and **intonation** adds meaning, emotion, and clarity to communication. These non-segmental features shape how listeners interpret messages, making them essential for effective interaction in everyday speech, language learning, and professional contexts.

The aim of this Series is to introduce you to the key non-segmental features of speech and to equip you with the skills to identify, reproduce, and apply tone, stress, and intonation patterns in practical communication.

We shall commence this Series by examining tone in speech, including its role in tonal languages and the challenges learners face in perception and production. Next, we will move on to stress, considering how word stress and sentence stress influence meaning and emphasis. Following that, we will explore intonation patterns, focusing on rising and falling intonation and how they convey sentence type and speaker attitude. Finally, we will wrap up by looking at the applications of tone, stress, and intonation in communication, language learning, and speech therapy, bringing the Series to a close with practical insights into their real-world relevance.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 4.1** define tone and explain its role in tonal languages,
- **SLO 4.2** analyse challenges learners face in perceiving and producing tone,
- **SLO 4.3** describe the functions of word stress and demonstrate how sentence stress conveys emphasis,
- **SLO 4.4** explain how stress shift can alter meaning in words and sentences,
- **SLO 4.5** identify rising and falling intonation patterns and apply them to different sentence types,
- **SLO 4.6** evaluate how intonation reflects speaker attitude and communicative intent, and
- **SLO 4.7**

4.1 Tone in Speech

4.1.1 Definition and role of tone



Tone refers to the use of pitch to distinguish meaning between words or syllables. In tonal languages, such as Yoruba or Mandarin, tone is not simply a matter of melody but a crucial part of the word's identity. For example, in Yoruba, the syllable “ba” can mean different things depending on whether it is spoken with a high, mid, or low tone. Tone therefore plays a central role in communication, as it can change the meaning of words entirely.

Fill in the blank: In tonal languages, tone is a crucial part of a word's _____.

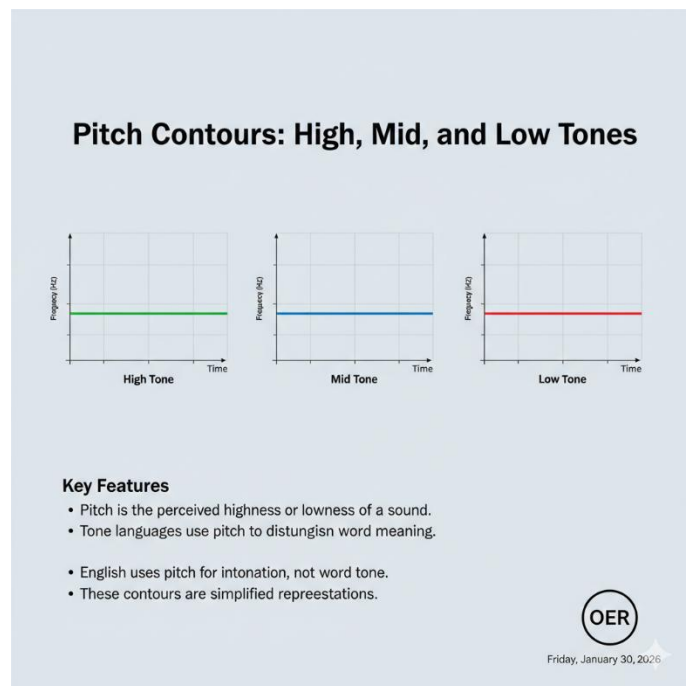


Figure 4.1: Pitch contours representing tone levels

4.1.2 Tone in tonal languages (e.g., Yoruba, Mandarin)

Tonal languages use pitch systematically to differentiate words. In **Mandarin Chinese**, the syllable “ma” has four distinct meanings depending on tone: high-level, rising, falling-rising, or falling. In **Yoruba**, tones are categorised as high, mid, and low, and they are marked in writing with diacritics. Learners of tonal languages must train their ears to perceive these differences and practise reproducing them accurately.

Fill in the blank: In Mandarin, the syllable “ma” can have _____ different meanings depending on tone.

Language	Word	Tone Description	Tone Mark	Meaning
Mandarin	ma	High-level	mā	Mother
Mandarin	ma	Rising	má	Hemp



Language	Word	Tone Description	Tone Mark	Meaning
Mandarin	ma	Falling-rising	mǎ	Horse
Mandarin	ma	Falling	mà	Scold
Yoruba	ba	High	bá	Meet
Yoruba	ba	Mid	ba	Accompany/Hide
Yoruba	ba	Low	bà	Perch/Spoil

Table 4.1: Examples of tone in Mandarin and Yoruba

4.1.3 Challenges of tone perception and production

Learners often struggle with **tone perception**, which is the ability to hear and distinguish pitch differences, and **tone production**, which is the ability to reproduce tones accurately. These challenges are common for speakers of non-tonal languages, as they may not be accustomed to using pitch to differentiate meaning. Strategies to overcome these challenges include repeated listening, practising with native speakers, and using visual aids such as pitch contour diagrams.

Fill in the blank: Learners of non-tonal languages often struggle with tone perception and _____.

Strategy	Implementation Tip
Native Immersion	Listen repeatedly to native speakers. Don't just focus on the sounds; try to "hum" the melody of the sentence to isolate the pitch from the consonants.
Tonal Minimal Pairs	Practice drills with words that are identical except for the tone (e.g., <i>mā</i> vs. <i>mǎ</i>). This sharpens your ear to hear pitch as a meaningful contrast.
Visual Mapping	Use pitch contour diagrams as visual aids. Seeing the "shape" of a tone (rising, falling, or dipping) helps your brain coordinate the physical movement.
Self-Recording	Record and compare your speech with native models. Use pitch-tracking apps to see if your vocal frequency actually matches the target contour.
Physical Awareness	Pay attention to your throat tension. High tones require tighter vocal folds, while low tones require relaxation.

Box 4.1: Strategies for mastering tone



Pilot questions 4.1

1. What is tone, and why is it important in tonal languages?
2. Give one example of how tone changes meaning in Yoruba.
3. How many meanings can the syllable “ma” have in Mandarin depending on tone?
4. What is the difference between tone perception and tone production?
5. Suggest one strategy learners can use to improve their mastery of tone.

4.2 Stress in Words and Sentences

4.2.1 Word stress and its functions

Stress refers to the emphasis placed on a particular syllable within a word. In English, stress often distinguishes meaning and helps listeners identify word boundaries. For example, the word “record” has stress on the first syllable when used as a noun (/ˈrekɔ:d/) but on the second syllable when used as a verb (/rɪˈkɔ:d/). Word stress therefore plays a crucial role in pronunciation, intelligibility, and meaning.

Fill in the blank: Stress refers to the _____ placed on a particular syllable within a word.

Word Form	Stress Pattern	IPA Transcription	Visual Pattern
Noun (an object)	Stress on 1st Syllable	/ˈrek.ɔ:rd/	REC-ord
Verb (the action)	Stress on 2nd Syllable	/rɪˈkɔ:rd/	re-CORD

Figure 4.2: Word stress patterns in English

4.2.2 Sentence stress and emphasis

Sentence stress refers to the emphasis placed on certain words within a sentence to highlight meaning. In English, content words (nouns, verbs, adjectives, adverbs) are usually stressed, while function words (articles, prepositions, auxiliary verbs) are often unstressed. For example, in the sentence “She bought a new car,” the words “bought,” “new,” and “car” carry stress. Sentence stress helps listeners identify the most important information.

Fill in the blank: In English, content words such as nouns and verbs are usually _____ in a sentence.

Sentence	Stressed Words (Content)	Unstressed Words (Function)
She bought a new car.	bought, new, car	She, a



Sentence	Stressed Words (Content)	Unstressed Words (Function)
They are going to the market.	going, market	They, are, to, the
I really like this book.	really, like, book	I, this
We should have called him.	called	We, should, have, him

Table 4.2: Examples of sentence stress in English

4.2.3 Stress shift and meaning differences

Stress shift occurs when the placement of stress changes the meaning of a word or phrase. For example, “import” stressed on the first syllable (/ˈɪmpɔ:t/) is a noun, while stressed on the second syllable (/ɪmˈpɔ:t/) it becomes a verb. This phenomenon is common in English and is important for learners to master in order to avoid misunderstandings.

Fill in the blank: Stress shift occurs when the placement of stress changes the _____ of a word or phrase.

Word	Noun Form (First Syllable Stressed)	Verb Form (Second Syllable Stressed)
Record	/ˈrekɔ:d/ (A physical disc or document)	/rɪˈkɔ:d/ (To capture sound or data)
Import	/ˈɪmpɔ:t/ (A product brought from abroad)	/ɪmˈpɔ:t/ (To bring something in)
Present	/ˈprezənt/ (A gift or the current time)	/priˈzent/ (To show or give a speech)
Object	/ˈɒbdʒɪkt/ (A thing you can see/touch)	/əbˈdʒekt/ (To disagree or protest)
Export	/ˈeksɔ:t/ (A goods sent to another country)	/ɪkˈspɔ:t/ (To send goods abroad)

Box 4.2: Examples of stress shift in English

Pilot questions 4.2

1. What is stress, and how does it function in words?
2. Give one example of a word where stress changes meaning.
3. Which types of words are usually stressed in English sentences?



4. What is sentence stress, and why is it important?
5. How does stress shift affect meaning in English?

4.3 Intonation Patterns

4.3.1 Rising and falling intonation

Intonation refers to the variation of pitch across an utterance. **Rising intonation** occurs when the pitch increases towards the end of a phrase, often signalling a question or uncertainty. **Falling intonation** occurs when the pitch decreases, typically marking statements, commands, or finality. These patterns are essential for distinguishing sentence types and conveying meaning beyond the words themselves.

Fill in the blank: Rising intonation often signals a _____, while falling intonation usually marks a statement.

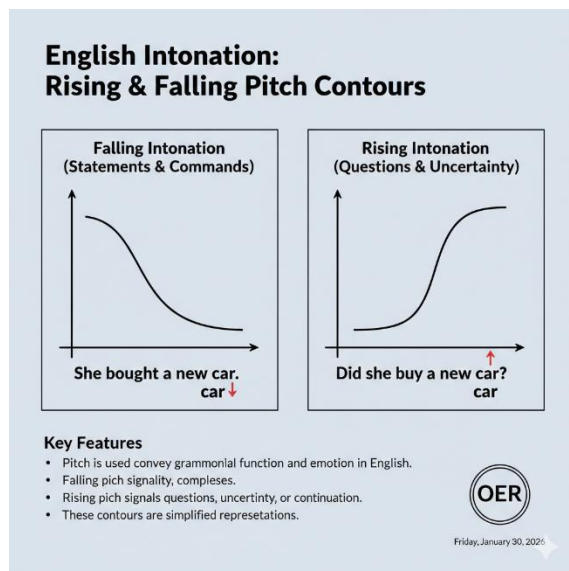


Figure 4.3: Pitch contours for rising and falling intonation

4.3.2 Intonation in questions, statements, and commands

Different sentence types are associated with distinct intonation patterns. Questions often use rising intonation, statements typically use falling intonation, and commands may use either depending on the speaker's attitude. For example, "Are you coming?" rises at the end, while "I am coming." falls. Intonation therefore helps listeners interpret the speaker's intent.

Fill in the blank: The sentence "Are you coming?" uses _____ intonation at the end.



Sentence Type	Example	Intonation Pattern	Communicative Intent
Statement	I am coming.	Falling (↘)	Conveys finality and certainty.
Yes/No Question	Are you coming?	Rising (↗)	Signals that a response is needed.
Command	Sit down.	Falling (↘)	Conveys authority and a direct order.
Polite Request	Could you sit down?	Rising (↗)	Softens the command to make it a request.
WH-Question	Where are you?	Falling (↘)	Standard for questions starting with Who, What, Where, etc.

Table 4.3: Intonation patterns in sentence types

4.3.3 Intonation and speaker attitude

Intonation also conveys **speaker attitude**, such as surprise, doubt, politeness, or certainty. For instance, a rising intonation in “Really?” may express disbelief, while a falling intonation in “Really.” may indicate confidence or finality. Learners must practise recognising and reproducing these subtle differences to communicate effectively in English and other languages.

Fill in the blank: Intonation conveys speaker _____, such as surprise, doubt, or confidence.



Plate 4.3: Intonation reflecting speaker attitude

Pilot questions 4.3



1. What is intonation, and why is it important in speech?
2. Which intonation pattern is commonly used in questions?
3. Give one example of a sentence with falling intonation.
4. How does intonation help listeners interpret the speaker's intent?
5. Provide an example of how intonation conveys speaker attitude.

4.4 Applications of Tone, Stress, and Intonation

4.4.1 Role in effective communication

Tone, stress, and intonation are not just abstract phonetic features; they are central to how we communicate meaningfully. They help listeners interpret emphasis, emotion, and intent. For example, stressing a particular word in a sentence can highlight its importance, while intonation patterns can signal whether a speaker is asking a question or making a statement. Without these features, speech would sound flat and much harder to interpret.

Fill in the blank: Stressing a particular word in a sentence can highlight its _____.



Plate 4.4: Stress and intonation in effective communication

4.4.2 Applications in language learning and teaching

In language learning, tone, stress, and intonation are essential for developing accurate pronunciation and natural fluency. Teachers often use listening drills, repetition, and transcription exercises to help learners master these features. For instance, practising stress placement in English words like "record" or "present" helps learners avoid misunderstandings. Intonation practice also improves conversational skills, making learners sound more natural and confident.

Fill in the blank: Practising stress placement in words like "record" helps learners avoid _____.



Strategy	Pedagogical Action
Minimal Pair Drills	Use pairs like <i>record</i> (noun) vs. <i>record</i> (verb) or <i>ship</i> vs. <i>sheep</i> to demonstrate how pitch and length changes meaning.
Shadowing Technique	Have students listen and repeat audio simultaneously with a native speaker to mimic timing, pauses, and pitch curves.
Intonation Mapping	Draw pitch contours over sentences on the board (e.g., an upward arrow for yes/no questions) to provide a visual anchor.
Transcription Exercises	Use IPA symbols along with stress marks (') and tone markers to reinforce the link between hearing and technical accuracy.
Physical Anchoring	Use hand gestures or rubber bands—stretching the band on stressed syllables—to feel the physical "length" of a sound.

Box 4.3: Teaching strategies for tone, stress, and intonation

4.4.3 Applications in speech therapy and professional contexts

In speech therapy, tone, stress, and intonation are used to diagnose and treat communication disorders. Therapists may analyse a patient's intonation patterns to identify difficulties with rhythm or stress placement. In professional contexts, such as public speaking or broadcasting, mastering these features enhances clarity, persuasion, and audience engagement. A speaker who uses varied intonation and stress effectively is more likely to hold attention and convey their message with impact.

Fill in the blank: In professional contexts, mastering tone, stress, and intonation enhances clarity, persuasion, and _____ engagement.

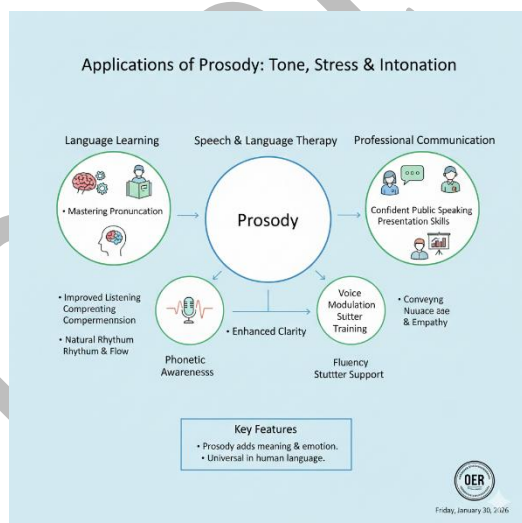


Figure 4.4: Applications of non-segmental features in practice

Pilot questions 4.4

1. How do tone, stress, and intonation contribute to effective communication?
2. Why are these features important in language learning?
3. Give one teaching strategy for practising tone, stress, and intonation.
4. How are tone, stress, and intonation used in speech therapy?
5. What benefits do these features provide in professional contexts such as public speaking?

Series Summary

This Series has explored the non-segmental features of speech, focusing on tone, stress, and intonation. Its purpose has been to show how these features shape meaning, emotion, and clarity in communication, making them essential for effective interaction in both everyday and professional contexts. By examining these elements, you have gained insight into how pitch, emphasis, and rhythm contribute to the intelligibility and expressiveness of spoken language.

We began with tone, considering its role in tonal languages and the challenges learners face in perception and production. We then moved on to stress, looking at word stress, sentence stress, and how stress shifts can alter meaning. Following that, we studied intonation patterns, including rising and falling contours, their use in different sentence types, and their role in conveying speaker attitude. Finally, we applied these features to real-world contexts such as language learning, teaching, speech therapy, and professional communication. By completing this Series, you should now be able to define and analyse tone (SLOs 4.1 and 4.2), describe and demonstrate stress functions (SLOs 4.3 and 4.4), identify and apply intonation patterns (SLOs 4.5 and 4.6), and use these features effectively in practical contexts (SLO 4.7).

Glossary of Terms

- **Command:** A type of sentence that gives an instruction or order, often marked by falling intonation.
- **Content words:** Words that carry the main meaning in a sentence, such as nouns, verbs, adjectives, and adverbs, and are usually stressed.
- **Falling intonation:** A pitch pattern where the voice drops at the end of a phrase, commonly used in statements and commands.
- **Function words:** Words that serve grammatical purposes, such as articles, prepositions, and auxiliary verbs, and are usually unstressed.
- **Intonation:** The variation of pitch across an utterance, used to signal sentence type, speaker attitude, or emotion.
- **Pitch contour:** The visual or auditory pattern showing how pitch rises or falls in speech.
- **Sentence stress:** The emphasis placed on certain words within a sentence to highlight meaning or importance.
- **Speaker attitude:** The emotion or stance conveyed by a speaker, often expressed through intonation patterns such as surprise, doubt, or confidence.



- **Stress:** The emphasis placed on a particular syllable in a word, which can affect meaning and pronunciation.
- **Stress shift:** A change in the placement of stress within a word that alters its meaning, such as “record” (noun) versus “record” (verb).
- **Tone:** The use of pitch to distinguish meaning between words or syllables, especially in tonal languages.
- **Tonal languages:** Languages in which pitch differences (tones) are used systematically to differentiate word meanings, such as Mandarin or Yoruba.
- **Word stress:** The emphasis placed on a syllable within a word, which helps listeners identify meaning and pronunciation.
- **Rising intonation:** A pitch pattern where the voice rises at the end of a phrase, often used in questions or polite requests.

Concept Check Questions [Series 4]

Objective questions

1. Tone refers to the use of _____ to distinguish meaning between words or syllables. (Linked to SLO 4.1)
2. In Mandarin, the syllable “ma” can have how many different meanings depending on tone? (Linked to SLO 4.1)
3. Stress shift occurs when the placement of stress changes the _____ of a word. (Linked to SLO 4.4)
4. Rising intonation is commonly used in: a) Statements b) Commands c) Questions d) Exclamations (Linked to SLO 4.5)
5. Which type of words are usually stressed in English sentences? (Linked to SLO 4.3)

Short-answer questions

1. Define tone and explain its role in tonal languages. (Linked to SLO 4.1)
2. Give one example of a word in English where stress shift changes meaning. (Linked to SLO 4.4)
3. Describe the difference between sentence stress and word stress. (Linked to SLO 4.3)
4. Provide one example of how intonation conveys speaker attitude. (Linked to SLO 4.6)
5. Suggest one teaching strategy for helping learners practise tone, stress, and intonation. (Linked to SLO 4.7)

Long-answer questions

1. Analyse the challenges learners face in perceiving and producing tone. (Linked to SLO 4.2)
2. Evaluate the importance of stress in words and sentences for effective communication. (Linked to SLO 4.3)
3. Demonstrate how intonation patterns differ across questions, statements, and commands. (Linked to SLO 4.5)



4. Discuss how tone, stress, and intonation are applied in language learning and teaching. (Linked to SLO 4.7)
5. Assess the role of tone, stress, and intonation in speech therapy and professional contexts. (Linked to SLO 4.7)

Answers to Concept Check Questions [Series 4]

Objective questions

1. Pitch.
2. Four.
3. Meaning.
4. c) Questions.
5. Content words (nouns, verbs, adjectives, adverbs).

Short-answer questions

1. Tone is the use of pitch to distinguish meaning between words or syllables. In tonal languages, it is essential because it changes the identity of words.
2. Example: “record” (/ˈrekɔːd/ noun vs /rɪˈkɔːd/ verb).
3. Word stress emphasises a syllable within a word, while sentence stress highlights certain words in a sentence to show importance.
4. Example: Rising intonation in “Really?” conveys disbelief, while falling intonation in “Really.” conveys certainty.
5. Teaching strategy: Use minimal pairs and listening drills to practise tone and stress differences.

Long-answer questions

1. *Basic response:* Learners struggle with hearing pitch differences (tone perception) and reproducing them accurately (tone production). *Value-added response:* These challenges are greater for speakers of non-tonal languages. Overcoming them requires repeated listening, visual aids such as pitch contour diagrams, and practice with native speakers.
2. *Basic response:* Stress helps distinguish meaning and ensures clarity in communication. *Value-added response:* Stress also guides listeners to the most important information in sentences. Misplaced stress can cause misunderstandings, making mastery essential for fluency and intelligibility.
3. *Basic response:* Questions often use rising intonation, statements use falling intonation, and commands may use either. *Value-added response:* Intonation patterns also reflect politeness and attitude. For example, “Sit down.” with falling intonation is firm, while “Could you sit down?” with rising intonation is polite.
4. *Basic response:* Tone, stress, and intonation are taught through drills, repetition, and transcription exercises. *Value-added response:* Teachers also encourage learners to mimic native speakers, use recordings for self-evaluation, and practise stress placement to avoid misunderstandings. These strategies build fluency and confidence.



5. *Basic response:* In speech therapy, tone, stress, and intonation help diagnose and treat communication disorders. In professional contexts, they improve clarity and engagement. *Value-added response:* Therapists use these features to track progress and design interventions, while professionals such as broadcasters and public speakers use them to persuade, hold attention, and convey emotion effectively.

Answers to Pilot Questions [Series 4]

Pilot questions 4.1

1. Tone is the use of pitch to distinguish meaning between words or syllables, and it is important in tonal languages because it changes the identity of words.
2. In Yoruba, “ba” with a high tone means “meet.”
3. Four.
4. Tone perception is the ability to hear pitch differences, while tone production is the ability to reproduce them accurately.
5. One strategy is to use pitch contour diagrams as visual aids.

Pilot questions 4.2

1. Stress is the emphasis placed on a syllable within a word, and it functions to distinguish meaning and aid pronunciation.
2. “Record” stressed on the first syllable is a noun, while stressed on the second syllable it is a verb.
3. Content words such as nouns and verbs.
4. Sentence stress is the emphasis placed on certain words in a sentence to highlight meaning.
5. Stress shift changes the meaning of a word or phrase.

Pilot questions 4.3

1. Intonation is the variation of pitch across an utterance, and it is important because it signals sentence type and speaker attitude.
2. Rising intonation.
3. “I am coming.”
4. Intonation helps listeners interpret whether a sentence is a question, statement, or command.
5. Example: Rising intonation in “Really?” conveys disbelief.

Pilot questions 4.4

1. They highlight emphasis, emotion, and intent, making speech clearer and more meaningful.
2. They are important for accurate pronunciation and natural fluency.
3. Use minimal pairs to practise tone and stress differences.
4. They are used to diagnose and treat communication disorders.
5. They enhance clarity, persuasion, and audience engagement.



References and Attributions [Series 4]

This section compiles all references and illustration attributions used or suggested in *Series 4: Non-Segmental Features: Tone, Stress, and Intonation*. References are presented in APA style for clarity and consistency.

General References

- Ashby, M. (2011). *Speech sounds*. Routledge.
- Cruttenden, A. (2014). *Gimson's pronunciation of English* (8th ed.). Routledge.
- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Cengage Learning.
- International Phonetic Association. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge University Press.

Illustrations

- *Figure 4.1: Pitch contours representing tone levels* Attribution: Suggested as AI-generated. Prompt: "Create a diagram showing pitch contours for high, mid, and low tones in speech." Suggested OER search string: "tone pitch contour diagram phonetics OER".
- *Table 4.1: Examples of tone in Mandarin and Yoruba* Attribution: Suggested as AI-generated. Prompt: "Generate a table showing examples of tone in Mandarin and Yoruba with meanings." Suggested OER search string: "Mandarin tones Yoruba tones examples OER".
- *Box 4.1: Strategies for mastering tone* Attribution: Suggested as AI-generated. Prompt: "Create a text box listing strategies for mastering tone in tonal languages." Suggested OER search string: "tone perception production strategies phonetics OER".
- *Figure 4.2: Word stress patterns in English* Attribution: Suggested as AI-generated. Prompt: "Create a diagram showing stressed and unstressed syllables in the word 'record' as noun and verb." Suggested OER search string: "word stress patterns English record noun verb OER".
- *Table 4.2: Examples of sentence stress in English* Attribution: Suggested as AI-generated. Prompt: "Generate a table showing examples of sentence stress in English sentences." Suggested OER search string: "sentence stress examples English OER".
- *Box 4.2: Examples of stress shift in English words* Attribution: Suggested as AI-generated. Prompt: "Create a text box listing examples of stress shift in English words." Suggested OER search string: "stress shift examples English noun verb OER".
- *Figure 4.3: Pitch contours for rising and falling intonation* Attribution: Suggested as AI-generated. Prompt: "Create a diagram showing pitch contours for rising and falling intonation in English sentences." Suggested OER search string: "intonation rising falling pitch contour diagram OER".



- *Table 4.3: Intonation patterns in sentence types* Attribution: Suggested as AI-generated. Prompt: “Generate a table showing examples of intonation patterns in questions, statements, and commands.” Suggested OER search string: “intonation patterns questions statements commands OER”.
- *Plate 4.3: Intonation reflecting speaker attitude* Attribution: Suggested as AI-generated. Prompt: “Generate an image of two speakers using different intonation patterns to express surprise and confidence.” Suggested OER search string: “intonation speaker attitude examples OER image”.
- *Plate 4.4: Stress and intonation in effective communication* Attribution: Suggested as AI-generated. Prompt: “Generate an image of two people in conversation, with one emphasising a word through stress and intonation.” Suggested OER search string: “stress intonation communication example OER image”.
- *Box 4.3: Teaching strategies for tone, stress, and intonation* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing teaching strategies for tone, stress, and intonation.” Suggested OER search string: “language teaching strategies tone stress intonation OER”.
- *Figure 4.4: Applications of non-segmental features in practice* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing applications of tone, stress, and intonation in language learning, therapy, and professional communication.” Suggested OER search string: “applications tone stress intonation language therapy professional OER diagram”.

Course code: LIN 103

Course title: General Phonetics

Course credit load: 3 Units

Series 1: Foundations of Phonetics in Linguistics

Series 2: Speech Production and Perception Mechanisms

Series 3: Recognition, Reproduction, and Transcription of Sounds

Series 4: Non-Segmental Features: Tone, Stress, and Intonation

Series 5: Applied Phonetics and Laboratory Practice

Proposed Outline for Series 5

Part .1 Introduction to Applied Phonetics

- 5.1.1 Definition and scope of applied phonetics
- 5.1.2 Importance of phonetics in real-world contexts



- 5.1.3 Relationship between theory and practice

Part .2 Laboratory Tools and Techniques

- 5.2.1 Overview of phonetics laboratory equipment (microphones, spectrographs, software)
- 5.2.2 Recording and analysing speech sounds
- 5.2.3 Using spectrograms and waveforms for analysis

Part .3 Practical Exercises in Speech Analysis

- 5.3.1 Transcription practice with laboratory recordings
- 5.3.2 Acoustic analysis of vowels and consonants
- 5.3.3 Intonation and stress analysis using laboratory tools

Part .4 Applications of Laboratory Phonetics

- 5.4.1 Language teaching and pronunciation training
- 5.4.2 Speech therapy and clinical applications
- 5.4.3 Research in linguistics and communication sciences

Introduction

In the last Series, we examined non-segmental features such as tone, stress, and intonation, which highlighted how pitch and emphasis shape meaning in spoken language. Building on that foundation, this Series takes us into the practical side of phonetics, where theory meets experimentation. Applied phonetics and laboratory practice allow us to observe, record, and analyse speech sounds using specialised tools, making phonetic study more precise and relevant to real-world contexts such as language teaching, therapy, and research.

The aim of this Series is to equip you with the knowledge and skills to carry out phonetic analysis in a laboratory setting, using tools and techniques to record, transcribe, and evaluate speech sounds for practical applications.

We shall commence this Series by introducing applied phonetics, defining its scope, and explaining its importance in bridging theory and practice. Next, we will move on to laboratory tools and techniques, where you will explore equipment such as microphones, spectrographs, and software for speech analysis. Following that, we will engage in practical exercises, including transcription practice, acoustic analysis of vowels and consonants, and intonation studies using laboratory recordings. Finally, we will wrap up by considering the applications of laboratory phonetics in language teaching, speech therapy, and professional research, bringing the Series to a close with a clear view of how phonetic practice supports communication and scientific inquiry.



Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 5.1** define applied phonetics and explain its scope in bridging theory and practice,
- **SLO 5.2** describe the importance of phonetics in real-world contexts such as communication and language learning,
- **SLO 5.3** identify and explain the functions of key phonetics laboratory equipment,
- **SLO 5.4** demonstrate how to record and analyse speech sounds using laboratory tools,
- **SLO 5.5** apply spectrograms and waveforms to the analysis of speech features,
- **SLO 5.6** carry out transcription practice using laboratory recordings,
- **SLO 5.7** analyse acoustic properties of vowels and consonants with laboratory techniques,
- **SLO 5.8** evaluate intonation and stress patterns using laboratory-based analysis, and
- **SLO 5.9** apply laboratory phonetics to language teaching, speech therapy, and linguistic research contexts.

5.1 Introduction to Applied Phonetics

5.1.1 Definition and scope of applied phonetics

Applied phonetics refers to the practical use of phonetic knowledge in real-world contexts such as language teaching, speech therapy, broadcasting, and linguistic research. While theoretical phonetics focuses on describing and classifying speech sounds, applied phonetics is concerned with how these sounds are recorded, analysed, and used to solve communication problems. Its scope includes transcription practice, acoustic analysis, and the application of laboratory tools to study speech.

Fill in the blank: Applied phonetics is concerned with how speech sounds are _____, analysed, and used in practice.



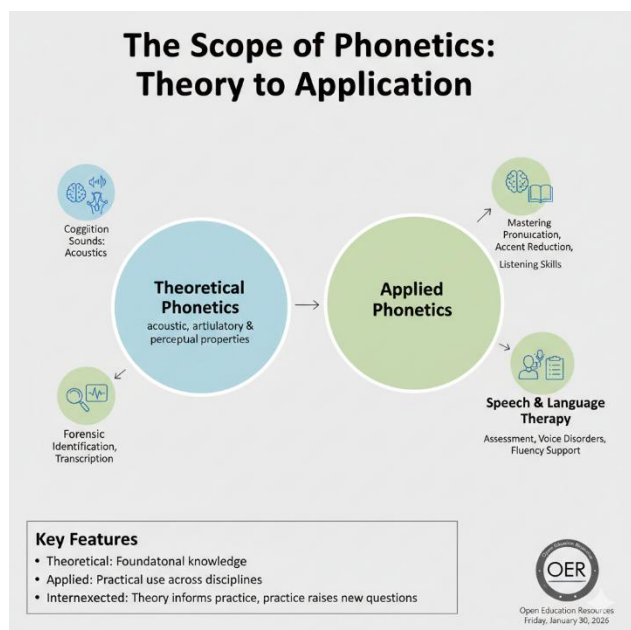


Figure 5.1: Scope of applied phonetics in relation to theoretical phonetics

5.1.2 Importance of phonetics in real-world contexts

Phonetics plays a vital role in everyday communication and professional practice. In **language teaching**, phonetics helps learners acquire accurate pronunciation and fluency. In **speech therapy**, phonetic analysis supports diagnosis and treatment of communication disorders. In **broadcasting and public speaking**, phonetics ensures clarity and audience engagement. Applied phonetics therefore bridges the gap between linguistic theory and practical needs, making it indispensable in multiple fields.

Fill in the blank: In speech therapy, phonetic analysis supports _____ and treatment of communication disorders.





Plate 5.1: Application of phonetics in speech therapy

5.1.3 Relationship between theory and practice

Applied phonetics is closely linked to theoretical phonetics. **Theoretical phonetics** provides the framework for describing speech sounds, while applied phonetics uses this framework to address practical challenges. For example, theoretical knowledge of vowel formants can be applied in laboratory practice to analyse recordings and improve pronunciation training. This relationship ensures that phonetic study is both scientifically rigorous and practically useful.

Fill in the blank: Theoretical phonetics provides the _____ for describing speech sounds, while applied phonetics addresses practical challenges.

Theoretical Foundation	Applied Practical Application
Vowel Formant Theory	Acoustic Analysis & Speech Tech: Used in forensic speaker identification and developing AI voice assistants (like Siri or Alexa) to recognize different accents.
Stress & Intonation Theory	Pronunciation Training (ESL/EFL): Helps non-native speakers master "sentence melody" to avoid sounding robotic and to ensure they are understood in professional settings.
Phonetic Transcription (IPA)	Language Documentation: Linguists use transcription theory to create written records of endangered languages that have no formal writing system.



Theoretical Foundation	Applied Practical Application
Articulatory Phonetics	Speech-Language Pathology: Therapists use knowledge of tongue placement and air-flow to help patients recover speech after a stroke or surgery.

Box 5.1: Examples of theory-practice links in phonetics

Pilot questions 5.1

1. What is applied phonetics, and how does it differ from theoretical phonetics?
2. Give one example of how phonetics is used in language teaching.
3. How does phonetics support speech therapy?
4. What role does theoretical phonetics play in applied phonetics?
5. Provide one example of a theory-practice link in phonetics.

5.2 Laboratory Tools and Techniques

5.2.1 Overview of phonetics laboratory equipment

Phonetics laboratories are equipped with specialised tools that allow us to record, analyse, and visualise speech sounds. Common equipment includes **microphones** (devices that capture sound waves and convert them into electrical signals), **spectrographs** (machines or software that display the frequency components of speech), and **speech analysis software** such as Praat. These tools make it possible to study speech in detail, beyond what the human ear can perceive.

Fill in the blank: A spectrograph displays the _____ components of speech.



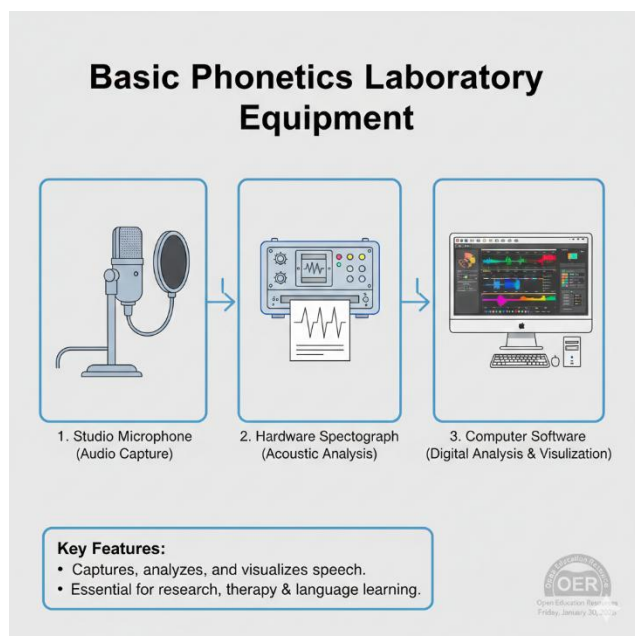


Figure 5.2: Common phonetics laboratory equipment

5.2.2 Recording and analysing speech sounds

Recording speech is the first step in laboratory phonetics. High-quality microphones are used to capture speech samples, which are then stored digitally for analysis. Once recorded, speech sounds can be examined for their acoustic properties such as pitch, loudness, and duration. Analysis often involves comparing different speakers, studying variations in pronunciation, or identifying features of disordered speech.

Fill in the blank: Recording speech is the first step in _____ phonetics.



Plate 5.2: Recording speech sounds in a laboratory setting

5.2.3 Using spectrograms and waveforms for analysis



A **spectrogram** is a visual representation of the frequency, intensity, and duration of speech sounds over time. It shows how energy is distributed across different frequencies, making it useful for identifying vowels, consonants, and suprasegmental features. A **waveform** is another visual tool that displays the amplitude of speech over time, helping to analyse rhythm and stress. Together, spectrograms and waveforms provide a comprehensive picture of speech.

Fill in the blank: A waveform displays the _____ of speech over time.

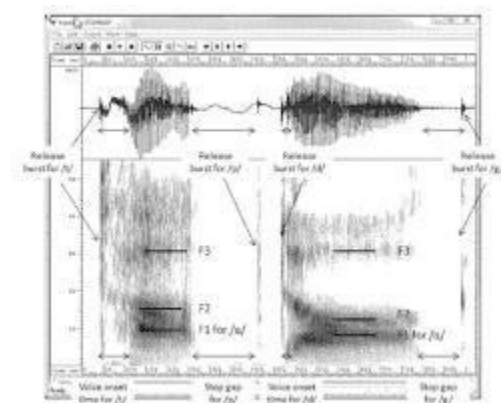


Figure 5.3: Spectrogram and waveform analysis of speech

Pilot questions 5.2

1. Name two common pieces of equipment used in a phonetics laboratory.
2. What is the first step in laboratory phonetics?
3. What does a spectrogram display?
4. How does a waveform differ from a spectrogram?
5. Give one example of how speech analysis can be applied in practice.

5.3 Practical Exercises in Speech Analysis

5.3.1 Transcription practice with laboratory recordings

Transcription is the process of representing spoken language using written symbols, often through the International Phonetic Alphabet (IPA). In laboratory practice, learners listen to recorded speech samples and transcribe them to capture details such as vowel quality, consonant articulation, and suprasegmental features. This exercise helps learners connect auditory perception with phonetic notation, improving accuracy and consistency.

Fill in the blank: Transcription is the process of representing spoken language using _____ symbols.



Word (English)	IPA Transcription	Phonetic Notes
Record (noun)	/ˈrekɔːrd/	Primary stress on the first syllable. Often a falling intonation.
Record (verb)	/rɪˈkɔːrd/	Primary stress on the second syllable; vowel in the first syllable is reduced.
Cat	/kæt/	Features the "ash" vowel; a short, front, open-mid vowel.
Sheep	/ʃiːp/	The /iː/ indicates a long vowel (tense), distinguishing it from <i>ship</i> /ʃɪp/.
Present (noun)	/ˈpreznt/	Stress on first syllable. Example of a trochaic pattern.
Present (verb)	/priˈzent/	Stress on second syllable. Example of an iambic pattern.

Table 5.1: Examples of IPA transcription from laboratory recordings

5.3.2 Acoustic analysis of vowels and consonants

Acoustic analysis involves examining the physical properties of speech sounds using laboratory tools. Vowels are often studied through their **formants**, which are resonant frequencies visible on spectrograms. Consonants are analysed by looking at their closure, release, and noise patterns. These exercises help learners understand how speech sounds differ acoustically and how these differences can be measured and compared.

Fill in the blank: Vowels are studied through their _____, which are resonant frequencies visible on spectrograms.



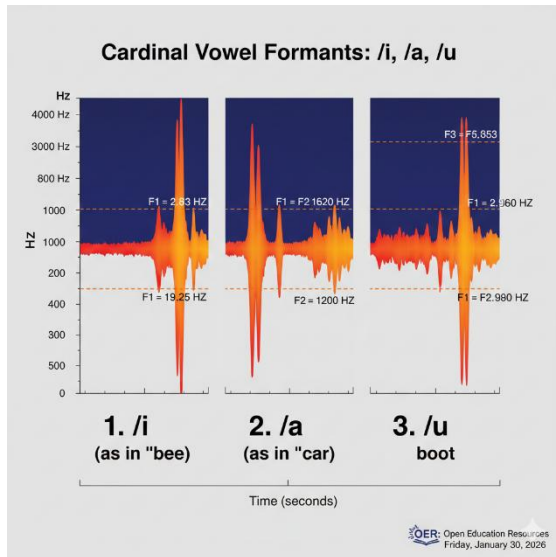


Figure 5.4: Acoustic analysis of vowel formants

5.3.3 Intonation and stress analysis using laboratory tools

Laboratory tools such as pitch trackers and waveform displays allow learners to study **intonation** and **stress** patterns in detail. Intonation is analysed by tracking pitch contours across sentences, while stress is examined by measuring amplitude and duration of syllables. These exercises provide learners with visual evidence of how non-segmental features operate in speech, reinforcing earlier theoretical knowledge with practical application.

Fill in the blank: Stress can be examined by measuring the amplitude and _____ of syllables.

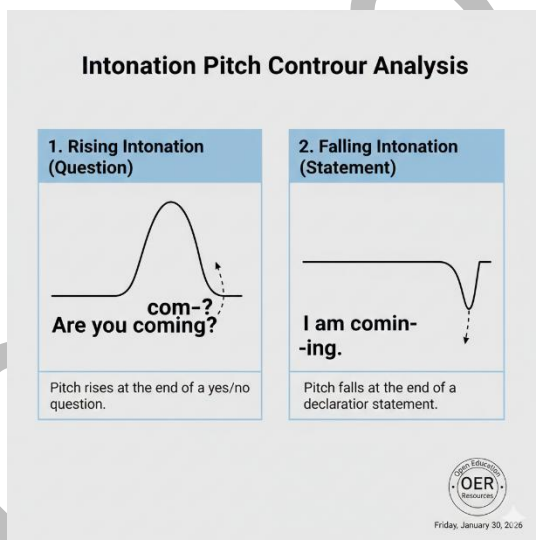


Figure 5.5: Intonation analysis using pitch contours

Pilot questions 5.3



1. What is transcription, and why is it important in laboratory phonetics?
2. Give one example of an English word where transcription shows stress differences.
3. What are vowel formants, and how are they studied?
4. How are consonants analysed acoustically?
5. Which laboratory tools can be used to study intonation and stress patterns?

5.4 Applications of Laboratory Phonetics

5.4.1 Language teaching and pronunciation training

Laboratory phonetics plays a vital role in **language teaching**, especially in helping learners acquire accurate pronunciation and natural fluency. Teachers can use laboratory recordings to demonstrate correct articulation, stress, and intonation patterns. Learners benefit from visual aids such as spectrograms and pitch contours, which make abstract features of speech more concrete. This practical approach bridges the gap between classroom theory and real-world communication.

Fill in the blank: Laboratory phonetics helps learners acquire accurate _____ and natural fluency.

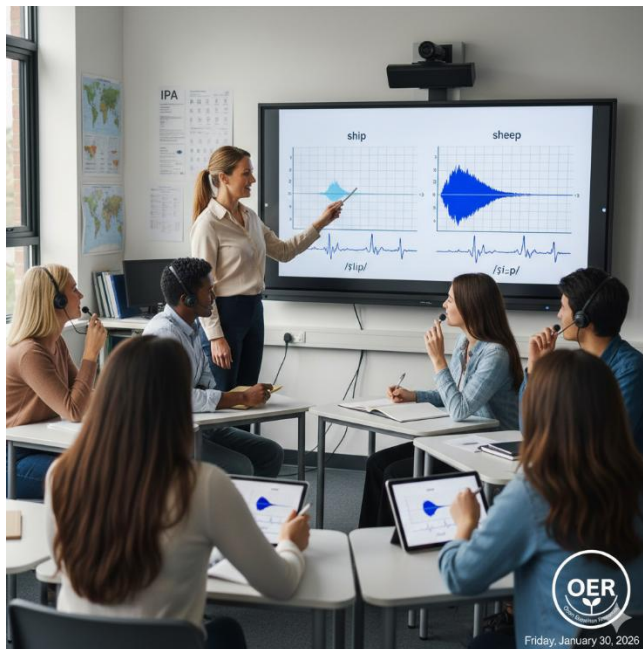


Plate 5.3: Laboratory phonetics in language teaching

5.4.2 Speech therapy and clinical applications

In **speech therapy**, laboratory phonetics is used to diagnose and treat communication disorders. By recording and analysing speech samples, therapists can identify issues such as misarticulation, abnormal pitch, or irregular stress patterns. Laboratory tools provide objective data that guide therapy sessions and track progress. This makes phonetics an essential tool in clinical practice, supporting both assessment and intervention.



Fill in the blank: Laboratory phonetics provides objective data that guide therapy sessions and track _____.

Phonetic Tool	Clinical Use
Spectrograms	Visualizing vowel quality and consonant "stop" bursts.
Nasometry	Measuring airflow to treat hypernasality (cleft palate).
Acoustic Analysis	Tracking pitch range and vocal stability (jitter/shimmer).
Ultrasound Imaging	Real-time visualization of tongue shape during speech.

Box 5.2: Clinical uses of laboratory phonetics

5.4.3 Research in linguistics and communication sciences

Laboratory phonetics also supports **linguistic research** and the study of communication sciences. Researchers use laboratory tools to investigate how speech sounds vary across languages, dialects, and social contexts. Acoustic analysis provides evidence for theories of phonology and sociolinguistics, while laboratory recordings help document endangered languages. This application highlights the scientific importance of phonetics beyond teaching and therapy.

Fill in the blank: Acoustic analysis provides evidence for theories of phonology and _____.

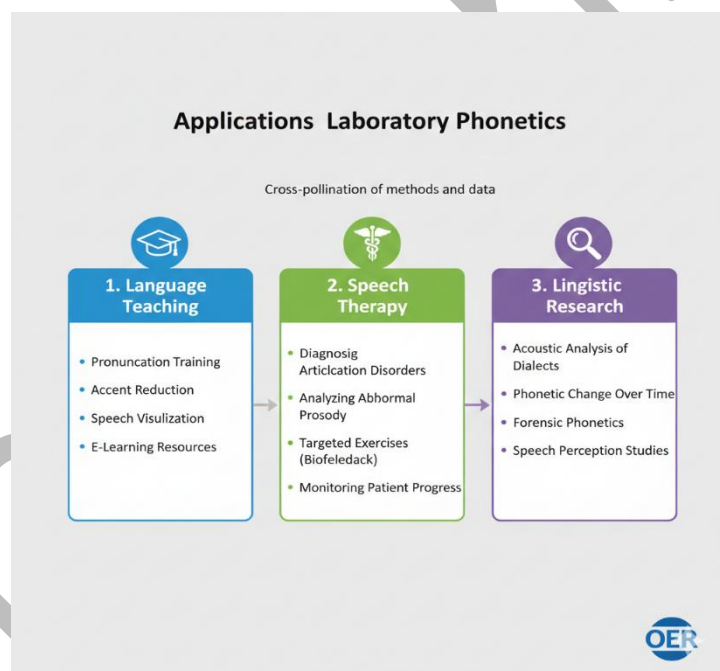


Figure 5.6: Applications of laboratory phonetics across fields



Pilot questions 5.4

1. How does laboratory phonetics support language teaching?
2. Give one example of how laboratory phonetics is used in speech therapy.
3. What type of data do laboratory tools provide for clinical practice?
4. How does laboratory phonetics contribute to linguistic research?
5. Provide one example of how laboratory phonetics helps document languages.

Series Summary

This Series has focused on the practical dimension of phonetics, showing how theoretical knowledge can be applied in laboratory settings to support communication, teaching, therapy, and research. Its purpose has been to equip you with the skills to record, analyse, and interpret speech sounds using specialised tools, making phonetic study both scientific and useful in real-world contexts.

We began by introducing applied phonetics, defining its scope and explaining how it bridges theory and practice. We then explored laboratory tools and techniques, including microphones, spectrographs, and software for speech analysis. Following that, we engaged in practical exercises such as transcription, acoustic analysis of vowels and consonants, and the study of intonation and stress patterns. Finally, we examined applications of laboratory phonetics in language teaching, speech therapy, and research. By completing this Series, you should now be able to define applied phonetics (SLO 5.1), describe its importance in communication (SLO 5.2), demonstrate the use of laboratory equipment (SLOs 5.3–5.5), carry out transcription and acoustic analysis (SLOs 5.6–5.8), and apply laboratory phonetics in professional and academic contexts (SLO 5.9).

Glossary of Terms

- **Acoustic analysis:** The study of the physical properties of speech sounds, such as pitch, loudness, and duration, often using laboratory tools like spectrograms and waveforms.
- **Applied phonetics:** The practical use of phonetic knowledge in real-world contexts such as language teaching, speech therapy, and research.
- **Formants:** Resonant frequencies of the vocal tract that shape vowel sounds, visible on spectrograms.
- **International Phonetic Alphabet (IPA):** A system of symbols used to represent speech sounds consistently across languages.
- **Laboratory phonetics:** The branch of phonetics that uses specialised equipment and software to record, analyse, and visualise speech sounds.
- **Microphone:** A device used to capture sound waves and convert them into electrical signals for recording and analysis.
- **Spectrogram:** A visual representation of speech showing frequency, intensity, and duration over time.
- **Spectrograph:** A machine or software tool used to produce spectrograms for speech analysis.



- **Stress:** The emphasis placed on a syllable within a word or on a word within a sentence, often marked by greater loudness or duration.
- **Transcription:** The process of representing spoken language using written symbols, typically through the International Phonetic Alphabet.
- **Waveform:** A visual representation of speech showing amplitude (loudness) over time, useful for analysing rhythm and stress.

Concept Check Questions [Series 5]

Objective questions

1. Applied phonetics is concerned with how speech sounds are _____, analysed, and used in practice. (Linked to SLO 5.1)
2. Which tool displays the frequency components of speech? (Linked to SLO 5.3)
3. Vowels are studied through their _____, visible on spectrograms. (Linked to SLO 5.7)
4. A waveform shows the _____ of speech over time. (Linked to SLO 5.5)
5. Laboratory phonetics provides objective data that guide therapy sessions and track _____. (Linked to SLO 5.9)

Short-answer questions

1. Define applied phonetics and explain its scope. (Linked to SLO 5.1)
2. Give one example of how phonetics supports language teaching. (Linked to SLO 5.2)
3. Identify two common pieces of equipment used in a phonetics laboratory. (Linked to SLO 5.3)
4. Explain the difference between a spectrogram and a waveform. (Linked to SLO 5.5)
5. Provide one example of how laboratory phonetics contributes to linguistic research. (Linked to SLO 5.9)

Long-answer questions

1. Analyse the relationship between theoretical phonetics and applied phonetics. (Linked to SLO 5.1)
2. Demonstrate how transcription practice supports phonetic learning in laboratory settings. (Linked to SLO 5.6)
3. Evaluate the importance of acoustic analysis of vowels and consonants in speech study. (Linked to SLO 5.7)
4. Discuss how intonation and stress can be studied using laboratory tools. (Linked to SLO 5.8)
5. Assess the applications of laboratory phonetics in language teaching, speech therapy, and research. (Linked to SLO 5.9)

Answers to Concept Check Questions [Series 5]

Objective questions



1. Recorded.
2. Spectrograph.
3. Formants.
4. Amplitude.
5. Progress.

Short-answer questions

1. Applied phonetics is the practical use of phonetic knowledge in contexts such as teaching, therapy, and research. Its scope includes transcription, acoustic analysis, and laboratory-based study of speech.
2. Teachers use phonetics to train learners in accurate pronunciation and stress patterns.
3. Microphones and spectrographs.
4. A spectrogram shows frequency, intensity, and duration, while a waveform shows amplitude over time.
5. Laboratory phonetics helps document endangered languages and provides acoustic evidence for phonological theories.

Long-answer questions

1. *Basic response:* Theoretical phonetics describes speech sounds, while applied phonetics uses this knowledge in practice. *Value-added response:* Applied phonetics relies on theoretical frameworks such as vowel formant theory to conduct acoustic analysis, bridging scientific description with practical applications in teaching and therapy.
2. *Basic response:* Transcription practice helps learners connect speech perception with phonetic notation. *Value-added response:* It also trains learners to identify subtle differences in stress and intonation, improving accuracy in language documentation and pronunciation training.
3. *Basic response:* Acoustic analysis reveals how vowels and consonants differ physically. *Value-added response:* Studying formants and consonant noise patterns provides measurable data that supports phonological theory and clinical diagnosis of speech disorders.
4. *Basic response:* Intonation is studied by tracking pitch contours, while stress is measured through amplitude and duration. *Value-added response:* Laboratory tools such as pitch trackers and waveform displays allow detailed analysis of suprasegmental features, supporting both teaching and therapy.
5. *Basic response:* Laboratory phonetics is applied in teaching pronunciation, diagnosing speech disorders, and conducting linguistic research. *Value-added response:* It enhances language pedagogy with visual aids, supports therapy with objective data, and contributes to documenting endangered languages and sociolinguistic variation.

Answers to Pilot Questions [Series 5]

Pilot questions 5.1



1. Applied phonetics is the practical use of phonetic knowledge, while theoretical phonetics focuses on describing speech sounds.
2. Teachers use phonetics to train learners in accurate pronunciation.
3. It supports diagnosis and treatment of communication disorders.
4. Theoretical phonetics provides the framework for describing speech sounds.
5. Example: Vowel formant theory applied in acoustic analysis.

Pilot questions 5.2

1. Microphones and spectrographs.
2. Recording speech.
3. Frequency components of speech.
4. A waveform shows amplitude, while a spectrogram shows frequency, intensity, and duration.
5. Analysing disordered speech to support therapy.

Pilot questions 5.3

1. Transcription represents speech sounds using written symbols, helping learners connect perception with notation.
2. “Record” as noun /'rekɔ:d/ and verb /rɪ'kɔ:d/.
3. Vowel formants, which are resonant frequencies visible on spectrograms.
4. By examining closure, release, and noise patterns.
5. Pitch trackers and waveform displays.

Pilot questions 5.4

1. It supports teaching by helping learners acquire accurate pronunciation and fluency.
2. Recording and analysing speech samples to diagnose articulation disorders.
3. Objective data for guiding therapy and tracking progress.
4. It provides acoustic evidence for phonological and sociolinguistic theories.
5. By recording and analysing speech samples to document endangered languages.

References and Attributions [Series 5]

This section compiles all references and illustration attributions used or suggested in *Series 5: Applied Phonetics and Laboratory Practice*. References are presented in APA style for clarity and consistency.

General References

- Ashby, M. (2011). *Speech sounds*. Routledge.
- Cruttenden, A. (2014). *Gimson's pronunciation of English* (8th ed.). Routledge.
- Ladefoged, P., & Johnson, K. (2014). *A course in phonetics* (7th ed.). Cengage Learning.



- International Phonetic Association. (1999). *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet*. Cambridge University Press.

Illustrations

- *Figure 5.1: Scope of applied phonetics in relation to theoretical phonetics* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing theoretical phonetics leading into applied phonetics with examples of applications.” Suggested OER search string: “applied phonetics scope diagram OER”.
- *Plate 5.1: Application of phonetics in speech therapy* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a speech therapist working with a child using phonetic exercises.” Suggested OER search string: “speech therapy phonetics application OER image”.
- *Box 5.1: Examples of theory-practice links in phonetics* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing examples of how theoretical phonetics links to applied phonetics.” Suggested OER search string: “theory practice relationship phonetics examples OER”.
- *Figure 5.2: Common phonetics laboratory equipment* Attribution: Suggested as AI-generated. Prompt: “Create a labelled diagram showing microphone, spectrograph, and computer software used in phonetics laboratory.” Suggested OER search string: “phonetics laboratory equipment diagram OER”.
- *Plate 5.2: Recording speech sounds in a laboratory setting* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a student recording speech using a microphone in a phonetics laboratory.” Suggested OER search string: “phonetics laboratory student recording speech OER image”.
- *Figure 5.3: Spectrogram and waveform analysis of speech* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing a spectrogram and waveform of a spoken word with labels.” Suggested OER search string: “spectrogram waveform speech analysis OER diagram”.
- *Table 5.1: Examples of IPA transcription from laboratory recordings* Attribution: Suggested as AI-generated. Prompt: “Generate a table showing examples of IPA transcription from laboratory recordings.” Suggested OER search string: “IPA transcription practice examples OER”.
- *Figure 5.4: Acoustic analysis of vowel formants* Attribution: Suggested as AI-generated. Prompt: “Create a spectrogram showing vowel formants for /i/, /a/, and /u/.” Suggested OER search string: “vowel formants spectrogram phonetics OER”.
- *Figure 5.5: Intonation analysis using pitch contours* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing pitch contours for rising intonation in a question and falling intonation in a statement.” Suggested OER search string: “intonation pitch contour analysis phonetics OER”.



- *Plate 5.3: Laboratory phonetics in language teaching* Attribution: Suggested as AI-generated. Prompt: “Generate an image of a language teacher showing spectrograms to students for pronunciation training.” Suggested OER search string: “language teaching phonetics spectrogram pronunciation OER image”.
- *Box 5.2: Clinical uses of laboratory phonetics* Attribution: Suggested as AI-generated. Prompt: “Create a text box listing clinical uses of laboratory phonetics.” Suggested OER search string: “speech therapy phonetics applications OER”.
- *Figure 5.6: Applications of laboratory phonetics across fields* Attribution: Suggested as AI-generated. Prompt: “Create a diagram showing applications of laboratory phonetics in teaching, therapy, and linguistic research.” Suggested OER search string: “applications laboratory phonetics teaching therapy research OER diagram”.

