

Introduction to Phonology and Phonetics Portfolio Assessment

Semester 1, 2025

Jeremy Steffman

Table of contents

Portfolio overview	4
□ Submitting the assessment	4
□ Materials	4
□ Core and Advanced tasks	5
□ Working with your classmates	5
1 Chamarro VOT	6
1.1 □ Overview	6
1.2 □ Materials	6
1.3 □ Tasks	7
1.3.1 Core Tasks	7
1.3.2 □ Advanced tasks	7
2 Chamarro vowel acoustics	8
2.1 □ Overview	8
2.2 □ Materials	8
2.3 □ Tasks	9
2.3.1 Core Task 1	9
2.3.2 Core Task 2	9
2.3.3 Core Task 3	9
2.3.4 □ Advanced task	10
3 Segmentation	11
3.1 □ Overview	11
3.2 □ Materials	11
3.3 □ Tasks	12
3.3.1 Core Tasks	12
3.3.2 □ Advanced Tasks	13
4 Spectrograms	14
4.1 □ Overview	14
4.2 □ Materials	14
4.3 □ Tasks	15
4.3.1 Core Tasks	15
4.3.2 □ Advanced Task	16

5	Phonology problems	17
5.1	<input type="checkbox"/> Overview	17
5.2	<input type="checkbox"/> Tasks	17
5.2.1	Core Task 1: Phonemes and Allophones	17
5.2.2	Core Task 2: Features and classes	18
5.2.3	Core Task 3: Distributions and phonological analysis	18
5.2.4	<input type="checkbox"/> Advanced Task	19

Portfolio overview

The assessment for this course is made up of a portfolio of five exercises that you can complete starting in Week 4.

This may seem like a lot! But remember, you will have a lot of the required knowledge to work on the portfolio starting week 4/5. Working on it from these weeks until the due date should give you plenty of time, and hopefully reduce your stress during the busy finals period.

This website has instructions for each of the five parts, which you can navigate at left.

If you prefer a pdf, that can be accessed and downloaded [here](#).

Submitting the assessment

All five parts will be submitted in a single PDF by **11th December at 12:00 via Turnitin on Learn**.

- Everything you submit (text, figures, etc.) for **each of the five parts must not exceed 2 pages**.
- The entire portfolio submission should not exceed 10 pages.
- The total word limit for the portfolio is 4000, though you will likely need fewer than this.

Materials

The materials for each of the five parts of the portfolio are specified in the instructions and will be available on Learn, or downloaded [here](#).

The sub-folders in the zipped folder are for each sub-part of the portfolio, excluding part 5 for which there are no materials.

Core and Advanced tasks

Each of the five parts consist of “Core” tasks that you must complete, and □ “Advanced” tasks you may complete if you would like to go further.

Advanced tasks are not required and should not be the focus of your work on each exercise.

Please note: it is possible to achieve top marks (70+) without incorporating any of the Advanced tasks. Therefore, it is in your best interest to focus on the Core tasks and make sure that you do them well.

- Note also that the 2-page limit per exercise, and 10-page limit overall, applies regardless of whether you include Advanced tasks in your submission.

Working with your classmates

You are allowed to discuss the assessment with your classmates, and work on the components together. If you do this, put the **exam number** the people you worked with at the top of the assessment you submit. They need to remain anonymous, as do you, for the purpose of marking.

- For Part 1 and Part 2 if you work with anyone you must choose different items from the word list. **You cannot use any of the same items.**

1 Chamorro VOT

1.1 Overview

In this part of your portfolio you will annotate, measure, and report on voice onset time (VOT) in Chamorro, an Austronesian language spoken in the Mariana Islands.

This language makes use of a two-way voicing contrast (voiced and voiceless) in stops, which occur at three places of articulation. Your task is to identify and select pairs of words that exemplify this contrast at all three places of articulation. Then you will annotate them to identify where voicing begins relative to stop closure release (voice onset time), and report the values that you measure.

Remember: The text that you submit for this exercise must not exceed 2 pages. **Anything beyond 2 pages will be ignored** for marking purposes. This includes all text, figures, graphs, tables and Advanced Tasks, if any.

- Your entire portfolio submission should not exceed 10 pages.

If you need a refresher on how to identify and measure VOT, you can consult the workshop on this topic from Week 5.

1.2 Materials

The materials for this exercise are available on Learn or downloadable from the Portfolio overview page. The materials for both this part and part 2 consist of 6 audio files and 1 word list file. The data for this exercise is taken from the [UCLA Phonetics Lab Archive](#). Note that the six files are ordered like the word list: the first file, cha_word-list_1983_01.wav, is the first section of the wordlist, and so on.

1.3 Tasks

1.3.1 Core Tasks

1. Examine the wordlist, and then choose word list items that exemplify the voicing contrast at each of the three places of articulation where it occurs, according to the transcription (bilabial, alveolar, and velar). You should have 6 items in total (three places, two voicing categories).
 - Report which word list items you are focusing on for your investigation. Include the word list item number, IPA transcription, orthographic transcription, and gloss/translation for the items that you choose.
2. Annotate the onset of voicing and stop closure release bursts for the tokens you have identified.
 - Describe your annotation methods in text. Supply enough detail that someone could replicate your annotation.
3. Include at least two illustrative spectrograms and waveforms with accompanying TextGrid annotations showing your annotations for one voiced sound and one voiceless sound. These can be screenshots from Praat.
4. Report the Voice Onset Time for all 6 tokens that you have measured. This can be in a table.
5. Answer the question: What kind of voicing contrast does this appear to be; think about the different types discussed in week 5 (voiced vs. unaspirated, and unaspirated vs. aspirated) relate your reasoning about this to the data you have mentioned.
6. Are there any patterns in place of articulation that you notice?

1.3.2 Advanced tasks

Discuss other factors, including possible contextual factors, that may influence the VOT measures that you have collected.

Consider relevant information about the tokens that you investigated, and the ways in which the factors you identify would influence your interpretation of the patterns that you have observed, and how they modify your interpretation of those patterns.

2 Chamorro vowel acoustics

2.1 Overview

In this exercise you will annotate, measure, and report on vowel formants in Chamorro, an Austronesian language spoken in the Mariana Islands.

In terms of its claimed phonological distinctions, this language makes use of three levels of vowel height (high, mid, and low) and two levels of advancement (front and back), resulting in six contrastive (phonological) vowel qualities: i, ε, a, α, o, u.

- As you will see in the word list, more symbols than these are used, meaning the transcribed word list is more phonetically detailed than the claimed six phonological vowel qualities. These symbols also include the archaic IPA [ɤ], which was replaced by [u] in 1989.

Remember: The text that you submit for this exercise must not exceed 2 pages. **Anything beyond 2 pages will be ignored** for marking purposes. This includes all text, figures, graphs, tables and Advanced Tasks, if any.

- Your entire portfolio submission should not exceed 10 pages.

If you need a refresher on how to identify and measure Formants and F0, you can consult the workshop on this topic from Week 4.

2.2 Materials

The materials for this exercise are available on Learn or downloadable from the Portfolio overview page. The materials for both this part and part 1 consist of 6 audio files and 1 word list file. The data for this exercise is taken from the [UCLA Phonetics Lab Archive](#).

Note that the **six audio files are ordered like the word list**: the first file, cha_word-list_1983_01.wav, is the first section of the wordlist, and so on. This means you will have to listen to the files to locate your chosen vowels.

2.3 Tasks

2.3.1 Core Task 1

1. Pick 6 vowel qualities to investigate, choosing **six different phonetic symbols** from the wordlist transcription.
2. Report which word list items you are focusing on for your investigation. Include the word list item number, IPA transcription, orthographic transcription, and gloss/translation for the items that you choose. You can report them in a table for ease of presentation.
3. Using a TextGrid, annotate the 6 items you have identified. Describe your annotation methods in text. Where did you take your formant measurements from? How did you determine this point? How did you extract the formant measurements? (See Week 4 lecture and lab).
4. Include at least one illustrative spectrogram with its accompanying TextGrid showing your annotations.
5. Report the frequency values of the first and second formants for all 6 tokens that you have measured. This can be reported in a table.

2.3.2 Core Task 2

Create a visualization of your vowel space with F2 on the x axis and F1 on the y axis, and arrayed in the typical fashion. Place this figure in your submission. This can be done in Excel, other computer programs, or simply by hand on graph paper, and scanned or photographed on your phone. See the Week 4 lab for details and templates.

2.3.3 Core Task 3

Choose **2 of the 6** vowels from above, and perform the following tasks for both vowels.

1. Locate the approximate midpoint of the vowel (50% of the vowel duration). Zoom into this location and identify one period in the waveform. Include a screenshot which shows several periods, for which the time stamps are visible.
2. Report this value for the period and then compute F0 **using the duration of the period measure**. Recall the inverse relationship between period and frequency and see Week 4 lecture for this.

2.3.4 Advanced task

For this task you should use the **same two vowels you used for Core Task 3**.

With F_0 , and your previously computed formant measures, take these pieces of information (F_0 , F_1 , F_2 , F_3), create a **schematic** line drawing of the vowel spectrum, with one vertical line representing each harmonic. This must have the following to receive full marks. See the Week 4 lecture slides for an example of what this can look like.

- An x axis which allows you to show frequency in an accurate and legible way, and a reasonable range.
- The y axis can be totally schematic, and does not require actual intensity values - you can just label it to be 'louder' versus 'quieter', or similar.
- A clear representation of F_1 , F_2 , and F_3 , which also approximates standard vowel spectrum properties, e.g., declination in harmonic's intensity at higher frequencies.

You can produce this in anyway that is easy to you. You could draw it by hand (graph paper would be helpful), take a picture or scan, and add it to your submission. Or, you can make it using e.g. powerpoint, or any other programme that let's you draw and/or manipulate shapes.

3 Segmentation

3.1 Overview

In this exercise you will annotate a short audio file containing a recording of someone telling a story in Kazakh. Your task is first to segment the audio (detailed below). Then, you will align the phonetic transcription of the speech to the segmentation you have created.

Remember: The text that you submit for this exercise must not exceed 2 pages. **Anything beyond 2 pages will be ignored** for marking purposes. This includes all text, figures, graphs, tables and Advanced Tasks, if any.

- Your entire portfolio submission should not exceed 10 pages.

If you need a refresher on these concepts you can consult the lecture materials, readings, and workshop exercises from Week 8.

3.2 Materials

The materials for this exercise are available on Learn and on the Portfolio overview page. They consist of 1 audio file.

The data for this exercise is taken from the phonetic illustration of [Kazakh](#) in the *Journal of the International Phonetic Association*. The journal paper is also included in the materials in case you are interested, but you do not need to use it for the purpose of this exercise.

A phonetic transcription of the data is provided in the paper, linked above, and reproduced for you here:

bɪr kʰɯnɪ soɫtstɪk ʒɪel mɪen kʰɯn iekʰjɯw arɑɑrɑndæ kʰəm mæχtɪ iekʰienn ʃɪɛʃɪ ɑɫmaj
bæsekʰielesiedɪ

This transcription has been simplified somewhat from the one provided in the full paper. The tie bars have been removed from diphthong vowels, along with diacritics that would indicate information about vowel length.

In the original transcription, the [t], [d], [n], [s], [l], and [r] phones were modified by a diacritic that indicates they are produced at the teeth rather than the alveolar ridge. These diacritics have been removed for the purposes of this exercise.

These changes should not affect your segmentations in any way, because you should be focused first on the acoustic events that are happening, and only then looking to align the transcription after the segmentation is completed.

3.3 Tasks

3.3.1 Core Tasks

Create a TextGrid with one tier for each segmentation type, being sure to label the tiers appropriately. Segment the provided audio according to two different sets of criteria:

- Voicing
- Oral closure

Align the phonetic transcription to each of the segmentations you have created in the TextGrid.

- **Choose only one TextGrid tier** (Voicing or Oral closure) and align the phone segmentation with it (as in the Week 8 workshop). In this alignment not all boundaries between phones will have a corresponding boundary in the tier you are aligning them with (i.e., not all phones will be separated).

Provide a screenshot of your annotations, making sure that they are legible on the page. You may need to split the annotation over two pages, and you may find it helpful to put the image in landscape orientation. See the Week 8 workshop for examples and instructions.



WARNING: The transcription given above is a (simplified) approximation given by the authors of the paper. It may present you with two notable challenges.

- Firstly, [r], though described as a voiced trill, may be realised by just a period of closure and release. This closure **may or may not be voiced** and your text grid segmentations should try to hew to the acoustics in this case, i.e. align the voicing tier based on the presence or absence of acoustic evidence for voicing in the waveform and spectrogram.

- Secondly, other segmentations may also deviate in their acoustics from the transcription. If you encounter tricky cases you may remark on them briefly. Again you should strive to base your segmentation on the acoustic evidence for voicing and oral closure.

3.3.2 Advanced Tasks

For this part you should focus only the first portion of the passage, that is:

[**br** k^hɪnɪ]

Based on the two text grids you have created, a combination of the intervals will correspond to individual speech segments in the transcription (like [n]). Choose **two** such intervals, and describe the following (a few sentences for each).

- What acoustic information in the spectrogram led you to place the boundaries on both tiers where you did? Refer to specific frequencies and locations, describing, for example, acoustic information that you used to identify presence or absence of voicing, the onset of a vowel, etc.
- What acoustic information in the wave form led you to place the boundaries where you did? How does this relate to the spectrogram?

Comment briefly, in a few sentences, on the extent to which the waveform vs. the spectrogram was useful for both boundaries.

4 Spectrograms

4.1 Overview

In this exercise you will reason about and analyse two waveform + spectrogram representations of speech.

Remember: The text that you submit for this exercise must not exceed 2 pages. **Anything beyond 2 pages will be ignored** for marking purposes. This includes all text, figures, graphs, tables and Advanced Tasks, if any.

- Your entire portfolio submission should not exceed 10 pages.

If you need a refresher on these concepts you can consult the lecture materials, readings, and workshop exercises from Weeks 4, 5, 7 and 8.

4.2 Materials

The materials for this exercise are available on Learn and consist of 2 visual spectrogram and waveform representations. They are also shown at the bottom of this section.

The first spectrogram was made from a careful word list production of a two-word phrase* by a male speaker of Scottish English. The second spectrogram was made from a conversational production of the same phrase *within a sentence* by the same speaker.

*By “phrase” here I just mean a sequence of two words which refers to a thing, for example “little dog”.

The files are named as `mystery-wordlist.pdf` for the careful production, and `mystery-connected.pdf` for the phrase produced in a sentence.

They are shown below, but for larger images you should access them from the portfolio materials.

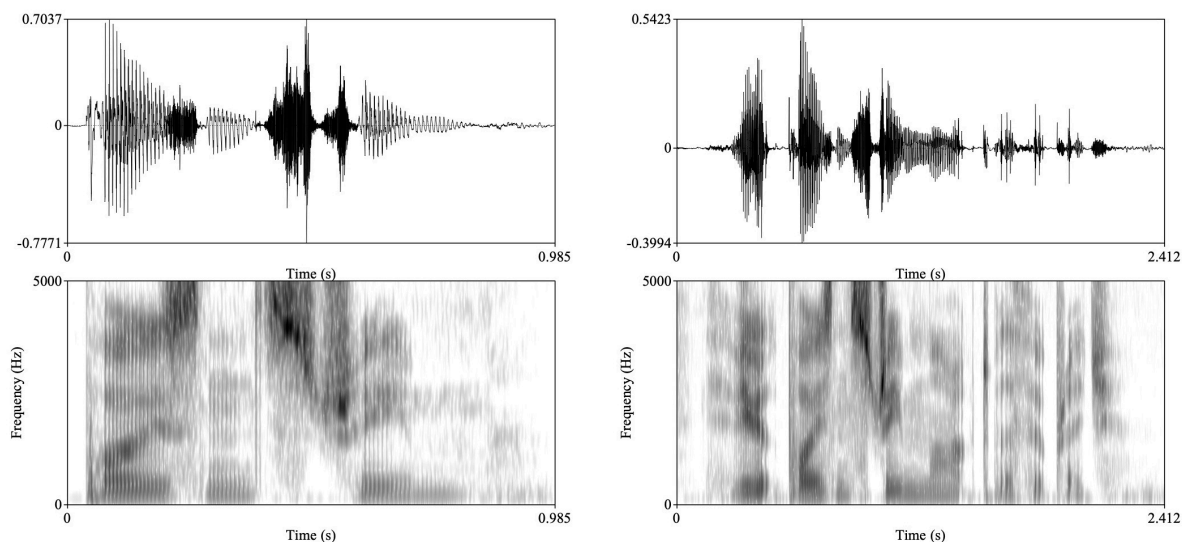


Figure 4.1: The careful wordlist production (left) and the connected speech production (right).

4.3 Tasks

4.3.1 Core Tasks

1. In the careful wordlist production, name the major classes of speech sounds that occur in the phrase in sequence (e.g. consonant manner & voicing, place information if you can identify it).
2. In the careful wordlist production, describe the relative vowel qualities present in the phrase. Be sure to use the relevant acoustic terminology in your description.
3. Identify where in the conversational sentence spectrogram the target phrase begins and ends. Describe this using acoustic terminology. You may estimate the time points at which the phrase begins and ends from the scale provided in the spectrograms.
 - You can also provide a screenshot with this interval highlighted in some way to indicate where things start and end.
4. Compare and contrast the sounds that are apparent in each production of the phrase. Are there any sounds that are missing or changed with respect to the word list item?

Note that it may help to try to segment the spectrograms using the method introduced in week 8. This segmentation is not directly part of the task, but may help you to delimit and identify the various sounds as they occur.

4.3.2 Advanced Task

What do you think the speaker is saying?

Posit a possible phrase that is consistent with the acoustic information you have interpreted above. Discuss any possible alternatives to your proposed phrase, and explain if the acoustics are ambiguous, as relevant.

5 Phonology problems

5.1 Overview

In this exercise you will look at some data and use it to answer questions about phonemes, allophones, and phonological features. There are no external materials for this part, everything you need is below.

Remember: The text that you submit for this exercise must not exceed 2 pages. **Anything beyond 2 pages will be ignored** for marking purposes. This includes all text, figures, graphs, tables and Advanced Tasks, if any.

- Your entire portfolio submission should not exceed 10 pages.

If you need a refresher on these concepts you can consult the lecture materials, readings, and workshop exercises from Weeks 9 and 10.

5.2 Tasks

5.2.1 Core Task 1: Phonemes and Allophones

Some information about the distributions of phones in a few languages is provided below. For each, determine whether the phones described in each part are allophones of the same phoneme or distinct phonemes. Justify your answers in a few sentences.

1. In some dialects of Southern Swedish, [ʀ] always appears at the beginning of a syllable, and [r] always at the end.
2. In Provençal, the word for ‘evening’ is [sɛʀo] and the word for ‘saw’ (noun) is [sɛro].
3. In Plautdiitsch, [x] and [ç] appear in the following words: [axt] ‘eight’, [açt] ‘real’, [laxt] ‘laughs’, [laçt] ‘lays’

5.2.2 Core Task 2: Features and classes

These are the sounds of a hypothetical language

p	t	$\widehat{tʃ}$	k	q	i	ɪ	u
p ^h	t ^h	$\widehat{tʃ}^h$	k ^h	q ^h	e		o
b	d	$\widehat{dʒ}$	g		ɛ		ɔ
f	s	ʃ	x	χ		a	
v	z	ʒ	ʏ				
m	n	ɲ	ŋ	ɴ			
w	l	ɭ	j				

1. Assuming the above inventory, and using the feature system from the textbook, list the features that are needed to select (all and only) the following classes of sound.
 1. fricatives
 2. high/close vowels
 3. oral velar stops
 4. voiced affricates
 5. only [χ] and no other sounds
2. Assuming the same inventory above, list the sounds that are selected by the following sets of features.
 1. [-voice, -continuant]
 2. [dorsal, +consonantal]
 3. [+anterior]
 4. [+round]
 5. [delayed release, +voice]

5.2.3 Core Task 3: Distributions and phonological analysis

Finally, your task to analyse the following data patterns in Japanese. Some of the consonants in the Japanese items below are in complementary distribution with each other, while others are not. To keep things simpler here, translations are not given (they're not relevant to solving the problem).

List all **obstruent consonants** (and only these) and the environments they occur in. Note that symbols that appear beneath a tiebar, such as \widehat{ts} should be considered **one segment**.

- For **phones which appear in complementary distribution**, posit an underlying form and state in prose the environments which result in the observed allophones.

- You may also draw a phonemicisation diagram if you prefer to represent the information that way.
- Some of the phones may not appear in complementary distribution. If this is the case then you can just state this.
- It is suggested that you follow the workflow in the Week 9 workshop materials on Setswana (steps 1 - 4).

ɸu:se	ɸu:tatsʊme	ɸu:tami	hatʃinohe	hamamatsʊ	haʃimoto
himi	hitatʃi	hoɸu	matsʊʃima	mine	minamata
motomatʃi	numata	setana	ʃinitʃi	soto	susa
tamana	tate	tsunami			

5.2.4 Advanced Task

Using what you have concluded from Core Task 3 above, write (a) phonological rule(s) in the formal notation, which:

1. Includes your chosen underlying form(s).
2. Describes the transformation of the posited underlying form(s) into the observed allophones, defining a conditioning environment.
 - This will be relevant only for the forms that you have determined are alternating.
3. For the highest marks, use features where appropriate.