

## Week 7: Phonology

### Practice Problems

*Remember to think about the sounds, not the spellings!*

- (1) For each pair of sounds below, provide minimal pairs of English words to illustrate that the sounds are phonemes of English. Note: provide words in standard written form, not IPA.

- (a) [s] and [z]
- (b) [ɹ] and [k]
- (c) [f] and [t]
- (d) [u] and [ʊ]

- (2) The following data are from Sindhi, an Indo-European language of the Indo-Aryan family, spoken in Pakistan and India. Examine the distribution of the phones [p], [pʰ], and [b]. Determine if the three are allophones of separate phonemes or allophones of the same phoneme. What is your evidence? Is the relationship among the sounds the same as in English? Why or why not?

- |             |                 |             |              |
|-------------|-----------------|-------------|--------------|
| (a) [pənʊ]  | 'leaf           | (g) [barʊ]  | 'weight'     |
| (b) [dʌkʰə] | 'grape'         | (h) [kʰirʊ] | 'milk'       |
| (c) [dʌpʊ]  | 'fear'          | (i) [putʰi] | 'back'       |
| (d) [pʰɛɳʊ] | 'hood of snake' | (j) [bənʊ]  | 'forest'     |
| (e) [kənʊ]  | 'ear'           | (k) [pʰəru] | 'arrow head' |
| (f) [pɛrʊ]  | 'foot'          | (l) [abʊ]   | 'water'      |

- (3) Consider the following Finnish words. Compare the voiceless alveolar stops with the (non-nasal) voiced alveolar stops. Are these sounds allophones of the same phoneme or are they two separate phonemes? Give evidence from the data for your answer.

- |                          |                        |
|--------------------------|------------------------|
| (a) [kuːzi] 'six'        | (f) [kadot] 'failures' |
| (b) [kate] 'cover'       | (g) [liisa] 'Lisa'     |
| (c) [maton] 'of a rug'   | (h) [kade] 'envious'   |
| (d) [ratas] 'wheel'      | (i) [kuːsi] 'sixty'    |
| (e) [radan] 'of a track' |                        |

- (4) Korean is argued to be a “language isolate,” meaning that it is not linguistically related to other languages. It is spoken in Korea. In the following Korean words, you will find the sounds [s] and [ʃ]. Determine whether [s] and [ʃ] are allophones of the same phoneme or separate phonemes.

(a) [ʃi]	‘poem’	(j) [sal]	‘flesh’
(b) [miʃin]	‘superstition’	(k) [kasu]	‘singer’
(c) [ʃinmun]	‘newspaper’	(l) [sanmun]	‘prose’
(d) [tʰaksanʃige]	‘table clock’	(m) [kasəl]	‘hypothesis’
(e) [ʃilsu]	‘mistake’	(n) [miso]	‘smile’
(f) [oʃip]	‘fifty’	(o) [susek]	‘search’
(g) [paŋʃik]	‘method’	(p) [tapsa]	‘exploration’
(h) [kanʃik]	‘snack’	(q) [so]	‘cow’
(i) [kaʃi]	‘thorn’		

- (5) German is an Indo-European language of the Germanic family, spoken in Germany. Examine the voiceless velar fricative represented by [x] and the voiceless palatal fricative represented by [ç] in the German data below. Are the two sounds in complementary distribution or are they contrastive? If the sounds are allophones in complementary distribution, state the phonetic contexts for each allophone. Note that : marks vowel length, so [u:], for example, is a long vowel.

(a) [bu:x]	‘book’	(f) [ɛçt]	‘real’
(b) [lo:x]	‘hole’	(g) [ʃpre:çə]	‘(he/she/it) would speak’
(c) [ho:x]	‘high’	(h) [lɛçəlɪn]	‘to smile’
(d) [flʊxt]	‘escape’	(i) [ri:çən]	‘to smell’
(e) [ɪç]	‘I’	(j) [fɛçtən]	‘to fence’

- (6) Ukrainian is an Indo-European language of the Slavic family, spoken in Ukraine. Compare the masculine nominative singular forms of nouns (used for the subject of the sentence) with the vocative forms (used when calling to or addressing someone, as in “Hey Robin.”). There is a phonological change between the nominative and the vocative, which adds the endings [-e] to the nominative form. Three pairs of sounds are in allophonic variation. What are these pairs of sounds? What sort of phonological process is at work here? What do you think is conditioning this alternation?

<i>nominative</i>	<i>vocative</i>	<i>gloss</i>
(a) [rak]	[ratʃe]	‘lobster’
(b) [junak]	[junatʃe]	‘young man’
(c) [ʒuk]	[ʒutʃe]	‘beetle’
(d) [pastux]	[pastuʃe]	‘shepherd’
(e) [ptax]	[ptaʃe]	‘bird’
(f) [boɦ]	[boʒe]	‘God’
(g) [pluɦ]	[pluʒe]	‘plough’

(7) Bukusu is a Niger-Congo language of the Bantu family, spoken in Kenya. The nasal prefix [n-] indicates that the verb is in the first person ('I eat, go sing', etc.). Two different processes occur when [n] stands before another consonant. Look at these words and think about what is happening. The symbols [β], [ɲ] and [x] represent, respectively, a voiced bilabial fricative, a palatal nasal, and a voiceless velar fricative. Note that ː marks vowel length, so [iː], for example, is a long vowel.

(a) [ndiːla]	'I hold'	(j) [nd̃zina]	'I scream'
(b) [seːnda]	'I move'	(k) [suna]	'I jump'
(c) [nd̃zuːŋga]	'I watch'	(l) [xala]	'I cut'
(d) [ŋgaβa]	'I divide'	(m) [ŋgeta]	'I pour'
(e) [mbiːma]	'I weigh'	(n) [ndasa]	'I add'
(f) [xola]	'I do'	(o) [mbula]	'I roam'
(g) [mbuka]	'I perish'	(p) [ndula]	'I trample'
(h) [fuka]	'I cook'	(q) [fwaːra]	'I dress'
(i) [funa]	'I break'	(r) [mbala]	'I count'

(i) How does the behavior of a nasal differ when it stands before the different types of obstruents (stops, fricatives, and affricates)?

(ii) There are two phonological processes at work here. What are they?

(iii) Write phonological rules to capture the facts about the nasal prefix /n-/ in Bukusu.

You will be provided with the following charts on the exam.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2018)

CONSONANTS (PULMONIC)

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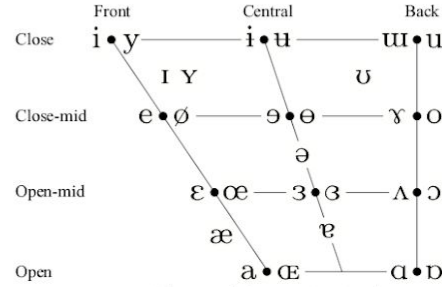
	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
◌ ɸ Bilabial	ɓ Bilabial	ʼ Examples:
Dental	ɗ Dental/alveolar	ɸ' Bilabial
! (Post)alveolar	ɟ Palatal	t' Dental/alveolar
‡ Palatoalveolar	ɡ Velar	k' Velar
Alveolar lateral	ɠ Uvular	s' Alveolar fricative

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

OTHER SYMBOLS

- ɱ Voiceless labial-velar fricative
- ɰ Voiced labial-velar approximant
- ɰ Voiced labial-palatal approximant
- ħ Voiceless epiglottal fricative
- ʕ Voiced epiglottal fricative
- ʔ Epiglottal plosive
- ʃ ʒ Alveolo-palatal fricatives
- ɻ Voiced alveolar lateral fricative
- ɟ Simultaneous ʃ and x
- Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary.

ts kp

SUPRASEGMENTALS

- ˈ Primary stress
- ˌ Secondary stress
- ː Long
- ˑ Half-Long
- ˚ Extra-short
- ◌ Minor (foot) group
- ◌ Major (intonation) group
- ◌ Syllable break
- ◌ Linking (absence of a break)

TONES AND WORD ACCENTS

- LEVEL
- CONTOUR
- ˥ or ˩ Extra high
- ˨ or ˩ Falling
- ˥ High
- ˥ High rising
- ˨ Low
- ˥ Extra low
- ˩ Downstep
- ˨ or ˩ Rising
- ˨ Falling
- ˥ High rising
- ˥ Low rising
- ˥ Rising-falling
- ↗ Global rise
- ↘ Global fall

DIACRITICS Some diacritics may be placed above a symbol with a descender, e.g. ɲ̄

◌ Voiceless	◌̥	◌̥ Breathy voiced	◌̤	◌̤ Dental	◌̤
◌ Voiced	◌̬	◌̬ Creaky voiced	◌̰	◌̰ Apical	◌̰
◌ Aspirated	◌ʰ	◌̱ Linguolabial	◌̲	◌̲ Laminar	◌̲
◌ More rounded	◌̹	◌̷ Labialized	◌̸	◌̸ Nasalized	◌̸
◌ Less rounded	◌̜	◌̘ Palatalized	◌̙	◌̙ Nasal release	◌̙
◌ Advanced	◌̟	◌̚ Velarized	◌̛	◌̛ Lateral release	◌̛
◌ Retracted	◌̠	◌̜ Pharyngealized	◌̝	◌̝ No audible release	◌̝
◌ Centralized	◌̞	◌̜ Velarized or pharyngealized	◌̟		
◌ Mid-centralized	◌̠	◌̟ Raised	◌̠ (ɹ̠ = voiced alveolar fricative)		
◌ Syllabic	◌̩	◌̡ Lowered	◌̡ (β̡ = voiced bilabial approximant)		
◌ Non-syllabic	◌̯	◌̠ Advanced Tongue Root	◌̠		
◌ Rhoticity	◌̤ ɻ̤	◌̡ Retracted Tongue Root	◌̡		