Chapter 6

1. Minimal pairs. Sample answers:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Initial | Medial | Final |
| a. /k/—/g/ | cold/gold | bicker/bigger | tuck/tug |
|  |  |  |  |
| b. /m/—/n/ | mice/nice | simmer/sinner | sum/sun |
| c. /l/—/r/ | lake/rake | cold/cord | feel/fear |
| d. /b/—/v/ | ban/van | saber/saver | dub/dove (near minimal pair) |
| e. /b/—/m/ | ban/man | clabber/clamor | rub/rum |
| f. /p/—/f/ | pail/fail | supper/suffer | leap/leaf |
| g. /s/—/ʃ/ | sell/shell | masses/mashes | lease/leash |
| h. /ʧ/—/ʤ/ | chin/gin | etches/edges | rich/ridge |
| i. /s/—/z/ | sip/zip | fussy/fuzzy | mace/maze |

2. Rules relating spelling to pronunciation. In the patient’s system of spelling-to-pronunciation, the following are true:

In reading:

a corresponds to /a/ or /æ/

medial e corresponds to /ɛ/ or /i/

final e corresponds to /i/

i corresponds to /aɪ/

o corresponds to /o/ or /ɔ/

c corresponds to /s/

every letter is pronounced

there is one vowel per syllable

In writing from dictation:

/e/ and /æ/ correspond to written A

/aɪ/ corresponds to written I

/i/ corresponds to written E

/o/ corresponds to written O

/k/ corresponds to written K

no silent letters are written, e.g., final e

/z/ is written as Z even when spelled s in an inflectional morpheme

3. Complementary Distribution and “A Case of Identity.” Sherlock Homes solved the mystery of Miss Mary Sutherland’s missing fiancé by noting that Mr. Hosmer Angel (the missing fiancé) and Mr. James Windibank were in complementary distribution, i.e. they never appeared in the same place at the same time. As Sherlock Holmes points out, “[T]he fact that the two men were never together, but that the one always appeared when the other was away, was suggestive.” The complementary distribution of these two “individuals” together with the fact that they shared certain physical traits and they both used a typewriter with the same characteristics led Sherlock Holmes to conclude that Mr. Hosmer Angel and Mr. James Windibank are in fact the same person.

So just as two sounds, sharing some features in common, that are in complementary distribution do not contrast and are not distinct phonemes, Mr. Angel and Mr. Windibank are not distinct people.

4. Korean.

**Part One**

<LL>a. [r] and [l] are allophones of one phoneme.

b. No, they do not occur in any minimal pairs.

c. Yes, [r] and [l] are in complementary distribution.

d. [r] occurs before vowels. [l] occurs before consonants and word finally.

e. The phoneme /l/ is realized phonetically as [r] when it occurs before a vowel, and as [l] in all other instances. This rule can be written as follows:

/l/ → [r] / \_\_\_ V

Note it is not necessary to include a rule that specifies where the allophone [l] occurs since /l/ will not be changed pre-consonantally or finally and will emerge phonetically as [l]. Note further that if the two allophones are derived from /r/, the rule would be more complex:

/*r*/ → [*l*] / \_\_

**Part Two**

a. [s] and [ʃ] are allophones of the same phoneme. They are in complementary distribution: [ʃ] appears before [i] and [s] appears before all other vowels or word finally.

b. This distribution can be written as the following phonemic rule:

/s/ → [ʃ] / \_\_\_ [i]

5. German [x] and [ç].

a. [x] and [ç] are allophones of the same phoneme. They are in complementary distribution. [x] only occurs after non-front vowels and [ç] only occurs after front vowels.

b. The most natural rule to account for the data is:

/*x*/ → [*ç*] / \_\_\_

6. English plural morphemes.

If Rule B is reformulated as below (and Rule A remains the same, as shown below), then the ordering between these rules won’t matter. However, the reformulation is less simple and less elegant. The plural morpheme /z/ becomes an [s], assimilating to the voicelessness of the preceding consonant. The revision of the rule suggests that only voiceless non-sibilants trigger this assimilation, which doesn’t seem entirely correct.

A. Insert a [ə] before the plural morpheme /z/ when a regular noun ends in a sibilant, giving [əz].

B. Change the plural morpheme /z/ to a voiceless [s] when preceded by a voiceless, non-sibilant sound.

7. Southern Kongo.

a. Distributions:

|  |  |
| --- | --- |
| [t]—[ʧ]: | [t] occurs before [o], [a], [e], and [u]; [ʧ] occurs before [i]. |
| [s]—[ʃ]: | [s] occurs before [o], [u], and [e]; [ʃ] occurs before [i]. |
| [z]—[ʒ]: | [z] occurs before [u], [e], and [w]; [ʒ] occurs before [i]. |

b. In each pair, the nonpalatal segment should be used as the basic phoneme (e.g., [t] and [ʧ] derived from /t/, [s] and [ʃ] derived from /s/, and [z] and [ʒ] derived from /z/). Nonpalatal segments have a wider (less specific) distribution, so the phonemic rule will be simpler with the nonpalatal segment as the “elsewhere” (default) case.

c. One phonemic rule that will account for all of the above distributions is the following:

Obstruent alveolar segments become palatalized before a high front vowel.

This can be stated formally as:

→ / \_\_\_

d. i. not a possible word, because [s] does not occur before [i] in Southern Kongo

ii. not a possible word, because [ʧ] does not occur before [u]

iii. is a possible word

iv. is a possible word

v. is a possible word

vi. is not a possible word, because [ʒ] does not occur before [a]

8. English [*aɪ*] ~ [*ʌɪ*].

a. The final sounds in column A are [-voice] and those in column B are [+voice].

b. The words in column C end in vowels.

c. Yes. [ʌɪ] and [aɪ] are in complementary distribution: their distribution is predictable. [ʌɪ] occurs before voiceless segments, and [aɪ] occurs elsewhere, i.e., before voiced segments or word finally.

d. They should be derived from /aɪ/. [aɪ] has a wider distribution than [ʌɪ]. Also, it is easier to characterize the distribution of [ʌɪ] than the distribution of [aɪ], so the phonemic rule will be simpler if [aɪ] is the sound ­occurring “elsewhere.”

e. life [lʌɪf] lives [laɪvz] lie [laɪ]

file [faɪl] bike [bʌɪk] lice [lʌɪs]

f. /aɪ/ → [ʌɪ] / \_\_\_ [–voice]

9. English palatalization. Palatalization occurs whenever /t/, /d/, /s/, and /z/ (alveolar obstruents) are followed by the palatal glide /j/.

→ / \_\_\_

10. Japanese [t] ~ [ʧ]~ [ʦ].

a. Yes, these sounds, [t], [ʧ], and [ʦ], are in complementary distribution as they never occur in the same environments.

b. [ʧ] occurs before [i], [ʦ] occurs before [u], and [t] occurs elsewhere (before vowels that are non-high). In features, [ʧ] occurs before [-consonantal, +high, -back] segments, [ʦ] occurs before [-consonantal, +high, +back] segments, and [t] occurs before [-consonantal, -high] segments.

c. [t], [ʧ], and [ʦ] are allophones of a single phoneme, which we will represent with /t/ since the [t] allophone has the widest distribution of the three. The allophones are derived according to the rules below:

1)   /t/ → [ʧ] / \_\_\_

2)   /t/ → [ʦ] / \_\_\_

d.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| tatami |  | /tatami/ |  | ʦukue |  | /tukue/ |  | ʦuʦumu |  | /tutumu/ |
| tomodaʧi |  | /tomodati/ |  | teʦudau |  | /tetudau/ |  | ʧizu |  | /tizu/ |
| uʧi |  | /uti/ |  | ʃita |  | /ʃita/ |  | kata |  | /kata/ |
| tegami |  | /tegami/ |  | ato |  | /ato/ |  | koto |  | /koto/ |
| totemo |  | /totemo/ |  | maʦu |  | /matu/ |  | tatemono |  | /tatemono/ |
| otoko |  | /otoko/ |  | deguʧi |  | /deguti/ |  | te |  | /te/ |
| ʧiʧi |  | /titi/ |  | naʦu |  | /natu/ |  | ʦuri |  | /turi/ |

11. Paku.

i. Yes, stress is predictable. It falls on the penultimate (next to last) syllable.

ii. No, nasalization is not a distinctive feature for vowels; it is predictable. A vowel is nasalized if it precedes a nasal consonant.

iii. Plurals are formed by adding the suffix -ni. Note that the addition of this suffix can affect the nasalization of the preceding vowel, given the rule in (ii), and will change where stress falls in a word, given the rule in (i).

12. English stress.

a. The following are essentially phonemic transcriptions, except for [ə], the symbol for all unstressed vowels.

|  |  |  |
| --- | --- | --- |
| A | B | C |
| /əstanɪʃ/ | /kəlæps/ | /əmez/ |
| /ɛgzət/ | /ɛgzɪst/ | /ɪmpruv/ |
| /ɪmæʤən/ | /rəzɛnt/ | /sərpraɪz/ |
| /kænsəl/ | /rəvolt/ | /kəmbaɪn/ |
| /əlɪsət/ | /ədapt/ | /bəliv/ |
| /præktəs/ | /ɪnsɪst/ | /əton/ |

b. The final syllable of the verb is stressed if it ends with a consonant cluster; otherwise, the stress falls on the penultimate syllable.

c. All of the final vowels in column C are tense vowels. Thus, the analysis in (b) must be modified to read: Stress the final syllable of a verb if its vowel is tense or followed by a consonant cluster; otherwise stress the penultimate syllable.

13. English phonotactics.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Word | Possible | Not  Possible | Reason |
| a. | [pʰril] |  | x |  |  |
| b. | [skriʧ] | screech |  |  |  |
| c. | [kʰno] |  |  | x | English phonotactic rules prohibit an initial cluster composed of two stops. |
| d. | [maɪ] | my |  |  |  |
| e. | [gnostɪk] |  |  | x | English phonotactic rules prohibit an initial cluster composed of two stops. |
| f. | [jũnəkhɔrn] | unicorn |  |  |  |
| g. | [fruit] |  |  | x | A glide always occurs between front and back high vowels in English. |
| h. | [blaft] |  | x |  |  |
| i. | [ŋar] |  |  | x | English phonotactic rules do not permit the velar nasal to occur word-initially. |
| j. | [æpəpʰlɛksi] | apoplexy |  |  |  |

14. Hebrew.

a. [b] and [v] are allophones of one phoneme and are in complementary distribution.

[b] occurs word-initially and after consonants while [v] occurs only after vowels.

/b/ → [v] / V \_\_\_

b. Yes, [f] occurs only after vowels, [p] occurs word-initially and after consonants.

c. The correct statement is (i): [b] but not [v] could occur in the empty slot.

d. The correct statement is (ii): [p] but not [f] could occur in the empty slot.

e. The correct statement is (i). These words would force you to revise conclusions reached on the basis of the first group of words since they show a distribution of sounds that differ from the first group: [b] occurring after a vowel, [v] occurring after a consonant, and [f] occurring word-initially. If we were doing a full analysis, we would therefore have to examine additional data not supplied here to formulate the correct analysis.

15. Maninka.

a. (1) -li

(2) -ni

b. Yes, the phonetic variants are predictable. The form is -ni if the last consonant of the stem is a nasal and -li otherwise. Notice that the last consonant of the stem does not have to be the last segment of the stem for the nasalized variant to appear.

c.

|  |  |
| --- | --- |
| da “lie down” | dali “lying down” |
| men “hear” | menni “hearing” |
| famu “understand” | famuni “understanding” |
| sunogo “sleep” | sunogoli “sleeping” |

d. The rule formulated above in (b) above predicts the form sunogoli “sleeping” because the last consonant of the stem is not a nasal.

e. In order to predict the form sunogoni “sleeping” without affecting the other cases, the rule can be reformulated as follows: The form is -ni if there is a nasal consonant somewhere in the stem and -li otherwise. If you happened to give the former as your rule, thus predicting sunogoni, then change it to the rule in (b) to derive sunogoli.

16. Luganda.

a. No, nasal vowels are not phonemic in Luganda. Yes, they are predictable since they only occur before nasal consonants.

b. Yes, the phonemic representation of “garden” is /dimiro/.

c. The phonemic representation of “canoe” is /ato/.

d. [p] and [b] represent separate phonemes and not allophones of one phoneme because their occurrence is not predictable and they are not in complementary distribution. Both sounds occur in phonetically similar environments.

e. No, [ãmdãno] is not a possible phonetic form. The problem is the sequence [md] which has two problems: (1) voiced oral consonants cannot directly follow nasal consonants; (2) consonant clusters that begin with a nasal must consist of consonants that have the same place of articulation.

f. Yes, there is a homorganic rule in Luganda.

g. Phonemic: /enpoːbe/ Phonetic: [empoːbe]

h. (i) /en/

i. [ẽntabi]

j. /akaugeni/

k. Rule 1:   
Vowel nasalization: a vowel is nasalized when it precedes a nasal consonant.

Rule 2:   
Homorganic nasal rule: /n/ assimilates to the place of articulation of a following consonant.

Rule 3:   
Voiced stop assimilation: A voiced stop becomes a nasal if preceded by a nasal consonant.

17. Japanese morphophonemics. (Cf. exercise 10.)

a.

|  |  |
| --- | --- |
| “call” | /yob/ |
| “write” | /kak/ |
| “eat” | /tabe/ |
| “see” | /mi/ |
| “leave” | /de/ |
| “go out” | /dekake/ |
| “die” | /sin/ |
| “close” | /sime/ |
| “swindle” | /kata/ |
| “wear” | /ki/ |
| “read” | /yom/ |
| “lend” | /kas/ |
| “wait” | /mat/ |
| “press” | /os/ |
| “apply” | /ate/ |
| “drop” | /otos/ |
| “have” | /mot/ |
| “win” | /kat/ |
| “steal a lover” | /neto/ |

b. i.  /t/ → [ʦ] / \_\_\_ [u]

ii. /t/ → [ʧ] / \_\_\_ [i]

iii. /s/ → [ʃ] / \_\_\_ [i]

c. i.  Formal: The allomorphs are [imasu] and [masu]. The rule is:

/imasu/ → [masu] / V \_\_\_

ii.  Informal: The allomorphs are [ru] and [u]. The rule is:

/ru/ → [u] / C \_\_\_

18. Ojibwa.

a. The morpheme “I” has the allomorphs [nit] and [ni].

The morpheme “you” has the allomorphs [kiʃ] and [ki].

b. Yes, the allomorphs for “I” are in complementary distribution. Their distribution is predictable; [nit] occurs before vowels, and [ni] occurs before consonants. The allomorphs for “you” are also in complementary distribution. Their distribution is predictable: [kiʃ] occurs before vowels, and [ki] occurs before consonants.

c. /nit/ and /kiʃ/ are the underlying morphemes.

d. Delete a consonant before another consonant, or more formally:

C → Ø / \_\_\_ C

e. Yes, most likely the rule is morphophonemic. If the rule applied in general, rather than to specific morphemes, the language wouldn’t have long (doubled) consonants such as [kː] and [ʃː] since they could be regarded as a CC cluster and the rule would delete the first C.

19. Myanmar nasals.

There is a four-way contrast between the phones [m], [m̥], [n], and [n̥], clearly exemplified by the following minimal set:

[ma] “health”

[m̥a] “order”

[na] “pain”

[n̥a] “nostril”

This set shows that these four phones belong to four separate phonemes. There is a pair of words that at first pass might seem to contradict this conclusion: [mi] ~ [m̥i] “flame.” However, this data isn’t a counterexample to our previous conclusion. The minimal set presented above proves that these four phones contrast. The various pronunciations of “flame” just show that these phones don’t always have to contrast. (We see similar examples in English. For example, we know that [ɛ] and [i] belong to separate phonemes in English, as shown by the minimal pair [bɛn] “Ben” and [bin] “bean.” However, the word economics can be pronounced either [ɛkənamɪks] or [ikənamɪks]. Note that the alternation of [ɛ] and [i] here doesn’t change the meaning of the word. Nevertheless [ɛ] and [i] contrast in English.)

20. Wakanti.

a. The phonemic form of the negative morpheme is /n/.

b. The allomorphs are [n], [m], [ŋ].

c. The nasal consonant [n] assimilates in place of articulation to the following consonant. For example, /n/ will become [m] before a labial, [ŋ] before a velar, and remain [n] elsewhere. Note: /w/ is considered a labial consonant in this language.

d. Oral voiced stops will become nasal after a nasal consonant. For example, /indeɪ/ will become [inneɪ].

e.

|  |  |
| --- | --- |
| /anba/ | “I don’t eat” |
| /indeɪ/ | “You don’t sleep” |
| /anguʊ/ | “I don’t go” |
| /unpi/ | “We don’t come” |
| /antu/ | “I don’t walk” |
| /inka/ | “You don’t see” |
| /injama/ | “You didn’t find out” |
| /anweli/ | “I didn’t climb up” |
| /inoa/ | “You didn’t fall” |
| /anie/ | “I don’t hunt” |
| /unlamaba/ | “We don’t put on top” |

21. French

a. The two forms for “small” are [pəti] and [pətit]. The two forms for “our” are [no] and [noz].

b. [pəti] occurs before words that begin with: [t], [l], [n]

[no] occurs before words that begin with: [t], [l], [n]

[pətit] occurs before words that begin with: [w], [a]

[noz] occurs before words that begin with: [w], [a]

c. [pəti] and [no] occur when the following word begins with an obstruent, liquid, or nasal consonant. [pətit] and [noz] occur when the following word begins with a vowel or a glide. We can summarize this by saying that [pəti] and [no] occur:

/ \_\_\_ [+consonantal] (before a +consonantal segment)

and [pətit] and [noz] occur:

/ \_\_\_ [-consonantal] (before a non-consonantal segment).

d. The basic forms must be the forms that end in consonants—[pətit] “small” and [noz] “our”—because we can make a generalization that deletes the word-final consonant in both cases, but we cannot make a generalization that inserts a [t] in one case and a [z] in the other.

e. Delete the final consonant of a word if it occurs before a word that starts with an obstruent, liquid, or nasal consonant.

f. C → ∅ / \_\_\_ ## [+consonantal]

22. English /b/ deletion.

a. The two allomorphs of each root morpheme are:

[bãm] ~ [bãmb]

[kʰrʌ̃m] ~ [kʰrʌ̃mb]

[aɪæ̃m] ~ [aɪæ̃mb]

[θʌ̃m] ~ [θʌ̃mb]

[rãm] ~ [rãmb]

[tũm] ~ [tũmb]

b. The phonemic form of the roots are:

/bamb/

/krʌmb/

/aɪæmb/

/θʌmb/

/ramb/

/tumb/

c. The /b/ is deleted when it occurs at the end of the word.

d.

|  |  |
| --- | --- |
| [bãm] “bomb” | [bãmb + ard] “bombard” |
| [kʰrʌ̃m] “crumb” | [kʰrʌ̃mb + əl] “crumble” |
| [aɪæ̃m] “iamb” | [aɪæ̃mb + ɪc] “iambic” |
| [θʌ̃m] “thumb” | [θʌ̃mb + əlĩnə] “Thumbelina” |
| [rãm] “rhomb” | [rãmb + ɔɪd] “rhomboid” |
| [tũm] “tomb” | [tũmb + əl] “tombal” |

23. Hebrew metathesis.

a. The phonological change taking place is metathesis.

b. This is an example of metathesis. When the reflexive lehit is added to the sibilant-initial verbs, the last sound of the reflexive metathesizes with the initial sound of the verb root.

24. Japanese vowel devoicing.

a. [u] and [i] may occur voiceless.

b. Yes, the voiceless vowels are in complementary distribution. The voiceless vowels occur between voiceless consonants as in [fu̥kuan] “a plan.” The voiced vowels appear elsewhere, as in [fugi] “discuss.”

c. Yes, [u] and [u̥], and [i] and [i̥], are allophones because they are in complimentary distribution, and are phonetically similar, differing in only one feature (voice).

d. High vowels (/u/ and /i/) become voiceless when they are between voiceless consonants. This rule can be stated formally as

→ [-voice] / \_\_\_

25. Plural and past tense rules of English. Answers should include some mention of faithfulness constraints. A faithfulness constraint is acting to preserve the underlying plural /z/ and the underlying past tense /d/.

26. German. Both German and English obey the constraint: Obstruent sequences may not differ with respect to their voice feature at the end of a word. In English, it is the final segment of the stem that conditions the past tense morpheme to devoice (/sɪp+d/ → [sɪpt], sipped), while in German, the third-person suffix conditions devoicing of the final segment of the stem (/loːb+t/ → [loːpt]).

27. Speech errors.

1. The final consonants of *gone* and *seed* are swapped. Normally, the vowel in *gone* would be nasalized because of the final [n]. However, in the speech error, the form *seen* (derived from *seed*) has a nasalized vowel, suggesting that the swapping of consonants happened before vowel nasalization was calculated.

2. The *ti* in *stick* and the *mu* in *mud* were swapped. The [t] in *stick* is not aspirated, because it occurs after the [s]. However, in the speech error form, the [t] is aspirated in [tʰid]. Here, again, this suggests that the rule that aspirates stops in word initial position was calculated after the speech error that swapped the segments.

3. This example is a little more complicated. It looks like first the entire CC onset [sp] in *speech* switched with the [pr] in *production*: resulting in *preach* and *speduction*. Then, perhaps because the resulting string was so similar to the actual word *seduction* the [p] was deleted from *speduction*. Note that the [p] in *speech* is not aspirated because of the [s]. However, in the form that results from the error, the [p] is aspirated. This gives further evidence that the phonological rule that aspirates stops in word initial position occurs after the speech error swapped the consonants.