Ling 105 Problem Set 3

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> **Problem 1.** Which English words do the following narrow IPA transcriptions represent? Keep in mind that words might include affixes.

(a) **Iron**

(b) **Fowl**

(c) **Use**

(d) **Thus**

(e) **Kale**

(f) **Noun**

(g) **Bared**

(h) **Castle**

(i) **Money**

(j) **Written**

(k) **Autumn**

(l) **Fuse**

(m) **Cushion**

(n) **Wrong**

(o) **Animated**

(p) **Tree**

(q) **Tenant**

(r) **Turkey**

(s) **Washed**

(t) **Dessert**

Problem 2. Transcribe the following words into narrow IPA.

(a) [ˈlʌvd]

(b) [ˈwɝdz]

(c) [ˈsɔɫtɪ̥d]

(d) [ˈpʰõĩnjn̩t]

(e) [g̊ɚˈaʒ]

(f) [ˈɔfn̩]

(g) [ˈdʒioʊd]

(h) [ˌpʰɑɹməˈʒɑ̃n]

(i) [ˈmiɾiɚ]

(j) [ˈluz]

(k) [ˈtw̥ĩndʒ]

(l) [ə̊ˈkw̥aɪɚz]

(m) [ˈspaɪɾɚ]

(n) [ˈaktɪ̥v]

(o) [ˈkʰẽĩmbɹɪdʒ]

(p) [ˌmæsəˈtʃusɪts]

(q) [əˈlɛkʃn̩]

(r) [ˈtʃaɹɫz]

(s) [ˈkʰãntə̃r̃n̩t]

Problem 3. Write the appropriate IPA symbol.

(a) [yː]

(b) [ʀ]

(c) [ɬ̝]

(d) [ɬ̞]

(e) [r̃]

(f) [p̩f]

(g) [ç]

(h) []

(i) [n̩]

(j) [l̩]

(k) [æ]

(l)

(m) [ʤ]

(n) [ɦ]

(o) [∅]

(p) [ʋ]

(q) [ʊ]

(r) [ʌ]

(s) [ɨ˞]

(t) [χ]

Problem 4. Recall that German unlaut involves fronting a vowel while keeping its other features intact. The following singular German nouns form their plurals by umlauting the first vowel. In each case, give the IPA of the first vowel of the plural form.

(a) [œ]

(b) [ø̃ː]

(c) [ʏː]

(d) [ɛ̃]

(e) [ʏ]

Problem 5. When we say that distinct allophones of a phoneme are in complementary distribution, what does the word "complementary" mean? When we say that vowel shortening in closed syllables is a compensatory process, what does "compensatory" mean?

Complimentary here means that the distinct allophones never occur in the same phonetic environments and are mutually exclusive. Compensatory on the other hand means that phonetic features balance each other to maintain a level of phonological equilibrium or ease of articulation. For example, vowel shortening is compensatory since it is response to the increased difficulty of articulation following a consonant cluster.

Problem 6. What is the wavelength (in ms) of an 80 Hz tone? What frequency (in Hz) corresponds to a wavelength of 15 ms?

The wavelength is 1 s/80 = 1000 ms/80 = 12.5 ms.
Next, the frequency is 1/(15 ms/1000ms) ≈ 66.6 Hz.

Problem 7. Just noticeable difference.

Q1: Lower
Q2: Lower
Q3: Lower
Q4: Lower
Q5: Lower
Q6: Higher
Q7: Higher
Q8: Higher
Q9: Higher
Q10: Higher

Problem 8. Two tones are played at 100 decibels. One is 100 Hz and one is 1000 Hz. Which sounds louder?

1000 Hz.

Problem 9. If a 400 Hz tone and a 600 Hz tone are played simultaneously, what fundamental frequency do humans perceive?

The perceived fundamental frequency is $\gcd(400, 600) = 200$ **Hz.**

Problem 10. Thai has five tones (low, mid, high, falling, rising), but the full range of tonal contrasts is only possible on syllables containing a long vowel or a short vowel followed by a voiced consonant. If a syllable contains a short vowel followed by a voiceless consonant – traditionally termed a "checked" or "dead" syllable – only two tones (high and low) are possible. Why might fewer tones be licensed on checked syllables?

First of all, the shorted duration of checked syllables limits the time available for expressing rising or falling tones. Also, voiceless consonants following a checked syllable prevents sustained vocal fold vibration which is essential for maintaining distinctions between the tones.