**Language Science - PSYCH-UH 2218 Name:**

**Problem set 1 Student ID:**

**I. Vowels in Greenlandic (35 points)**

Here is a data set from Greenlandic. The words in brackets are already written in IPA. The translations in italic are just there for fun. You don’t need them for this problem set.

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| **IPA** | **translation** | **IPA** | **translation** | **IPA** | **translation** |
| [ivnɑq] | *bluff* | [nɑnoq] | *bear* | [qilɑluvɑq] | *white whale* |
| [ipeʁɑq] | *harpoon strap* | [iseʁɑq] | *ankle* | [qɑtigɑk] | *back* |
| [tuluvɑq] | *raven* | [igɑ] | *pot* | [ugsik] | *cow* |
| [imɑq] | *sea* | [seʁmeq] | *glacier* | [neʁdloq] | *goose* |
| [sɑvɑ] | *sheep* | [qɑsɑloq] | *bark* | [mɑʁɑq] | *clay* |
| [nunɑ] | *land* | [ikusik] | *elbow* | [oʁpik] | *tree* |

If you look at the words in this data set, you will notice 5 vowels: ɑ, e, i, o, u

These are allophones (surface forms). We know this because the words are written with square brackets.

Your goal in this problem set is to figure out what the underlying phonemes are in Greenlandic, and what the rules are that give rise to the allophones that we see in this data set. To be clear, with 5 allophones, there could be anywhere from 5 phonemes (each with 1 allophones) to 1 phoneme (with 5 allophones), and anything in between. The challenge here is to figure out how many phonemes there are, and which allophones they each give rise to.

1. The first step is to determine the phonetic contexts for each of the 5 vowels (allophones/surface forms) that appear in the data set. Here is a table that you can fill in with the contexts. I have filled in one example for each vowel. You have to fill in the rest. You will have to increase the number of rows in the table. (10 points)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ɑ |  |  | e |  |  | i |  |  | o |  |  | u |  |
| n | \_\_ | q | p | \_\_ | ʁ | # | \_\_ | v | n | \_\_ | q | t | \_\_ | l |
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1. The next step is to identify any vowel allophones that appear in a context that can be described using a natural class based on articulatory features. Use the logic we learned in class. For each of the 5 vowel allophones, tell me whether they appear in a context that forms a natural class, and if they do appear in a context that forms a natural class, write that context using an underscore \_\_ and the feature written in square brackets and in the right position relative to the underscore. For example, if the context were “precedes a voiced consonant”, then you’d write \_\_ [voiced]”. You will need to look at an IPA chart for this. Here is one: <https://www.ipachart.com/>. One thing to note is that this vowel chart uses close/open instead of high/low. Feel free to use either labeling system you want for vowels. (10 points)

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| --- | --- | --- |
|  | Does it appear in a context that forms a natural class?(yes or no) | Write the context here |
| ɑ: |  |  |
| e: |  |  |
| i: |  |  |
| o: |  |  |
| u: |  |  |

1. The next step is challenging. Now that you have identified which allophones appear in natural contexts, you are ready to try to figure out how many underlying phonemes there are, and what the rules are that give rise to their allophones. Remember that every phoneme has at least one allophone (usually itself). Some phonemes may have two or more – itself, and then other allophones that arise due to rules. My best advice is to guess and test. This means making a guess about how many phonemes there are, writing down what you think they are, and then trying to come up with rules that would give rise to their allophones. You can then compare the rules you have written to the original data set, and see if it makes the correct predictions. This means that it never predicts the wrong vowel for the words in the data set.

Once you have figured it out, fill in this table (you may not need to fill in all 5 rows, I have just included 5 because that is the maximum you could need). (10 points)

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| **Phoneme in IPA** | **Allophone(s) in IPA**(remember that phonemes typically also have themselves as an allophone, so include that as well) | **Rule** that gives rise to the non-identical allophone in **articulatory features** using the **notation we learned in class**, e.g.:/front, low/→[front, high] / \_\_[voiced] |
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1. Take a look at the rules you have written (in articulatory features). Can you simplify them? If so, write the simplified rule or rules here (in articulatory features). (5 points)

**II. Allophones in your native language (20 points)**

For this problem, I’d like you to identify an allophonic alternation in your native language. This alternation must involve one phoneme with at least two allophones: itself and one other allophone. It can be any allophonic alternation you want. This can be challenging, as some languages don’t have as much allophony as others. If you speak a language that was discussed in class, please do not use one of the examples we saw. You should be able to find a new one.

To be clear about the grading, I will be grading the logic of your analysis – whether your data set justifies your conclusions, whether your rules use natural classes, whether your rules are maximally simple, etc. I will not be grading whether your analysis is ultimately correct or incorrect for your native language. Grading based on the correctness of the analysis would require me to independently investigate the language, and I will not be able to do that.

To demonstrate the alternation, you must show me the following:

1. Name your native language. (5 points)
2. Create a data set of words from your native language, written in IPA, that provides the logical information one would need to identify the underlying form of the phonemes and the phonological rules that give rise to the allophones. You only need to show me enough to demonstrate the phonetic contexts of the alternation. This means choosing the words carefully. This can often be done with somewhere around 5-10 words, and never more than 15. You can use this table. (5 points)

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| **IPA** | **translation** | **IPA** | **translation** | **IPA** | **translation** |
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1. List the phonetic contexts of the allophones in this table. Replace X and Y with the two allophones. (5 points)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | X |  |  | Y |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |
|  | \_\_ |  |  | \_\_ |  |

1. Now, the challenging part. Use the logic from class (in your head) to figure out the underlying form of the phoneme and the rule that gives rise to the non-identical allophone. Tell me the underlying form of the phoneme, its two allophones, and write the phonological rule that gives rise to the non-identical phoneme using articulatory features and the notation from class. (5 points)

|  |  |  |
| --- | --- | --- |
| **Phoneme in IPA** | **Allophones in IPA**(both itself and the non-identical one) | **Rule** that gives rise to the non-identical allophone in **articulatory features** using the **notation we learned in class** |
|  |  |  |