

Sunil Singh
LIN 177
HW 2, Prof. Sagae
5/5/17

1. The phoneme [b] differs from [p] in that [b] vibrates the vocal folds and creates a voiced sound, whereas [p] is not voiced. Otherwise [p] and [b] share the characteristics of being consonantic, labial, and anterior. The phonemes [k] and [g], as well as [s] and [z], share this difference in that the phonemes [g] and [z] are also voiced by the vibration of the vocal folds, whereas [k] and [s] are not voiced.

2. Prolog Code:

```
transition(1, b, 2, p).  
transition(1, k, 2, g).  
transition(1, s, 2, z).  
transition(1, p, 2, b).  
transition(1, g, 2, k).  
transition(1, z, 2, s).  
transition(1, Phoneme, 2, Phoneme).  
transition(2, b, 3, p).  
transition(2, k, 3, g).  
transition(2, s, 3, z).  
transition(2, p, 3, b).  
transition(2, g, 3, k).  
transition(2, z, 3, s).  
transition(2, Phoneme, 3, Phoneme).  
transition(3, b, 4, p).  
transition(3, k, 4, g).  
transition(3, s, 4, z).  
transition(3, p, 4, b).  
transition(3, g, 4, k).  
transition(3, z, 4, s).  
transition(3, Phoneme, 4, Phoneme).  
transition(4, b, 5, p).  
transition(4, k, 5, g).  
transition(4, s, 5, z).  
transition(4, p, 5, b).  
transition(4, g, 5, k).  
transition(4, z, 5, s).  
transition(4, Phoneme, 5, Phoneme).  
transition(5, b, 6, p).  
transition(5, k, 6, g).  
transition(5, s, 6, z).  
transition(5, p, 6, b).  
transition(5, g, 6, k).  
transition(5, z, 6, s).  
transition(5, Phoneme, 6, Phoneme).  
transition(6, b, 7, p).
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transition(6, k, 7, g).

transition(6, s, 7, z).

transition(6, p, 7, b).

transition(6, g, 7, k).

transition(6, z, 7, s).

transition(6, Phoneme, 7, Phoneme).

initial(1).

final(7).

3. Prolog Code:

transition(1, b, 7, p).

transition(1, k, 7, g).

transition(1, s, 7, z).

transition(1, p, 7, b).

transition(1, g, 7, k).

transition(1, z, 7, s).

transition(1, Phoneme, 2, Phoneme).

transition(2, b, 7, p).

transition(2, k, 7, g).

transition(2, s, 7, z).

transition(2, p, 7, b).

transition(2, g, 7, k).

transition(2, z, 7, s).

transition(2, Phoneme, 3, Phoneme).

transition(3, b, 7, p).

transition(3, k, 7, g).

transition(3, s, 7, z).

transition(3, p, 7, b).

transition(3, g, 7, k).

transition(3, z, 7, s).

transition(3, Phoneme, 4, Phoneme).

transition(4, b, 7, p).

transition(4, k, 7, g).

transition(4, s, 7, z).

transition(4, p, 7, b).

transition(4, g, 7, k).

transition(4, z, 7, s).

transition(4, Phoneme, 5, Phoneme).

transition(5, b, 7, p).

transition(5, k, 7, g).

transition(5, s, 7, z).

transition(5, p, 7, b).

transition(5, g, 7, k).

transition(5, z, 7, s).

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transition(5, Phoneme, 6, Phoneme).

transition(6, b, 7, p).

transition(6, k, 7, g).

transition(6, s, 7, z).

transition(6, p, 7, b).

transition(6, g, 7, k).

transition(6, z, 7, s).

transition(6, Phoneme, 7, Phoneme).

initial(1).

final(7).

4. Prolog Code:

transition(0, Phoneme, 0, Phoneme):- Phoneme \= 1.

transition(0, 1, 1, 1).

transition(1, Phoneme, 0, Phoneme):- Phoneme \= "p".

transition(1, Phoneme, 0, Phoneme):- Phoneme \= "k".

transition(1, Phoneme, 0, Phoneme):- Phoneme \= "t".

transition(0, p, 2, p_h).

transition(0, k, 2, k_h).

transition(0, t, 2, t_h).

transition(2, Phoneme, 3, Phoneme):- Phoneme \= 1.

transition(3, 1, 1, 1).

initial(0).

final(3).