

INTRODUCTION TO SPEECH SCIENCE

Lab 9: Effect of lexical neighbourhoods on word perception

Introduction

It is claimed that words are easier to perceive if they come from *sparse* lexical neighbourhoods than if they come from *dense* lexical neighbourhoods. In establishing whether a word is likely to be 'easy' or 'hard', account is taken of its frequency of occurrence and of that of its neighbours. Here, we will test the effect of lexical neighbourhood by evaluating your perception of 'easy' and 'hard' words presented in a background of noise.

Material

A set of 100 'easy' and 'hard' words was selected. In order to establish whether a particular test word was likely to be 'easy' or 'hard', the following steps were taken:

- a. The size of the lexical neighbourhood of the test word was calculated by looking at all words that could be produced by swapping one of the phonemes in the test word.
- b. This number was then weighted for word frequency of occurrence (by calculating the relative frequency of occurrence of the test word relative to that of its neighbours)
- c. The test word was classified as 'easy' or 'hard' if it reached a particularly high or low score in this calculation.

A word can therefore be 'hard' to perceive either because it has lots of neighbours and/or because its frequency of occurrence is much lower than that of its neighbours.

Test method

Words have been mixed with speech-shaped noise at a level of 0 dB Signal to Noise Ratio (i.e. the noise is of equal intensity as the words) then recorded onto DAT tape. The words will amplified then presented via loudspeaker. Your task will be to write down each word.

Worksheet

1. Lexical neighbours are defined as words that differ in only one phoneme. Think of words in the same lexical neighbourhood as the word 'GLIMPSE'. Do you think this word comes from a 'dense' or 'sparse' neighbourhood? _____

2. Think of words in the same lexical neighbourhood as the word 'TINE'. Do you think this word comes from a 'dense' or 'sparse' neighbourhood?

3. Calculate what percentage of words from 'easy' and 'hard' words were correctly perceived.

4. Work out a group average with other students sitting at your table. Was the effect consistent across the group?

5. Where words were misperceived, how often was they heard as a word belonging to the same lexical neighbourhood (i.e. differing in one phoneme only, or in the omission of one phoneme)? Work this out as a percentage of errors made.

6. Is it your impression that words that were misperceived were heard as words with higher or lower frequencies of occurrence than the test words?

7. In your view, does it make sense to include in a lexical neighbourhood any word that differs by a single phoneme? Justify your answer

8. What are the difficulties involved in constructing a clinical test based on lexical neighbourhoods for children?

9. This type of word test based on lexical neighbourhoods is now often used in the US for clinical evaluations of speech perception (e.g. with adults or children with cochlear implants). What are the pros and cons of using this approach?

10. Would this test have been easier or harder if the test words had been presented in a sentence context?

11. Imagine that you are assessing speech perception in an elderly person who has an age-related hearing loss. What approach could you take if you wanted to evaluate how well this patient was at making use of contextual (linguistic) information to compensate for the hearing loss.
