# Allophonic Reassignment in Dialect Adaptation

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## Introduction

Recent sociophonetic studies (Sankoff, in press; Harrington et al. 2000; Munro et al. 1999) show that adult speakers are capable of modifying their dialect in natural conditions. We explore this capability through a dialect training study targeting /r/ and /t/ in Glaswegian English.

The main questions in the study are:

**Lexical versus systematic learning**: To what extent do subjects learn general phonological or phonetic patterns, which transfer from words in the training materials to new words?

**Categorical versus parametric learning**: To what extent do subjects reuse phonological categories that already exist in their native dialect? To what extent do they establish new categories over the parametric-phonetic space?

**Positional constraints**: If existing categories are reused, can they be reused in a different prosodic position (like phonemes)? Or are they confined to their native context (like allophones)?

Answers to these questions distinguish between **exemplar models** (Johnson, in press; Goldinger 1998) and **neo-generative models** (Maye, in press; Peperkamp, to appear).

**Exemplar models**
- Interactions between socio-indexical and lexical information.
- Word-specific phonetic patterns.
- Generalization via similarity to practiced words.

**Neo-generative models**
- Strong factoring of socio-indexical and lexical information.
- Fast, general, categorical remapping.
- But what kind of categories: positional allophones? phonemes?

## Experiment: Dialect Adaptation

### Overview

**Am. English** talkers imitated **Glaswegian English*** speech.

| Phoneme | Position | American | Glaswegian |
|---|---|---|---|
| /t/ | strong (*top*ic) | [tʰ] | [tʰ] |
| | weak (*mat*ting) | [ɾ] | [tʰ] |
| /r/ | all (*rubble, ferry*) | [ɹ] | [ɾ] |

- Can talkers reassign allophones to new prosodic contexts [1]?
- Can talkers reassign allophones to new phonemic categories [2]?

*Glaswegian English = Glaswegian *accented* English, as opposed to Lowland Scots.

### Materials

- 192 sentences with /t/, /r/ in strong (word-initial) and weak (word-medial) positions
- 4 conditions, with target phonemes only in final words
  - **/t/-initial**: He gave away his only token.
  - **/t/-medial**: The damp wind made him all sweaty.
  - **/r/-initial**: All the family's belongings lay beneath the rubble.
  - **/r/-medial**: The boy swallowed mud because he was curious.
- 4 blocks of 48 target sentences; 12 per condition, pseudo-randomized
- 3 blocks of 12 non-target items (i.e. no target phonemes in sentence)
  - **non-target:** A display of the dig can be seen in the lobby.
- Blocks produced by a native speaker of Glaswegian English (male), recorded onto CD

### Participants

24 undergraduate students at Northwestern University, native speakers of American English.

## Experiment: Procedure

### Week One

- Blocks of target items counterbalanced to appear in each condition.

**Baseline**: Participants produce 1st block of target sentences in their native dialect.

**Training 1, 2**: For 2nd block, participants hear a Glaswegian model of each sentence and attempt imitation. Task repeated as Training 2.

**Generalization 1**: Participants generalize the accent to new sentences, without hearing model.

### Week Two

- Order of target conditions counterbalanced.
- Target conditions not modeled.

**Non-target 1, 2, 3**: Refamiliarization on non-target block before each target condition.

**Training 3**: Repetition of 2nd block (from Training 1, 2).

**Generalization 1R**: Repetition of 3rd block (from Generalization 1).

**Generalization 2**: Production of entirely new block.

### Coding

- Phonetically transcribed and categorized as shown at right
- Listening and visual inspection of waveform and spectrogram

### Outcome Categories

| | /t/ | /r/ |
|---|---|---|
| Allophonic transfer | [tʰ] | [ɾ] |
| Phonetic innovation | [t] | variants of [ʁ], [ɾ], [ʒ] |
| Non-adaptation | [ɾ] | [ɹ] |

## Results: Allophonic Transfer

**Production of [tʰ]**

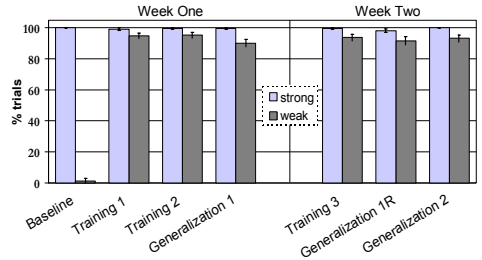



Figure 1. Mean rate of producing allophonic target [tʰ] for /t/.

**Overall**: Successful recruitment of [tʰ] for /t/.

**Position**: /t/-medials slightly less accurate than /t/-initials.

**Production of [ɾ]**

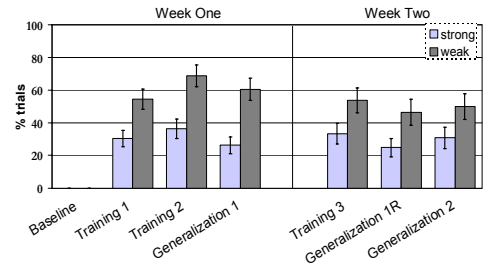



Figure 2. Mean rate of producing allophonic target [ɾ] for /r/.

**Overall**: Moderate success at recruiting [ɾ] for /r/.

**Position**: /r/-medial > /r/-initial in all conditions.

**Practice**: Training 2 > Training 1.

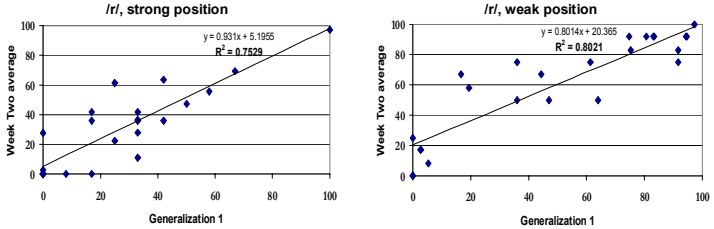
**Lexical Effect**: Training 2, 3 > Generalization 1, 1R, but only slightly.

**Time Effect:** Week 2 shows only a small decline from week 1.

## Results: Variability

### Long-term Learning

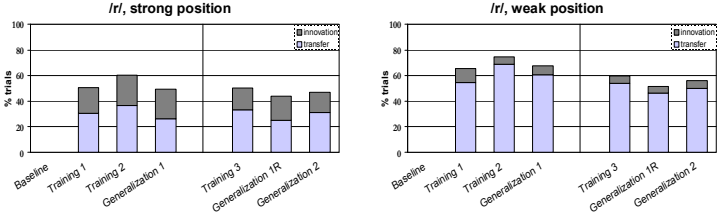
Success in Week 2 tasks highly correlated with success in Generalization 1.




Figures 3, 4. Scatter plots of allophonic transfer in Generalization 1 versus the composite average of tasks in Week Two.

### Allophonic Transfer versus Phonetic Innovation

- Allophonic transfer dominated.
- Phonetic innovation also occurred.




Figures 4, 5. Additive contributions of innovation- and transfer-driven outputs.

## Summary/Discussion

**Lexical versus systematic learning**
- Dominant effect was systematic learning; lexical effects were secondary

**Categorical versus parametric learning**
- Most subjects (variably) remapped flap allophone to /r/
- Some phonetic innovations, especially in poor (strong, initial) flap contexts
- Some subjects made no progress at either level

**Positional constraints**
- Remapping was more successful in better (weak, intervocalic) flap contexts

**Exemplar models vs. neo-generative models**
- Dominant effects accord with neo-generative models such as Maye et al., Peperkamp
- Lexical effects recall effects found by exemplar theorists (Johnson, in press; Goldinger 1998)
- Total picture supports a hybrid model (Pierrehumbert 2002)

**References**

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