

## Orthographic Information and the Phonological Structure of the L2 Lexicon

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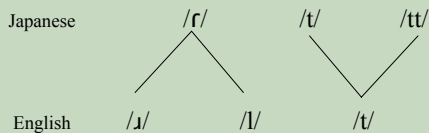
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## Introduction

- Adults typically experience difficulty perceiving and producing L2 phonemes
- General Questions
  - Why do learners exhibit foreign accents?
  - Why are foreign accents often so difficult for learners to overcome?
- *A lexical-phonological source?*

## Introduction

- Allophonic split is particularly difficult



## Introduction

- Native Japanese speakers exhibit difficulty distinguishing English words like 'read' and 'lead' → neutralized to /rid/
- At the level of perception/production only?
  - Accurate lexical representations /lid/ and /lid/, become /rid/ due to surface constraints
- At the level of lexical representation?
  - /lid/ and /lid/ → /rid/ in the lexicon

## Lexical Consequences?

- What are the consequences of novel phonemic contrasts for L2 lexical representations?
- What kinds of information can learners use to establish contrastive lexical representations?

## Lexical Representation

- Storage of a word in memory
  - phonological, morphological, syntactic, semantic, (and orthographic) structures
- Traditionally, lexical representations contain only contrastive information about the phonological structure of words (but see, e.g., Pater 2003)

## Homophony?

- When learners are not aware of a novel contrast, they should not be able to encode the relevant phonemes in their L2 lexical representations
- Are L2 minimal pairs encoded as homophones in the learner lexicon?
  - /lid/ and /lid/ → /rid/?

## Homophony?

- Learners experience patterns of lexical activation that are consistent with homophonous representations of L2 minimal pairs

## Pallier, Colomé & Sebastián-Gallés (2001)

- Spanish-dominant (but not Catalan-dominant) bilinguals showed repetition priming for Catalan minimal pairs differing only by contrasts that exist in Catalan but not in Spanish (/o/-ɔ/: dóna-dona ‘s/he gives’-‘woman’)

Spanish: only /o/ Catalan: /o/ & /ɔ/	Spanish-dominant	Catalan-dominant
[dɔna] → [dɔna]	✓	✓
[dona] → [dona]	✓	✓
[dona] → [dɔna]	✓	✗
[dɔna] → [dona]	✗	✗

## Alternative Explanation...

- Spanish-dominant were unable to perceptually distinguish the minimal pairs in the auditory task
  - Inability to perceive the difference between /o/ and /ɔ/ words prevented them from differentially accessing /o/ and /ɔ/ lexical items

Pallier et al. (2001)

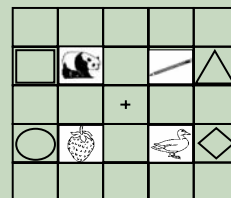
## Weber & Cutler (2004)

- Tease apart the contributions of online perception and lexical representations using eye-tracking technology



Image source: <http://www.a-s-l.com/>

- Native Dutch speakers of English
- /æ/ and /ɛ/ are not contrastive in Dutch
- Subjects initially looked at *pencil* when they heard p[æ]nda



Weber & Cutler (2004)

## Asymmetric Lexical Activation

- Consistent with a homophonous lexical representation of /æ/ and /ɛ/, however...
- The pattern of inappropriate lexical activation was *asymmetric*
  - Subjects looked at *pencil* when they heard p[æ]nda but not at *panda* when they heard p[ɛ]ncil

Weber & Cutler (2004)

## Asymmetric Lexical Activation

- English /æ/ and /ɛ/ perceived as Dutch /ɛ/
- Initially activate lexical items containing /ɛ/ regardless of whether /æ/ or /ɛ/ is produced
- But how can learners lexically encode a contrast that they do not perceive?
  - *Knowledge of the spelled forms of words?*

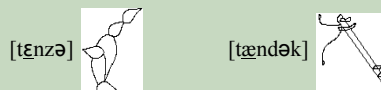
Weber & Cutler (2004)

## Orthographic Influence?

- The letters ‘a’ and ‘e’ may be a cue to the /æ/-/ɛ/ contrast (e.g. ‘bet’ vs. ‘bat’)
- If knowledge of orthography contributes to contrastive lexical representations, subjects should exhibit asymmetric lexical activation when *spelled forms* are available in the input

## Eye-Tracking Study

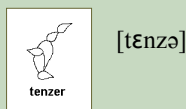
- Native Dutch subjects learned “meanings” of 20 auditory nonwords via association with pictures of nonobjects during a word learning phase



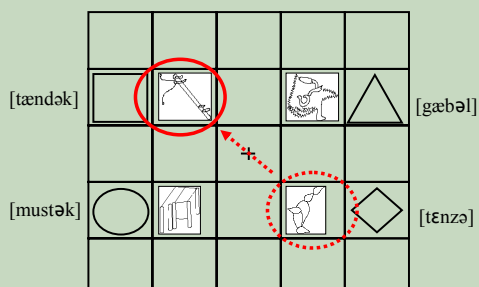
- Two word learning conditions (n=24 each)
  - Auditory Forms Only: Only auditory forms and pictures



- Auditory and Spelled Forms: Spelled forms also available

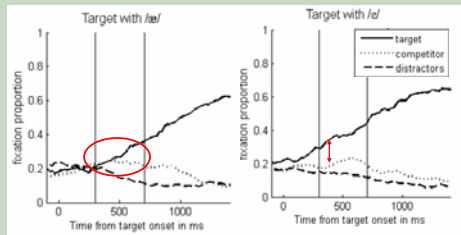


## Test: “Click on the [tændək]”



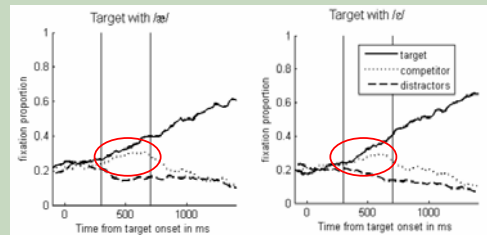
## Results: Fixation Patterns

### Auditory and Spelled Forms



## Results: Fixation Patterns

### Auditory Forms Only



## Conclusion

- We replicated Weber & Cutler (2004)'s asymmetric lexical activation patterns *only for subjects exposed to written forms*
- Orthographic information cued the establishment of lexical contrast  
→ Orthographic and phonological forms interact in the L2 lexicon

## Related Findings

(Hayes-Harb, Nicol & Barker)

- Can knowledge of written forms *prevent* learners from establishing target-like phonological representations for words?
- Can mismatches between the spelling conventions of the L1 and L2 influence the phonological forms of words in the L2 lexicon?

Spanish	English
/h/ 'gente' [hente] <i>people</i>	/dʒ/ 'gentle', /g/ 'governor'

- Native English speakers in three artificial L2 word learning conditions

### Auditory Form [kuvæk]



Hayes-Harb, Nicol & Barker (under review)

- Subjects in the *incongruent group* were more likely than subjects in the other two groups to

- (1) name the picture of the toothbrush [kubæk]; and
- (2) incorrectly match the picture of the toothbrush with the auditory form [kubæk]  
→ Orthographic and phonological forms interact in the L2 lexicon

Hayes-Harb, Nicol & Barker (under review)

## Conclusion

(Hayes-Harb, Nicol & Barker)

- Learning written labels that don't correspond to L1 grapheme-phoneme correspondence rules might result in an orthography-based "foreign accent"
- In cases where the L1 and L2 differ in grapheme-phoneme correspondence rules, it may be better for students to learn words initially without using written forms

## However...

- Knowledge of written forms can help learners establish lexical contrast even when they don't perceive the contrast
- Future research is aimed at replicating the asymmetry with identical vowels in 'æ' and 'ɛ' words



[tɛnzə]



[tɛndək]

## Conclusion

- Orthographic and phonological forms interact in the L2 lexicon
- The influence of orthography is strong enough to overcome auditory information...
  - When auditory and orthographic information "conflict" (Hayes-Harb, Nicol & Barker)
  - When auditory information is unusable (e.g., where Dutch learners of English don't perceive the /æ/-/ɛ/ contrast)

## Conclusion

- Why does this matter?
  - L2 word learning (when literacy is involved) is not based solely on memory of individual exemplars
  - L2 learners make use of abstract knowledge (in this case, grapheme-phoneme correspondences) to make inferences about the phonological forms of words
  - L2 learners are *resourceful*...

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