L2 Learners often confuse words...
And that’s why…
Overview of the talk

- Spoken word recognition and the L2 mental lexicon
  - phonetic perception and lexical encoding are related
- L2 learners differ from native speakers in lexical behavior
- Fuzzy or not fuzzy? Two hypotheses about the form of words in the L2 lexicon
- Experiments, Methods, Results
SPOKEN WORD RECOGNITION
Stages in perception

*Conceptual, syntactic, orthographic codes*

Lexical Selection & Retrieval

*Prelexical code*

Phonetic Decoding

*Acoustic code*
Stages in perception

Conceptual, syntactic, orthographic codes

Lexical Selection & Retrieval

Prelexical code

Phonetic Decoding

Consonants & vowels

Acoustic code
Stages in perception

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Stages in perception

**Conceptual, syntactic, orthographic codes**

**Prelexical code**

**Phonetic Decoding**

**Consonants & vowels**

**Word Forms**

**Acoustic code**

- "Phonetic Decoding" is connected to "Consonants & vowels".
- "Lexical Selection & Retrieval" is connected to "Conceptual, syntactic, orthographic codes".
- "Prelexical code" is connected to "Lexical Selection & Retrieval".
- "Acoustic code" is connected to "Phonetic Decoding".

Examples of word forms include:
- /lu:p/
- /li:k/
- /lu:s/
- /lu:p/

The acoustic code is represented by the waveform at the bottom of the diagram.
Spoken word recognition

Recognizing words in L1
- Cohort model
  - Activation, competition
  - Selection
  - (Marslen-Wilson, 1987)
- Input is perceived reliably
- Lexical representations are accurate
- Error free and fast recognition

Recognizing words in L2
- Much more complex
  - Competition from both lexicons
  - (Ju & Luce, 2004; Marian & Spivey, 2003; Spivey & Marian, 1999; Costa & Santesteban, 2004)
- Spoken input perception is less reliable (Sebastian-Galles, 2005)
  - More competitors (unnecessarily) activated (Broersma, 2012)
- **Lexical representations might be fuzzy**
- Slower and less efficient recognition
Differences in lexical behavior (between NS and NNS)

Repetition priming for minimal pairs in lexical decision (no priming for native listeners)

/netə/-/nɛtə/ (granddaughter - clean);
/θɹiː/- /tɹiː/ (three - tree)

Darcy, Dekydtspotter, Sprouse, et al., 2012; Pallier, Colomé, & Sebastián-Gallés, 2001; Trofimovitch & John, 2011

Cross-modal priming from non-words to real words (not for native listeners)

*/gruːf/ - GROOVE ; */dæf/ - DEAF

Broersma & Cutler, 2008; 2011

False-alarm recognition of non-words as words (not for native listeners)

*/gruːf/ -> groove; */lɛmp/ -> læmp;

Dupoux, Sebastian, Navarrete & Peperkamp, 2008; Sebastian-Gallés, Echeverría & Bosch, 2005; Sebastián-Gallés, Rodríguez-Fornells, de Diego-Balaguer, & Díaz, 2006

False-positives in visual semantic-relatedness decision task (not for native speakers)

key – lock (yes) vs. key – rock (yes!)

Ota, Hartsuiker, & Haywood, 2009
Lexical decision with repetition priming

Repetition effect: you are faster on an item presented a second time

Repetition: Faster RT the second time

Minimal pair: no facilitation, equal RT

Unless “bear” and “pear” are in fact homophones for you => repetition priming
Segmental deafness


[e] vs [ε] classification

Lexical decision: repetition priming

| netə | ... | netə |
| netə | ... | netə |
Repetition priming for minimal pairs


[e] vs [ε] classification

Lexical decision: repetition priming

![Graph showing repetition priming effects for Catalan and Spanish languages.](image-url)
No segmental “deafness” but repetition priming

English-French bilinguals (AoL : after 10) (Darcy et al., 2012)

[u] vs [y] categorization (ABX)  Lexical decision: repetition priming

Accurate perception (around 10% error for either L2 group)
But Weber & Cutler (2004) found an asymmetry in lexical activation...


“Click on the [pæn... ]”

A similar bias towards /ε/ is also found in phonetic categorization
So, lexical separation is possible despite perceptual problems

• When Dutch hear \[\text{pæn...}\], they activate both “pencil” and “panda”

• When Dutch hear \[\text{pɛn...}\], they do not look at the “panda”

• /ɛ/ is the vowel closest to a Dutch category => “dominant”

• Thus: even if asymmetrically, they do encode a lexical contrast (no competition = no homophones) for categories they have difficulty discriminating

Weber & Cutler 2004
What about the phonological form of L2 lexical representations?
PHONETIC CATEGORIZATION

LEXICAL REPRESENTATIONS

HYPOTHESES
“old” and “new” sounds

- German vowels: /o/ and /ø/
- Only /o/ exists in English
- For English L1 listeners:
  
  /o/ is the vowel closest to an English category => “dominant”
PHONETIC DECODING DEFICIT
Conceptual, syntactic, orthographic codes

Lexical Selection & Retrieval

Prelexical code

Phonetic Decoding

Acoustic code

Not necessarily target-like, but not fuzzy

Word Forms

Consonants & vowels

Consonants & vowels

Acoustic code

Phonetic Decoding

Lexical Selection & Retrieval

Conceptual, syntactic, orthographic codes

[konić] [honić]
LEXICAL ENCODING DEFICIT
LEXICAL ENCODING DEFICIT

Conceptual, syntactic, orthographic codes

Lexical Selection & Retrieval

Prelexical code

Phonetic Decoding

Consonants & vowels

Acoustic code

Word Forms

Makes reference to L1 category, fuzzy

/no mismatch/

/[kɔɲɪç] /[honɪç]/

/*[hɔɲɪç] /*[kɔɲɪç]

relat. easy "no"
hard "no"
easy "yes"
very easy "yes"

/*[hɔɲɪç] /*[kɔɲɪç]

*|hɔɲɪç| *|kɔɲɪç| |kɔɲɪç| |honɪç|
Predictions for lexical decision

**PHONETIC DECODING DEFICIT**

**LEXICAL ENCODING DEFICIT**

### Non Word
- hard **“no”**
- easy **“no”**
- New Old

### Word
- hard **“yes”**
- very easy **“yes”**
- New Old
EXPERIMENTS
## Participants and stimuli

### L2 Japanese

<table>
<thead>
<tr>
<th>Geminate / Singleton consonants</th>
</tr>
</thead>
<tbody>
<tr>
<td>[geminate] is new</td>
</tr>
<tr>
<td>[singleton] is old</td>
</tr>
</tbody>
</table>

### L1 English

- Beginner [first-year, N = 11]
- Advanced [fourth-year, instructors, N = 14]

### Japanese Native Speakers

- [N = 11]

### L2 German

<table>
<thead>
<tr>
<th>Front/Back rounded vowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>[front rounded] is new</td>
</tr>
<tr>
<td>[back rounded] is old</td>
</tr>
</tbody>
</table>

### L1 English

- Intermediate [third-year, N = 55]
- Advanced [> 6 months in Germany, N = 21]

### German Native Speakers

- [N = 18]
**L2 Japanese**
- **Test**  
  A
- **Control**  
  B

**L2 German**
- **Test**  
  B
- **Control**  
  A
- **Distractor**  
  A

**Lexical decision**
- **Word**
  - L2 Japanese: akeru
  - L2 German: Honig
  - Control: Kanne
- **Non Word**
  - L2 Japanese: *akkeru
  - L2 German: *Hønig
  - Control: *Blanne
ABX: Categorization
Lexical Decision

RESULTS
L2 Japanese

Interaction between “group” and “condition”: more errors on the test condition

Higher error rate for high vowels /y/ over mid vowels /ø/; Overall: high accuracy despite small statistical differences

L2 German

No interaction between “group” and “condition” => very low error rate

Higher error rate for high vowels /y/ over mid vowels /ø/; Overall: high accuracy despite small statistical differences
L2 Japanese

Accuracy rate
Lexical decision
(test condition)

If lexical representations are fuzzy →

![Bar chart showing mean accuracy for Beginner, Advanced, and NS (non-native speaker) groups. The chart includes bars for nonword and word conditions, with variations for sound categories: geminate [new] and singleton [old].](Image)
Accuracy rate
Lexical decision (test condition)

If lexical representations are fuzzy →

L2 German
SUMMARY AND CONCLUSIONS
Lexical representations can be fuzzy

• Fuzzy yet separate
  – Of course, learners might have merged representations, too

• New categories make reference to L1
  – Advanced learners show signs of recovery

• Independent of phonetic perception
  – Persistent lexical issues co-occurs with highly accurate phonetic perception
L2 lexical representations are hard to build

• **Good part**: Don’t feel bad

• **Distressing part**: Perceptual learning gives no guarantee

• **Bad part**: We don’t know what’s going on

• **Interesting part**: What can we do about it? (can we teach it?)
Bright future for research...

• Understand in which case orthography helps and in which it doesn’t
  – Chung-Lin Yang, Ph.D. work, in progress
  – Cate Showalter, Ph.D. work, in progress
• Understand how this works for non-segmentals (e.g. tones)
  – Vance Schaefer, Ph.D. work, in progress
• Understand what happens when both categories are “new” or when there is no “dominant” category
  – Danielle Daidone, Ph.D. work, in progress
• Understand how L2 learners update the phonological form of their lexical entries
  – At once? Word by word? By frequency bands?
  – Danielle Daidone, Ph.D. work, in progress
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