The Effects of Cafeteria Noise Distraction on Generative Naming in Bilingual Speakers

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Theoretic Grounding

- This study is grounded in two approaches
  - Capacity theory of divided attention (Kahneman, 1974)
  - Theories of bilingualism and language processing (Caramazza & Brones, 1979; de Bot, 1992; Tzelgov, Henik, & Leiser, 1990)
Why is this Important?

- Speed and accuracy of information processing is critical for academic pursuits, business, and most other daily tasks.

- Attention provides management of information processing.

- In our daily lives we observe the negative effects of auditory distractions on task performance in many settings, such as restaurants, libraries, and cars.

- The concept of irrelevant noise affecting lexical processing in bilinguals is relatively unstudied.
Rationale: Interference, Competition, and Distraction Affects Us in Many Ways

- More errors and slower speed on cognitive and linguistic tasks
- Difficulty managing two languages greatly affected by divided attention
- Very little research on distraction effects on semantic fluency in bilingualism
Purposes

- To determine the effects of auditory distraction on written lexical-semantic word generation in bilingual speakers

- To explore differential effects of distraction across languages in bilingual speakers (Spanish vs. English)
Research Questions

- Will cafeteria noise distraction have an effect on the number of lexical-semantic items generated in a fixed time frame?

- Will the number of words generated vary across languages with or without distraction?
Hypotheses

- L1 (Spanish) will result in the generation of more words in a fixed time frame than will L2 (English)

- The condition of quiet will result in the generation of more words than during cafeteria noise distraction at 70dB

- No significant differences will be evident across semantic categories during conditions of quiet or cafeteria noise distraction
Participants

- The participants used in this study were 8 Spanish-English speaking bilingual students.

- Participants ranged in age from 18 to 23 (M=20.3; SD=1.6).

- All had no reported history of neurological impairments.

- Participants were students at Florida State University.

- All participants had Spanish as their native language but were reported to be fluent in English.
Procedures

- All participants completed a detailed language history form (see Appendix A)

- Setting: An IAC double walled sound shielded audiometric suite

- Participants were administered a hearing screening to decide on the presentation level of auditory distraction (Appendix B)

- For semantic generative naming task:
  - Write as many words in each category (sports, fruits, animals, vegetables) in one minute, first in one language, then in the other (English and Spanish) (Appendix C)

- Conditions:
  - Either a quiet condition or a 70dB SL cafeteria noise condition

- Both languages and conditions were counterbalanced
Data Analysis

- Participant semantic generative naming responses were recorded and tallied.
- Measures of central tendency using descriptive statistics were determined for all responses across all conditions.
- Nonparametric statistics (Wilcoxon Signed Ranks Tests) were used to determine differences in performance across conditions and languages.
Results

- Participants generated more words in English (M=24.6; SD=7.4) than Spanish (M=14.6; SD=5.0) with categories and conditions pooled (Z=2.31; p=0.021).

- The number of words generated across conditions (quiet vs. cafeteria noise distraction) failed to reach statistical significance with categories and languages pooled.

- Number of words generated across semantic categories was relatively equal and no category differences were found.
Comparisons of English vs. Spanish with
Pooled Distraction & Quiet Conditions & Pooled Categories

Means of Semantic Generative Naming Task Raw Scores

English: 24.6
Spanish: 14.6
Conclusions

- Significantly more words were generated in English than in the native (L1) language (Spanish). This was unexpected.

- No differences in the number of words generated were found between quiet and cafeteria noise distraction.

- Performance was relatively equal in number of words generated across semantic categories (sports, animals, vegetables, and fruits).

- More research is necessary to clarify the effects of distraction and interference on language skills in bilingual speakers.
Interpretations

- Perhaps more concentrated effort and focused attention was produced with the language perceived as being weaker. This is consistent with other research findings on cognitive resource allocation.

- Another plausible explanation may be that performance was influenced by immersion into a non-native language environment and into an academic environment that demanded L2 experience.

- Participants performed equally well in the two conditions. Perhaps our sample (young, college students) is impervious to or accustomed to auditory distraction.

- These subjects may not be representative of the population of bilingual speakers. They learned English early (preschool) and rated their English proficiency as equal to their proficiency in Spanish.

- It is possible that individuals with an intact nervous system can accommodate distraction. It would be of interest to further examine the effects of distraction with bilingual speakers who may have sustained neurological impairments (i.e. traumatic brain injury, progressive neurological disease, stroke).
References


Erickson, R. J., Goldinger, S. D., & LaPointe, L. (1996). Auditory vigilance in aphasic individuals: Detecting nonlinguistic stimuli with full or divided attention. Eludlq dqq Frj qlslyh/ 63, 244-253.


Appendix A: Degree of Bilingualism Form

Appendix A
Bilingual Questionnaire

Name: ___________________ Sex: ___ Age: ___
Where were you born?
Where were your parents born?

If you were not born in the United States, how old were you when you moved to this country? ______ How many years have you lived in the United States?
At what age did you start using English?
How did you learn Chinese?
Which dialect of Chinese did you learn?
How did you learn English?

In response to the questions below, circle the relative frequency with which you used Chinese and English at different ages and in different situations. Use the following scale:

1 = Chinese only
2 = Chinese frequently, English rarely
3 = Chinese majority with English used at least 1/4 of the time
4 = Equal use of Chinese and English
5 = English majority with Chinese used at least 1/4 of the time
6 = English frequently, Chinese rarely
7 = English only

1. As a young child, before starting school?
   Chinese
   Equal use—Chin. & Engl.
   English

   1  2  3  4  5  6  7

2. As a child, primary school age?
   In school
   Chinese
   Equal use—Chin. & Engl.
   English

   1  2  3  4  5  6  7

   At home
   Chinese
   Equal use—Chin. & Engl.
   English

   1  2  3  4  5  6  7
<table>
<thead>
<tr>
<th>In other places</th>
<th>Chinese only</th>
<th>Equal use—Chin. &amp; Engl.</th>
<th>English only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

3. As a teenager, secondary school age?

<table>
<thead>
<tr>
<th>In school</th>
<th>Chinese only</th>
<th>Equal use—Chin. &amp; Engl.</th>
<th>English only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>At home:</td>
<td>Chinese only</td>
<td>Equal use—Chin. &amp; Engl.</td>
<td>English only</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In other places</th>
<th>Chinese only</th>
<th>Equal use—Chin. &amp; Engl.</th>
<th>English only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

4. As an adult?

<table>
<thead>
<tr>
<th>In the University or at work</th>
<th>Chinese only</th>
<th>Equal use—Chin. &amp; Engl.</th>
<th>English only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>At home:</td>
<td>Chinese only</td>
<td>Equal use—Chin. &amp; Engl.</td>
<td>English only</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
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<tr>
<th>In other places</th>
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<th>English only</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Circle the one that best answers the following questions:

How well do you understand Chinese and English?
- Chinese: perfectly well sufficiently scarcely
- English: perfectly well sufficiently scarcely

How well do you understand what you read in Chinese and English?
- Chinese: perfectly well sufficiently scarcely
- English: perfectly well sufficiently scarcely

How well do you speak?
- Chinese: perfectly well sufficiently scarcely
- English: perfectly well sufficiently scarcely

How well do you write?
- Chinese: perfectly well sufficiently scarcely
- English: perfectly well sufficiently scarcely

Which language do you feel more comfortable using?
- Chinese
- English
- Chinese and English equally
## Appendix B: Setting Auditory Intensity

<table>
<thead>
<tr>
<th>Subject #</th>
<th>Date:</th>
<th>Gender: M  F</th>
<th>Age:</th>
<th>SRT: dB</th>
<th>Played distraction at dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>500Hz</td>
<td>1000Hz</td>
</tr>
<tr>
<td>Right</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

SRT: _________ dB

Played distraction at ________ dB
Appendix C:

Semantic Generative Naming Task Form

<table>
<thead>
<tr>
<th>Examinee's ID</th>
<th></th>
</tr>
</thead>
</table>

**Animals**
1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________

# + = ____ x 2 = ____
# √ = ____ x 1 = ____

Raw Score ____

**Sports**
1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________

# + = ____ x 2 = ____
# √ = ____ x 1 = ____

Raw Score ____

**Vegetables**
1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________

# + = ____ x 2 = ____
# √ = ____ x 1 = ____

Raw Score ____

**Fruits**
1. __________________________
2. __________________________
3. __________________________
4. __________________________
5. __________________________
6. __________________________
7. __________________________
8. __________________________
9. __________________________
10. __________________________

# + = ____ x 2 = ____
# √ = ____ x 1 = ____

Raw Score ____
## Appendix D: Counterbalancing

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Animals</th>
<th>Vegetables</th>
<th>Sports</th>
<th>Fruit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Q E</td>
<td>Q S</td>
<td>C70 E</td>
<td>C70 S</td>
</tr>
<tr>
<td>2</td>
<td>C70 S</td>
<td>Q E</td>
<td>Q S</td>
<td>C70 E</td>
</tr>
<tr>
<td>3</td>
<td>C70 E</td>
<td>C70 S</td>
<td>Q E</td>
<td>Q S</td>
</tr>
<tr>
<td>4</td>
<td>Q S</td>
<td>C70 E</td>
<td>C70 S</td>
<td>Q E</td>
</tr>
<tr>
<td>5</td>
<td>Q E</td>
<td>Q S</td>
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<td>C70 S</td>
</tr>
<tr>
<td>6</td>
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<td>Q S</td>
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<td>Q S</td>
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