Effects of Cafeteria Noise on Generative Naming: Cross-Cultural Differences

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Aphasia theory is evolving to include aspects of cognitive resource allocation
- Erickson & LaPointe, (1996)
- McNeil (1997)
- Murray (1999)

Only a few studies have been conducted on cognitive resource allocation across languages
- Brown & Hulmes (1992)
- Leftheri, LaPointe, & Goldinger, (1997)
Theoretic Groundings

- Cognitive-linguistic interactions

- Cognitive resource allocation theory (Kahneman, 1973)

- Cognitive systems models of signal extraction from interference, competition, distraction
Major Assumptions of Cognitive Resource Allocation Theory

- Limited capacity processor that can divide up resources
- Total amount of resources is influenced by arousal
- Some processes require more resources than others
- We allocate resources to optimize performance
- Capacity can be allocated variably depending on level of arousal, motivation, effort, task demands, and nervous system integrity
Cognitive Resource Allocation Model

(after Kahneman, 1973)

LaPointe, 2004
Why is this Important?

- Effects of interference, distraction, competition on human communication are unclearly understood.

- Limited capacity systems require cognitive (attention, memory, et al) parsing and distribution.

- Humans (that would be us) face myriad multi-task challenges daily that tax our abilities to attend, perceive, discriminate, and remember and appreciate and produce linguistic operations.
Aphasia and Distraction

- Lexical-semantic processing disorders are ubiquitous in aphasia

- Anecdotal and clinical reports suggest that a wide variety of external factors influence word retrieval, naming, and semantic processing in aphasia

- Effects of specific auditory distractions on word retrieval in aphasia are relatively unknown

- Differential effects of distraction across languages or in bilingual speakers is unclear
Purposes

- To determine the degree and quality of degradation of an aspect of language performance by co-existent auditory distraction in aphasia

- To investigate the effects of cafeteria noise on generative naming of people with aphasia

- To discover if differences in distraction tolerance exist between English-speaking and Cantonese-speaking people with aphasia
Methods: Participants

- 17 participants with CVA and aphasia
  - 9 females
  - 8 males
  - 9 nonfluent
  - 8 fluent moderate aphasia
  - 11 from USA
  - 6 from Hong Kong

- Single, thrombo-embolic left hemisphere CVA

- Age (Range = 30 – 83 yrs; Mean = 65.4)
- Time Post Onset
  - Range = 2 – 60 months; Mean = 24.4

- 14 non-neurologically damaged controls matched in age, gender, education
- All participants passed hearing screening test
Methods: Procedures

Language Task

Oral Generative Naming (“Verbal or Word Fluency”)
“Say as many as you can in 60 seconds for each category...”
- Cities
- Animals

Responses recorded on line and audio taped
Generative Naming Categories

Cities

Animals
Methods: Distraction

Cafeteria Noise
- Generated and recorded at AudiTec, St. Louis acoustic laboratory (US)
- Custom recorded at Hong Kong cafeteria for HK portion of study
- Presented at 70 dB Sensation Level (above auditory pure tone average threshold)
Methods: Procedures

- Conditions of **Quiet** and **Distraction** as well as **categories** were counterbalanced.
- Rest period of 1 minute allowed between categories.
- Participants were prompted to continue responding during lulls until trial ended.
- Responses were recorded, coded, reduced, and analyzed.
**Methods: Instrumentation**

- Grason-Stadler, Inc. (GSI) 61 Clinical Audiometer (calibrated to ISO-389 reference thresholds) for hearing screening and presentation of cafeteria noise distraction

- IAC sound attenuating, electrically shielded audiometric suite used for data collection
Means and (SDs) of Responses for Generative Naming Categories with and without Distraction

<table>
<thead>
<tr>
<th></th>
<th>Aphasia</th>
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<tr>
<td>US</td>
<td>8.3 (1.9)</td>
<td>4.9 (1.2)</td>
<td>8.7 (1.9)</td>
<td>5.2 (1.3)</td>
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<tr>
<td>HK</td>
<td>4.5 (5)</td>
<td>1.8 (4)</td>
<td>5.5 (6.6)</td>
<td>3.7 (8.5)</td>
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<tr>
<td>Combined</td>
<td>6.9 (1.5)</td>
<td>3.7 (.9)</td>
<td>7.5 (1.6)</td>
<td>4.6 (1.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>22.6 (2.5)</td>
<td>16.7 (1.9)</td>
<td>23.1 (2.2)</td>
<td>18.4 (2.1)</td>
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<tr>
<td>HK</td>
<td>13.5 (4.4)</td>
<td>12 (1.2)</td>
<td>15.2 (4.2)</td>
<td>14.7 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Combined</td>
<td>18.4 (1.9)</td>
<td>14.5 (1.2)</td>
<td>19.5 (1.8)</td>
<td>16.7 (1.4)</td>
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Generative Naming Across Conditions of Quiet and Distraction for both Groups (HK and US Combined)

Trend is evident, but differences between quiet and distraction failed to reach significance at .05 for either controls or participants with aphasia
Total Semantic Responses (Categories Combined) across Conditions of Quiet and Cafeteria Noise for Control and Aphasia Groups

* Statistically significant differences for control and aphasia groups in quiet condition .05

** Statistically significant differences in distraction condition at .05
Results: Aphasic Group Mean Responses Across Categories for Quiet and Distraction (US & HK)*

*Not statistically significant across conditions or categories
Generative Naming across Quiet and Distraction for US and Hong Kong Participants

Nearly equal performance of HK control and aphasia participants across conditions of quiet and cafeteria noise.
Correlational Analysis: Aphasia Group Participants

- Negative Correlation (-.67)* between Age and WABAQ (aphasia severity)
- Negative Correlation (-.78)* between Age and Generative Naming in No Distraction Condition
- Negative Correlation (-.83)* between Age and Generative Naming in Distraction Condition
- Positive Correlation (.90)* between Generative Naming Across No Distraction and Distraction Conditions

Pearson Correlation Coefficients all significant @ p = <.05
Conclusions

- As expected, the aphasia group generated significantly fewer semantic responses across categories than controls...both in quiet and during cafeteria noise.

- Trend is evident of decreased generative naming during conditions of cafeteria noise, but these differences failed to reach significance.

- Combined data from US and HK may not have reached significance because HK group showed little difference between quiet and distraction conditions for both control and aphasia groups.

- Effect size may be a factor in the null finding as well.
Discussion

- Findings are unexpected
- Aphasic participants were hypothesized to perform poorer in cafeteria noise than in quiet; that was not the case for our sample
- Hong Kong participants, both controls and those with aphasia seemed to be less affected by distraction than the US group
- Density of living conditions and more frequent exposure to ambient noisy environments by be a factor (SAR Noise Exposure Report, 2006)
- Ambient noise exposure and distraction tolerance may explain the nearly equal HK performance across quiet and cafeteria noise conditions
- Further research will attempt to discover levels and quality of distraction that impact performance on a variety of cognitive and communication tasks
References


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