LEXICAL DECISION TASKS IN MONOLINGUAL VS. BILINGUAL PERSONS

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Bilingualism

- “Having, speaking, spoken or written in two languages” (Concise Oxford Dictionary)
- Many types of bilingualism
  - Compound Bilingual (Lambert, 1978)
  - Co-Ordinate Bilingual (Lambert, 1978)
  - Balanced Bilingual (Hakuta, 1987)
  - Non-Balanced Bilingual

Bilingualism and Cognitive Abilities

- Earlier studies concluded that bilingualism hindered cognitive development (Hakuta, 1986)
- Contrarily, Peal & Lambert (1962) concluded that bilinguals are more mentally flexible than monolinguals and better able to conceptualize

Neurology of Bilinguals

- The anterior midbody of the corpus callosum was found to be larger in bilinguals than in monolinguals (Coggins, Kennedy and Armstrong, 2003)
- Perani et al (1998) examined event-related potentials and concluded that early fluent bilinguals performed as well as monolinguals on a LDT, indicating that when subjects are equally fluent and literate in two languages, concepts may be activated the same way in both languages.

Performance in Various Tasks

- Bilingual children performed physical science problems better than monolingual children (Kessler and Quinn, 1980)
- Spatial Tasks: Conflicting results (Gorrell, 1987; McLeay, 2003)
- Divergent Thinking: Bilinguals were noted to perform better than monolinguals (Ricciardelli, 1992)

Control / Selective Attention

- Bilinguals may have a higher level of control and not deterred by unimportant factors when engaging in a cognitive task (Bialystok & Majumder, 1998)
- Bilinguals performed better on most metalinguistic tasks than monolinguals (Bialystok & Majumder, 1998)
- The higher the level of bilingualism, the more control they are found to have (Bialystok & Majumder, 1998)
Control / Selective Attention

- Early bilinguals had a greater ability to identify words presented aurally at a lower S/N ratio than late bilinguals (Mayo, Florentine & Buus, 1997).
- Bilinguals were presented with a word visually and auditorily and were asked to decide if the word and picture matched.
- When asked to switch between languages and name the picture every third trial, participants had delayed processing and slower responses.

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Control / Selective Attention

- When asked to repeat a target word in a sentence presented with babble in the background, monolinguals performed better than the bilinguals.
- The earlier one learned their L2, the better they understood L2 in noise.

Current Study

- Balanced bilinguals experience cognitive benefits over non-balanced bilinguals and monolinguals in lexical decision tasks. Possible reason:
  - The way a distracter is presented may play a role in performance during the task.
- We set out to examine the effects of three different types of auditory distractors (presented aurally) on bilinguals’ and monolinguals’ ability to perform a LDT.

Purpose: To determine whether bilinguals will perform a lexical decision task (LDT) faster and more accurately than monolinguals in the presence of distracters.

Rationale: Past research indicates that bilinguals may possess cognitive abilities, such as better selective attention to the salient portions of a task, that would permit them to perform better in a LDT than monolinguals in the presence of distracters.

Hypotheses

- When performing a lexical decision task with an auditory distracter, bilinguals will perform better than monolinguals.
- If an auditory distracter is presented in the participant’s L1, the participant will be slower to respond and will be less accurate than when the distracter is their L2 or if it is indecipherable speech.

Methods

- Participants: 10 non-balanced bilinguals and 10 monolinguals.
- Task completed in a quiet setting.
- Bilinguals completed questionnaire prior to testing, indicating their level of proficiency in each language.
- Hearing thresholds were determined.
- Subjects were presented with strings of letters and asked to indicate whether or not this represented a word in their L1.
Methods

- Three sets of twenty strings were presented, each under a different type of noise.
  - Someone reading in the subject’s L1
  - Someone reading in the subject’s L2
  - Indecipherable noise
- Distracters were presented through speakers 50-60dB above pure tone averages. Distance from the speaker was adjusted, when necessary, to compensate for any minor hearing loss.

Methods

- A laptop with the DMDX software (from K. Forster http://www.u.arizona.edu/~kforster/dmdx/dmdx.htm) was used to administer the tasks. Response times and accuracy were recorded.
- The stimulus duration was 1500 ms and the inter-stimulus interval was 750 ms.
- Response Times: A One-Way Between Groups ANOVA was performed to analyze these data.
- Accuracy: Two-way Between Groups ANOVA was performed to analyze these data.

Results: Response Times

- Response Times: Monolinguals responded faster than bilinguals.
  - Average response time for monolinguals was 775 ms in L1. Bilinguals’ response time was 840 ms in L1.
  - L2 as distracter resulted in an average response time of 741 ms for monolinguals and the bilinguals’ average response time was 879 ms.
  - With cafeteria noise as the distracter, the average response time for monolinguals was 744 ms while for the bilinguals the average response time was 861 ms.
  - ANOVA: these results (shown in the next slide) were statistically significant.

Results: Accuracy

- Accuracy: Bilinguals performed better than monolinguals.
- Mean percent correct for bilinguals overall was 96.17% (SD=3.869) vs. 91% (SD=5.632) for monolinguals.
- The condition which yielded the highest LDT accuracy was the cafeteria noise, which had an overall accuracy rate of 93.58% (SD=5.453).
- The condition under which subjects had the lowest overall LDT accuracy rate was that where L1 was the distracter.

Results: Accuracy According to Condition

- Condition #1: Distracter in L1
  - Monolinguals achieved an accuracy rate of 87% (SD=5.375), while bilinguals achieved an accuracy rate of 96.5% (SD=3.375).
- Condition #2: Distracter in L2
  - Accuracy rate was 91% (SD=3.944) for monolinguals and 95.5% (SD=4.378) for bilinguals.
- Condition #3: Indecipherable babble
  - Monolinguals achieved an accuracy rate of 95% (SD=4.714), while the bilinguals’ accuracy rate was 96.5% (SD=4.116).
Discussion

Subjects may have been faster in L1 and slower in L2 because they were better able to “tune out” something irrelevant in their native language, but have difficulty disregarding something in another language.

- Possibly due to human curiosity
- Bilinguals were faster when the distracter was in L1 than when it was in L2, indicating it was easier for them to ignore L1.
- Bilinguals were slower when the distracter was in L2 perhaps because they were processing one language aurally and the other visually.

Discussion

Bilinguals may have also been slower because they were focused on performing the LDT correctly while having to actively ignore two comprehensible Ls (L1, L2).

- Monolinguals responded faster when the distracter was in a foreign language; this may be because they were able to tune out distracters that they didn’t comprehend.

Discussion

Bilinguals may have had a higher accuracy rate with L1 as a distracter because they are used to hearing it and can ignore it as well as they could ignore indecipherable speech. This may have been one reason for their slower response rates.

- Monolinguals were most accurate in the presence of indecipherable speech and least accurate in the presence of L1, indicating they were more distracted by a language they were familiar with than one they were not familiar with.

Discussion

Theories pertaining to these results:

- The Bilingual Interactive Activation Model states that when presented with a word, bilinguals activate the orthographic representation of that word in both languages, which may require additional processing time.

- Age of acquisition may influence performance in such tasks. All our bilingual subjects acquired L2 at somewhat different ages.
Conclusion

- RT may not be the best differentiator of attention control or of levels of cognitive ability in bilingual vs. monolingual participants.
- RT data may reflect increased processing time needed for bilinguals than for monolinguals.
- Normalization of individual differences using RT with no distracter may provide useful information.
- Previous studies on control did not measure response time, so more research is needed.

Bibliography


