INTRODUCTION

• Recent research has identified the complex interplay between language and cognitive control in normal bilingual individuals (Costa, 2008; Luk, 2010; Paap, 2011).

• Evidence shows that bilingual individuals can effectively inhibit non-linguistic and linguistic information.

• In bilingual aphasia we see language control impairments (e.g., pathological codewitching, asymmetrical translation ability). However, it is not clear whether bilingual patients have a domain specific or domain general control impairment.

• No study yet has systematically examined cognitive control in bilingual aphasia to determine whether deficits in language inhibition are specific to the language domain or are indicative of a more general cognitive deficit.

OBJECTIVES

Determine whether deficits in language control are specific to the language domain or are indicative of a more general cognitive deficit.

Specific Aim 1: Examine the nature of cognitive control requiring inhibition in a non-linguistic task.

• Do Spanish-English neurologically healthy bilingual adults and Spanish-English bilingual adults with aphasia exhibit similar patterns on the Flanker task (Eriksen and Eriksen, 1974)?

Specific Aim 2: Examine the nature of language control in a linguistic task that requires active inhibition of the non-target language.

• Do neurologically healthy bilingual adults and bilingual adults with aphasia exhibit similar patterns on a semantic interference task that requires language control?

Specific Aim 3: Examine the effect of language proficiency on language processing.

• How does language proficiency for Spanish-English neurologically healthy bilingual adults and Spanish-English bilingual adults with aphasia effect speed of processing on translation and non-translation conditions that vary by semantic relationship?

Hypotheses

1. Neurologically healthy bilingual adults will complete both tasks successfully (intact cognitive control).

2. Bilingual adults with aphasia will perform more poorly on the linguistic task compared to the non-linguistic task (evidence for domain specific cognitive control). Or bilingual adults with aphasia will perform poorly on both tasks (evidence for domain general cognitive control).

3. Language proficiency will effectively response time outcomes on the linguistic task.

PARTICIPANTS

30 neurologically healthy Spanish-English bilingual adults (NHBA) (21 women, M=48; SD=14).

• Spanish-English bilingual adults with aphasia (BAA) (4 women, M=54; SD=14).

• BAA completed the Pyramids and Palm Trees Test (PPT), Bilingual Aphasia Test (BAT) in Spanish and English, The Boston Naming Test (BNT).

METHODS

Flanker Task: Instructions: Is the red arrow pointing left or right?

Linguistic Task: Instructions: Are the two words are related or unrelated?

RESULTS

Specific Aim 1: Flanker Task

Controls and patients exhibit the congruency effect: longer RT on incongruent condition compared to the congruent condition.

Specific Aim 2: Linguistic Task

Accuracy

NHBA and BAA are more accurate on Tr, Un, and UnR conditions, demonstrating semantic interference. The BAA model is not significant although trends show higher accuracy for semantically related conditions.

Response Times

NHBA: RT is effected by language dominance on congruent and incongruent non-translation conditions. A similar trend is observed on the Tr condition. These results suggest that NHBA exhibit more efficient processing when going into their dominant language.

BAA: Language dominance influences RT on the semantic non-translation condition only. BAA are efficient with processing semantically related words in their dominant language only.

IMPLICATIONS

Results suggest that in BAA linguistic control mechanisms are dissociable from non-linguistic control.

CONCLUSIONS

Flanker Task

NHBA and BAA exhibit the congruency effect, thus demonstrating non-linguistic cognitive control.

Linguistic Task

NHBA: Accuracy & Response Time

NHBA are more rapid on Tr, Un, and UnR conditions indicating that NHBA exhibit semantic interference on accuracy. However, NHBA are fastest on congruent conditions (Tr, Sr, St) indicating an RT processing benefit from semantic information.

BAA: Accuracy & Response Time

BAA do not show an interfering or facilitatory effect from processing semantic information, suggesting inefficient linguistic processing. Although individual RT analysis does reveal that the majority of BAA do show faster RTs for semantically related conditions.

Effect of Language Proficiency

• NHBA: RT is effected by language dominance on congruent and incongruent non-translation conditions. A similar trend is observed on the Tr condition. These results suggest that NHBA exhibit more efficient processing when going into their dominant language.

• BAA: Language dominance influences RT on the semantic non-translation condition only. BAA are efficient with processing semantically related words in their dominant language only.

SELECTED REFERENCES


Luk, A. & Paap, K. (2001). Domain specific deficits in BAA.

ACKNOWLEDGEMENTS

We would like to thank the members of the Aphasia Research Laboratory for their steadfast support in this project. Most of all we give thanks to the participants and their families for without their contributions this project would not be possible.