Understanding Cognate Processing in Bi- and Multilingual People with Aphasia

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BACKGROUND

Aphasia & Stroke

- Aphasia is an **acquired language disorder** that impacts communication like producing speech, understanding speech, reading, and writing.
- Aphasia is caused by stroke, specifically strokes which cause damage to the left hemisphere, where the language centres are located.
- Approximately **one-third of people who have a stroke will experience aphasia.**

Bilingualism & Multilingualism

- Approximately 3.3 billion bilingual people worldwide, accounting for 43% of the population
- As bilingualism and multilingualism are becoming increasingly more common, the number of **bilingual patients with aphasia** increases, too.

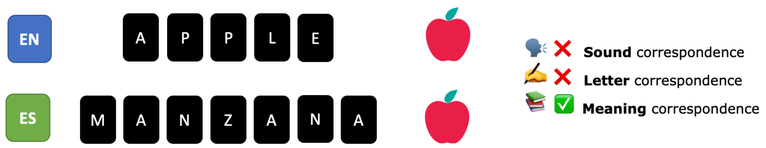
Treatment for bilinguals with aphasia

- After stroke, bi- and multilingual individuals may use their languages differently than they did before. For example, some individuals find using the language they learned first most accessible[1], others maintain access to both languages[2], others maintain access to the language that was used most frequently[3], and still others yet switch spontaneously between their languages[4].
- Given the nuanced picture of language post-stroke, researchers and clinicians are faced with the decision of which language(s) to treat in.
- Language therapy for bilinguals with aphasia has been shown to improve both the treated language (**within-language generalization**) and the untreated language (i.e., **cross-language generalization).** For example, if a client spoke English and Spanish, does working on using nouns in English (apple, orange, plantain) help use nouns in Spanish (cross-language), too, (manzana, naranja, plátano), or does it only help English (within-language)?

- The findings on generalization have been inconsistent[5,6].
- Ideally, if clinicians could understand when treating in one language or both languages is beneficial, outcomes for bi- and multi-lingual clients could improve.

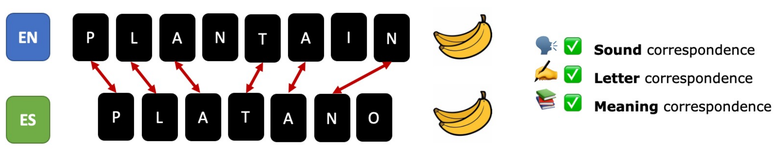
Cognates

- A special case of generalization might occur when words in two languages share some part of their form, whether that be in their sounds, letters, or meanings.
- Most words across different languages do **not** share any correspondence, even though they have the same meaning. For example, a red, crunchy fruit is called an "apple" in English (EN) and "manzana" in Spanish (ES).



Cognates are a special class of words that DO have correspondence!

- Words that are cognates share orthographic (written letters) and phonetic (word sounds) similarities, and sometimes share semantic meaning. For example, the word PLANTAIN in English shares both orthographic and phonetic information with the word PLANTANO in French; they both share meaning, too.



- Like the general literature on cross-language generalization, the literature on **how cognates generalize** has **similarly inconsistent results**.

STUDY AIMS

- Many people who are bi- and multilingual are impacted by strokes that cause aphasia
- Knowing which languages to treat in, and which words to treat in those languages, can have important impacts on client's therapy

Investigate role of cognate processing for bilingual people with aphasia

METHODOLOGY

WHAT: Reading + discussion group

WHO: Chelsea, Alex, Dr. Gravier, Dr. Higby

WHEN: Meetings every other week during both semesters

Fall Semester

In the first semester, papers were selected in collaboration or by our faculty mentor. We read the papers together and then discussed. The topics during Fall included foundational theoretical knowledge that would set the stage for the readings to come in Spring. We read about how words are accessed, how words are accessed for bilinguals, and competing theories about how speakers of multiple languages manage using those languages.

Meeting	Title	Paper
9/14/22	*Cross-Linguistic Influence In Bilingualism: Evidence from Psycholinguistic and Memory Paradigms Reveals Ubiquitous Facilitation and Competition-Dependent Interference Effects on Lexical Processing*	Bailey, Lockary, Higby (pres.)
9/14/22	*The Cognate Facilitation Effect: Implications for Models of Lexical Access*	Costa (2000)
9/14/22	*On the facilitatory effects of cognate words in bilingual speech production*	Costa (2005)
9/21/22	*Lexical activation in late bilinguals: effects of phonological neighbourhood on spoken word production*	Hameau (2021)
9/28/22	*Tracking Lexical Access in Speech Production: Electrophysiological Correlates of Word Frequency and Cognate Effects*	Strijkers (2010)
10/10/22	*The representation and processing of identical cognates by late bilinguals: RT and ERP effects*	Peeters (2013)

Spring Semester

In the second semester, sessions were student-led. Each student would select a paper and present the results for the other student, alternating weeks.
The topics during Spring included papers about processing in aphasia, types of treatments for bilingual people with aphasia, and the processing of cognates in bilingual people with aphasia.

Meeting	Title	Paper
11/9/22	*Cross-language transfer for cognates in aphasia therapy with multilingual patients: a case study*	Hameau & Kopke (2015)
11/30/22	*Picture Naming of Cognate and Non-cognate Nouns in Bilingual Aphasia*	Deslaurier & Roberts (1999)
1/17/23	*Cognitive and cognate-based treatments for bilingual aphasia: A case study*	Kohnert (2004)
1/17/23	*Effects of cognate status and language of therapy during intensive semantic naming treatment in a case of severe nonfluent bilingual aphasia*	Kurland (2011)
1/31/23	*The role of cognates in bilingual aphasia: Implications for assessment and treatment*	Lalor (2001)
2/7/23	*Inhibition accumulates over time at multiple processing levels in bilingual language control*	Kleinman & Gollan (2018)
2/23/23	*Semantic Processing in Bilingual Aphasia: Evidence of Language Dependency*	Calabria, et al. (2019)
3/23/23	*Cognate effects and cognitive control in patients with parallel and differential bilingual aphasia*	Van der Linden, et al. (2018)

Read **15** papers over the course of the 2022-2023 academic year thus far.

During reading groups, students shared responsibilities to take notes and summarize the relevant findings from the presented papers. The resulting document is the **Bilingual Aphasia Cognate Journal**.

At the end of the first semester, in addition to the Journal, students created the **Reading Themes** document. Each paper was added under the relevant sub-heading, allowing for papers to fall under multiple categories. New categories were created as the need came up.

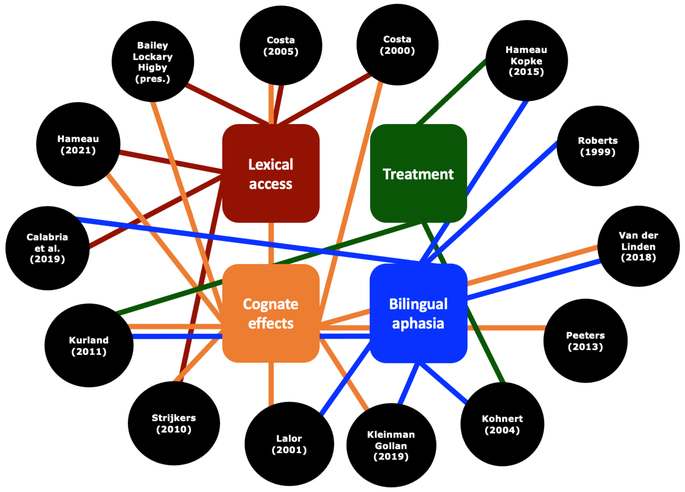
Students summarized their readings into **literature reviews** drafts that serve as preliminary drafts of the introduction and literature review chapters of our theses. The goal of the review is to not only summarize, but to synthesize the findings and weave the various papers into a coherent narrative.

RESULTS

Reading Themes

- Lexical access: study explored how words are accessed & retrieved from memory
- Cognate effects: study showed some results due to cognates
- Bilingual aphasia: study recruited bi- and multi-lingual people with aphasia
- Treatment studies: study implemented a treatment or therapy

Reading Themes helped us identify what we had read and what areas we needed to continue to develop our understanding. It helped us to see the connections between papers at a high-level.



QUESTIONS & NEXT STEPS

Questions

This literature review helped students learn about how bilinguals process language, how people with aphasia process language, how cognates are processed, and how bilingual people with aphasia process cognates. This has left us with some additional questions that we will continue to explore as we move towards refining our specific research question:

- Do cognates on a continuum of overlap show a continuum of priming?
- How are false cognates processed? Do they give rise to cognate effects?
- What other variables impact cognate effects? How do they interact?

Next Steps

SUMMER 2023	FALL 2023	SPRING 2023
• Continue reading	• Finalize study design	• Analyze data
• Formulate hypothesis	• Recruit participant	• Write up findings
• Begin study design	• Run pilot study	• Share results

REFERENCES

[1] Green, D. W. (1986). Control, activation, and resource: A framework and a model for the control of speech in bilinguals. *Brain and language*, *27*(2), 210-223. **[2]** Obler, L. K., Albert, M. L., Goodglass, H., & Benson, D. F. (1978). Aphasia type and aging. *Brain and language*, *6*(3), 318-322. **[3]** Paradis, M., & Libben, G. (2014). *The assessment of bilingual aphasia*. Psychology Press. [4] Fabro, F., Skrap, M., & Aglioti, S. (2000). Pathological switching between languages following frontal lesions in a bilingual patient. Journal of Neurology, Neurosurgery and Psychiatry, 68, 650 – 652. **[5]** Edmonds, L. A., & Kiran, S. (2006). Effect of semantic naming treatment on crosslinguistic generalization in bilingual aphasia. **[6]** Goral, M., Rosas, J., Conner, P. S., Maul, K. K., & Obler, L. K. (2012). Effects of language proficiency and language of the environment on aphasia therapy in a multilingual. *Journal of neurolinguistics*, *25*(6), 538-551.

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