Conflict regulation during bilingual lexical production

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Introduction

- Speech planning involves selecting the appropriate words from the mental lexicon.
- Bilinguals must select the appropriate word based on both the semantic information and the intended language.
- Lexical competition engages regulatory mechanisms such as monitoring and inhibitory control (Shao et al., 2014), but the nature of these mechanisms is not well understood.
- Competition from both within-language and between-language competitors makes lexical selection for bilinguals more challenging than for monolinguals. This may require greater regulation for bilinguals.
- Bilinguals often show better performance than monolinguals on tasks measuring regulation in the form of cognitive control, conflict monitoring, and inhibition (Costa et al., 2009; Morales et al., 2015).
- Brain areas involved in non-linguistic cognitive control and language categorization are overlapping for bilinguals but distinct for monolinguals, suggesting a coupling between language and domain-general regulatory mechanisms for bilinguals (Coderre et al., 2015).
- The precise way that these regulatory mechanisms are engaged during language tasks is not clear, however.
- In the current study, we use a novel lexical retrieval paradigm designed to induce regulatory mechanisms such as proactive control, reactive control, and task switching.

Research Questions

What are the conditions that induce conflict during word retrieval?

What type of regulation is involved when bilinguals retrieve words for speech?

Participants

- 24 young adults, aged 18-40 (mean 20.3)
- Language make-up
  - 21 bilinguals (= self-rating of 4+ for two languages), 3 monolinguals
  - 15 heritage speakers, 6 bilinguals who learned English first
  - 11 learned English first, 13 learned another language first
- Language proficiency (self-rating on scale of 0-10)
  - English: mean 9.53 (range 8-10)
  - Other language (if bilingual): 6.60 (range 4-9.5)

Methods

Tasks

Picture naming

- 288 colored line drawings of objects
- Pictures preceded by a distractor word or string of X's (6 types)
- Cued task-switching: 80% object-naming, 20% color-naming
- Attentional conflict: color distractors
- Lexical conflict: semantically related and unrelated distractors

Distractor types:

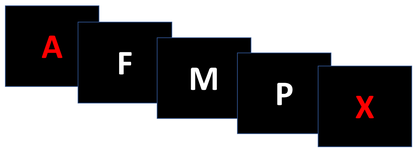
Control	Object match	Semantically related	Semantically unrelated	Color match	Color mismatch
XXXXX	kite	yoyo	nose	blue	green

Measures (accuracy and response times)

- Proactive control: Color distractors on object-naming trials vs control
- Reactive control: Object distractors on object-naming trials vs control

AX Continuous Performance Task

- Participants respond to each letter that appears on the screen.
- A "no" response is given for every letter unless it is a red X that was preceded (4 letters back) by a red A.
- 100 trials of 5 letters each.
  - 70% AX, 10% AY, 10% BX, 10% BY (B/Y refer to any letter but A/X)



Set Shifting (NIH Examiner Battery)

- Participants match a shape according to color (red/blue) or shape (triangle/rectangle) based on a task cue
- 104 trials
- Measure: Shift score combines accuracy and response time

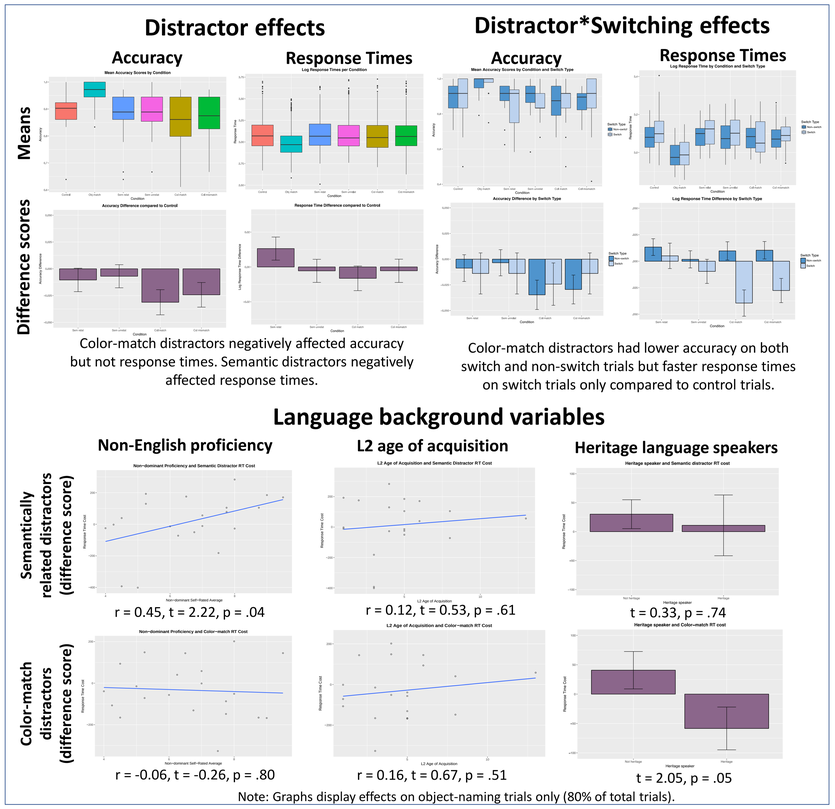
Working memory (NIH Examiner Battery)

- "Dot counting" - Participants count aloud the number of blue dots in an array that contains blue dots, green dots, and blue squares.
- Count must be remembered across a series of trials and then recalled.
- Series goes from 2 to 8 trials.
- Measure: Total number correctly recalled in the right order

Language History Questionnaire

- Early childhood language exposure and use, current proficiency and use, code-switching habits, experience living abroad, etc.

Results



Note: Graphs display effects on object-naming trials only (80% of total trials).

Discussion

- This picture naming design may be a useful way to tap into individuals' ability to regulate attentional and lexical competition during lexical selection.
- Color distractors led to lower accuracy overall, especially for non-switch trials, perhaps reflecting task maintenance difficulty. Naming the object's color instead of the name accounted for 24% of the errors on trials with color distractors, compared to 13% of trials with object distractors.
- RTs for color distractors were faster than control trials, but only when switching from a color-naming trial. This may reflect efficient task-switching ability along with active suppression of the color distractor. Heritage speakers showed this pattern, but non-heritage speaker bilinguals and monolinguals tended to show interference costs for color distractors.
- The stronger the proficiency in a non-English language, the more accurate but slower subjects were in the face of lexical competition.

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