

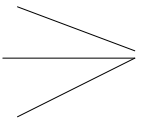
Bilingualism & Cognitive Flexibility

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Cognitive Flexibility

- Executive processes
- Uniquely human?
- Ability to avoid a prepotent response in favor of the currently relevant one
- Proposed mechanisms:
 - Inhibition?
 - Conceptual? Neural?
 - Competition/Activation/Working Memory?
 - Hot debate! :)

Plan

- DCCS (+ Bilingualism)
 - Simon Task
 - Ambiguous Figures
- 
- Executive Processes
- Creativity
 - Implications for understanding how (whether?) bilingualism affects cognitive flexibility

DCCS

- Video goes here

DCCS & Bilingualism

- Bialystok, 1999; Bialystok & Martin, 2004
- Bilingual advantage - bilingual kids switch easier between sorting rules
- Mechanism - inhibitory control/conceptual inhibition
- My bias - not as clear-cut, does not get at the *underlying* mechanisms

Aging Gracefully

- Bilingual advantage in kids established; what about adults? What about elderly?
- Representation (analysis) & Control
- Aging:
 - Representation - constant
 - Control - declines
- Bilingual kids are better at control, so maybe bilingual adults don't show as much decline?

Simon Task

- Right button for red; Left for green
- Congruent & incongruent trials
- Bilingual advantage for kids

Study 1

- 20 younger (30-54 years old)
- 20 older (60-88 years old)
- In each group, half English monolingual, half Tamil-English bilingual
- Bilingual since 6 years old; ~50% daily use of English
- Age-matched, similar SES

Study 1 Tasks

- Language background questionnaire
- PPVT
- Raven's Standard Progressive Matrices
- Simon Task
 - 8 practice trials, 28 experimental trials (half congruent, half incongruent; randomized order)

Study 1 Results

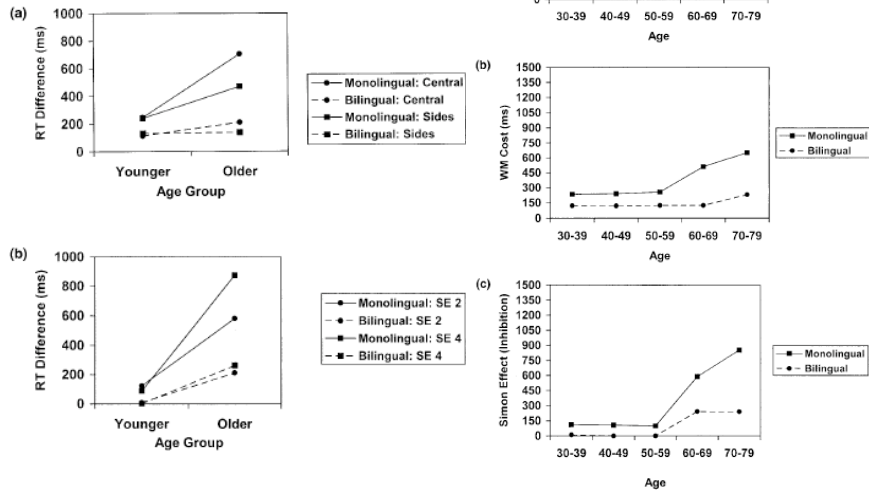
Table 1
Mean Background Measures (and Standard Deviations) by Age and Language Group in Study 1

Measure	Younger		Older	
	Monolingual	Bilingual	Monolingual	Bilingual
Age (in years)	43.0 (7.3)	43.0 (7.3)	71.6 (7.5)	72.3 (8.7)
PPVT-R	91.0 (4.4)	91.8 (9.8)	85.8 (7.1)	91.9 (2.6)
Raven	1.4 (0.5)	1.3 (0.5)	1.5 (0.5)	1.3 (0.5)

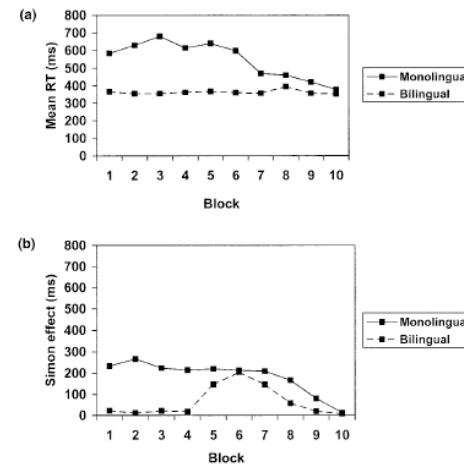
Table 2
Mean Accuracy and Reaction Time (RT, in Milliseconds) by Age and Language Group in Study 1

Age and language group	Congruent		Incongruent		Simon effect
	Accuracy (%)	RT (in ms)	Accuracy (%)	RT (in ms)	
Younger					
Monolingual	100	770 (132.8)	86.4	1,304 (273.0)	535 (231.2)
Bilingual	100	497 (252.5)	97.1	536 (273.0)	40 (32.2)
Older					
Monolingual	99.2	1,437 (560.6)	72.1	3,150 (1,309.6)	1,713 (971.7)
Bilingual	100	911 (374.2)	100	1,659 (1,151.0)	748 (806.6)

Study 2



Study 3

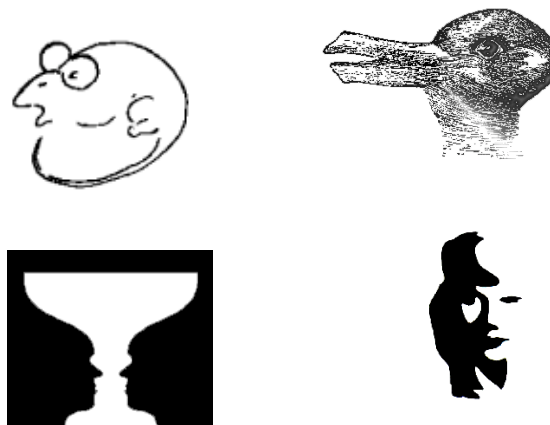


Converge!
Monolinguals improve

Implications for aging gracefully....

- “Bilingualism **reduced** the age-related increase in the Simon effect, implying that lifelong experience of managing two languages attenuates the age-related decline in the efficiency of inhibitory processing”
- Working memory vs. Inhibition

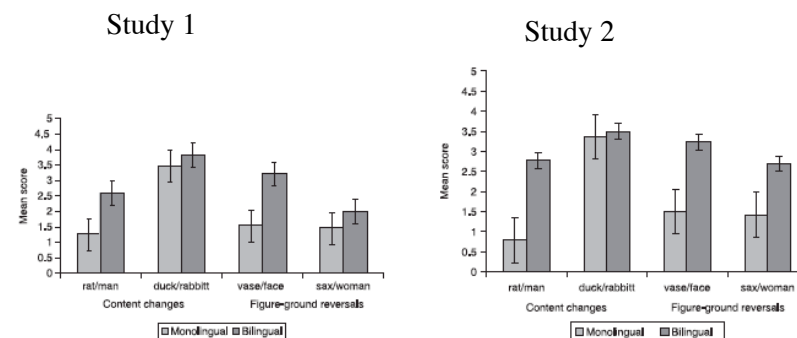
Bilingualism & Ambiguous Figures



Ambiguous Figures

- Kids can't see both images until ~ age 5
- Similar to the card-sorting task
- Bilinguals have better control, so would bilingual children be better at seeing it?
- A nonlinguistic task?!
- Used bilinguals of many languages

Results



Added DCCS and Opposite Worlds Game

Questions/Concerns - Bialystok

- Is Bialystok advocating inhibition at the behavioral level or the mechanistic level?
- Are there different benefits bilinguals have depending on what languages they are bilingual in?
- Autistic children & ambiguous figures? Are there fewer bilingual autistic kids?
- PPVT
- Managing 2 languages & code-switching? Does age of acquisition matter? Practice effects and explicit training?
- “cold, wet, raw” - not as uncommon?
- Weak semantic links in bilinguals?

Bilingualism & Creativity

- Whorf vs. Chomsky
- 2 “windows or corridors through which to view the world” --> bilingual children may be more creative
- Definition of bilingualism
- Definition of creativity

Method

- 9-11 year old kids
- Bilinguals: Yoruba/English (N=62) & Welsh/English (N = 86)
- Monolinguals were all English-speaking

Tasks

- Verbal Creativity tests
 - Word meaning
 - Uses of objects
 - Instances tests
- Nonverbal Creativity tests
 - Picture construction
 - Picture completion

Tasks, cont'd

- Intelligence tests
 - Verbal: VTE, VTY, Thornton-Hagen Cognitive Abilities Test
 - Nonverbal: Raven's
- Language Proficiency tests
 - Yoruba & English
 - Welsh & English
- General Information Inventory
 - General information questionnaire + linguistic background scale (language status of parents, etc.)

Results

- Total Verbal Creativity Score (41.9; 44.4 pts)
- Verbal Originality Score (11.3; 8.2 pts)
- Therefore, bilingual kids are more creative
- “Group” (bilingual or not) is a significant factor in multiple regression
- Critical factors: # of languages spoken, verbal IQ, language proficiency

Questions/Concerns - Okoh

- Construct validity?
- Creativity = flexibility?
- Bilinguals are better at verbal, but not nonverbal creativity
- English monolinguals - problematic?
- Should we be surprised that Yoruba/English speaking children can come up with multiple meanings easier than English-speaking children?
- Mechanisms?