

# Beyond Panglossian Optimism: No Bilingual Advantages in Five Switching Tasks

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## Two Hypotheses about Bilingualism & Switching

**H1: Language switching may recruit control mechanisms associated with general task switching ability. If true, then bilinguals, especially those who switch languages often, accrue massive amounts of practice that should transfer across cognitive domains and make bilinguals better task switchers.**

**H2: Language switching may rely on language-specific mechanisms. If true, then language switching should not enhance a general ability to switch between tasks. The modular assumption is consistent with research showing that language-switching performance does not correlate with performance on nonverbal switching tasks and that general switching can be impaired while language switching is not (Calabria et al, 2015).**

## Are there Bilingual Advantages in Cued Switching Tasks?

Switching Costs: Switch Trial RT – Repeat Trial RT  
Mixing Costs: Repeat Trial RT – Pure Single Task RT

ARTICLE	SWITCHING COST	MIXING COST
Prior & MacWhinney (2010)	B*	ns
Prior & Gollan (2011)		
Spanish-English bilinguals	B*	ns
Chinese English bilinguals	ns	ns
Tare & Linck (2011)	ns	ns
Prior & Gollan (2013)		
Spanish-English bilinguals	ns	ns
Hebrew-English bilinguals	ns	ns
Chinese-English bilinguals	ns	ns
Paap & Greenberg (2013)		
Study 1	ns	ns
Study 2	ns	ns
Study 3	ns	ns
Hernández et al. (2013)		
Experiment 1	ns	
Experiment 2	ns	
Experiment 3	ns	
Paap & Sawi (2014)	ns	ns
Mor et al. (2014)	ns	ns
Moradzadah et al. (2014)	ns	ns
Wiseheart et al. (2014)	ns	B*
von Bastian et al. (2015)		
color-shape task	ns	
animacy-size task	ns	
parity-magnitude task	ns	

B\* = Statistically significant difference at  $p < .05$

## Participant Characteristics

Measure	Bilingual		Monolingual		Diff	p
	n	Mean	n	Mean		
English Proficiency	125	6.26	111	6.66	-0.40	<.001
MINT Total Correct	116	59.6	106	63.1	-3.44	<.001
Parent's Education	123	3.27	111	3.77	-0.51	=.012
Age	123	21.3	111	22.3	-0.93	=.211
Raven's Matrices	119	8.19	107	8.62	-0.42	=.156

Although monolinguals have an advantage in parent's education, this measure does not correlate with either switching costs or mixing costs and consequently cannot be camouflaging a bilingual advantage in switching.

	Parent's Educational Level	Mixing Costs RT Color	Switching Costs RT Color	Mixing Cost RT Letter	Switching Costs RT Letter	Mixing Costs RT Living	Switching Costs RT Living
Parent's Educational Level	1	.081	-.048	-.077	.021	-.015	.005
Pearson Correlation		.233	.479	.256	.757	.820	.938
Sig. (2-tailed)							
N	234	220	220	220	220	225	225

## Characteristics of bilinguals (means)

English Proficiency	6.3	7 = Better than a typical native speaker
Other Proficiency	5.6	6 = As fluent as a typical native speaker
Age-of-Acquiring English	4.4	5 = Almost as fluent as a typical native
Age-of-Acquiring Other	1.1	years old
% Speaking English	72	percent
Frequency of Switching	3.2	3 = a couple of times/day; 4 = several times/day
% Think in English	73	percent

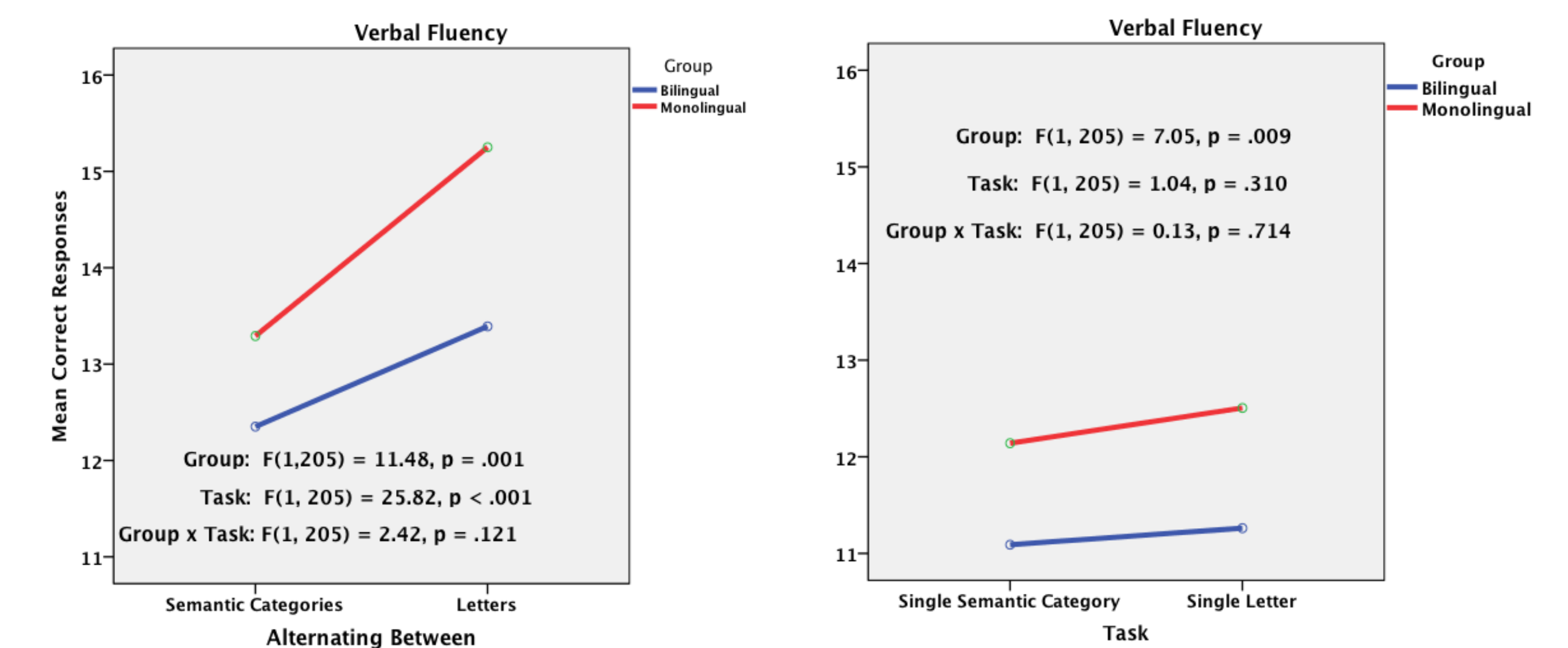
## No Bilingual Advantages in 3 Cued Switching Task for either Switching Costs or Mixing Costs

Task/Measure	Bilingual		Monolingual		Diff	p
	n	Mean	n	Mean		
Color-Shape						
Switching Costs	111	224	94	216	7.9	= .09
Mixing Costs	111	341	94	269	72.3	= .70
Letter-Number						
Switching Costs	115	304	101	321	-17.5	= .46
Mixing Costs	115	70	101	134	-64.0	= .08
Animacy-Size						
Switching Costs	116	140	102	122	18.60	= .33
Mixing Costs	116	-21	102	-21	0.00	= .99

There are no significant language-group differences at  $p < .05$  in either switching costs or mixing costs in any of the three tasks. There is a trend toward a switching cost monolingual advantage in the color-shape task and a mixing cost bilingual advantage in the letter-number task.

## Monolingual Advantages in Switching between Letters or Semantic Categories

Alternating Letters: (1) S & T (2) C & N  
Alternating Categories: (1) Animals & Countries (2) Fruits & Furniture  
Single Letters: (1) F (2) A  
Single Categories: (1) Musical Instruments (2) Vegetables



## Convergent Validity of Switching Measures

Cued switching measures correlate with one another, category fluency measures correlate with one another, but switching in verbal fluency does not correlate with switching in the cued switching tasks.

## Are Bilingual Advantages in Switching Restricted to Specific Types of Bilingual Experience? Analyzing Switching Costs in a Composite Database of 201 bilinguals and 178 monolinguals

	Higher/Early		Lower/Late		Monolingual		F	p
	n	Mean	n	Mean	n	Mean		
Frequency of Language Switching	75	197	111	213	178	222	0.87	.42
L2/L1 Ratio (Balance)	116	205	85	216	178	222	0.48	.62
Age of Acquisition of L2	127	200	74	226	178	222	1.17	.32

The same three factors were used as predictors in a forced entry multiple regression with switching costs as the outcome variable. Only the data for the 186 bilinguals were analyzed.

- The  $R^2$  for model = .017
- The beta coefficients were:
  - Switch Rate = -.03,  $p = .40$
  - L2/L1 Ratio = -.07,  $p = .26$
  - A-of-A of L 2 = +.09,  $p = .70$
- Clearly, these three aspects of bilingualism do not predict color-shape switching costs.

## Conclusion

Bilingual advantages in general switching ability either do not exist or are restricted to very specific and undetermined circumstances.