



Cognitive Styles, Reasoning Abilities, and Cognitive Control

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Introduction

- Cognitive styles putatively represent preferred modes of processing information, such as whether an individual prefers to think in terms of pictures or words.
- Verbal cognitive style is correlated with higher scores on vocabulary tests (Kirby et al., 1988). Visual cognitive style is correlated with better performance on tasks involving visual imagery, such as mental rotation (Kozhevnikov et al., 2005).

Open Questions:

- Do cognitive styles correlate with measures of verbal and visual reasoning and/or cognitive control?
- Are verbal and visual cognitive styles better described as two ends of one spectrum or, rather, two separate dimensions?

Methods

Verbalizer-Visualizer Questionnaire (VVQ):

(revised version from Kirby et al., 1988)

• Verbalizer Dimension (10 items)

- I prefer to read instructions about how to do something rather than have someone show me.

• Visualizer Dimension (10 items)

- I often use diagrams to explain things.

Wechsler Adult Intelligence Scale (WAIS):

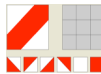
• Verbal Comprehension Index

- Vocabulary
- Similarities
- Information

friend
enemy

• Perceptual Organization Index

- Picture Completion
- Block Design
- Matrix Reasoning



Stroop Interference Measures:

• Verbal Color Word Task

- Respond to font color
- Following Milham et al., 2001

red

• Non-Verbal Moving Dots Task

- Respond to direction of dots
- Conflict entirely in visual domain

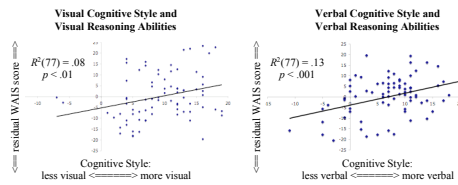


* for more on the non-verbal moving dots task, see Poster 4073 on Saturday *
* for more on the VVQ, see Poster 1120 in this session *

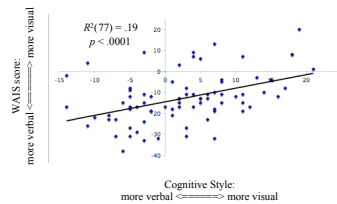
Visual and Verbal Reasoning

	Pearson's Correlations (N=80)					
	POI	VCI	POI - VCI	Visualizer	Verbalizer	Visualizer - Verbalizer
WAIS: Perceptual Organization Index	--	0.48**	0.58**	0.22*	-0.06	0.19
WAIS: Verbal Comprehension Index	--	-0.44**	-0.07	0.29**	-0.27*	
WAIS: POI - VCI	--		0.28*	-0.33**	0.44**	
VVQ: Visualizer Dimension	--			0.01	0.65**	
VVQ: Verbalizer Dimension	--				-0.75**	
VVQ: Visualizer - Verbalizer	--					--

* indicates $p < .05$, ** indicates $p < .01$



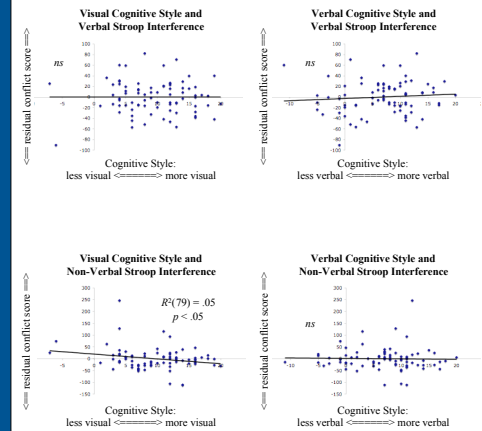
(Visual - Verbal) Cognitive Style Scores and (Visual - Verbal) WAIS Scores



Cognitive Control

	Pearson's Correlations (N=80)					
	NS	VS	NS-VS	Visualizer	Verbalizer	Visualizer - Verbalizer
Non-Verbal Stroop	--	-0.06	0.73**	-0.22*	-0.02	-0.13
Verbal Stroop	--		-0.73**	0.00	0.08	-0.06
Non-Verbal - Verbal Stroop	--			-0.15	-0.07	-0.05
VVQ: Visualizer Dimension	--				0.01	0.65**
VVQ: Verbalizer Dimension	--					-0.75**
VVQ: Visualizer - Verbalizer	--					--

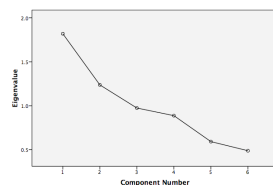
* indicates $p < .05$, ** indicates $p < .01$



Exploratory Factor Analysis

Component Matrix	Component	
	1	2
Verbal Stroop Conflict	.14	.38
Non-Verbal Stroop Conflict	.01	-.72
WAIS: residual POI score	-.78	.04
WAIS: residual VCI score	.81	.07
VVQ: Visualizer Dimension	-.42	.67
VVQ: Verbalizer Dimension	.58	.36

Extraction Method: Principal Component Analysis.



- Reasoning abilities and cognitive control abilities appear to load on separate factors.
- Cognitive style may be associated with both.

Conclusions

- Verbal and visual cognitive styles are independently correlated with respective reasoning abilities. Moreover, the difference between one's verbal and visual style preference is strongly correlated with the difference between verbal and visual reasoning abilities.
- Verbal and visual cognitive styles represent uncorrelated dimensions.
- A correlation appears to exist between cognitive styles and cognitive control.

References and Acknowledgments

- Kirby, J. R., Moore, P. J., & Schofield, N. J. (1988). Verbal and visual learning styles. *Contemporary Educational Psychology*, 13(1), 169-184.
- Kozhevnikov, M., Kosslyn, S., & Shepard, J. (2005). Spatial versus object visualizers: A new characterization of visual cognitive style. *Memory & Cognition*, 33(4), 710-726.
- Milham MP, Banich MT, Webb A, Barad V, Cohen NJ, Wszalek T, Kramer AF. (2001). The relative involvement of anterior cingulate and prefrontal cortex in attentional control depends on nature of conflict. *Brain Res Cogn Brain Res.* 12(3):467-73.
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