Personality Traits Predict Cognitive Control Ability

Ranjani Prabhakaran, David J.M. Kraemer, & Sharon L. Thompson-Schill
Department of Psychology and Center for Cognitive Neuroscience
University of Pennsylvania

BACKGROUND

- Two dimensions of personality related to motivational control of behavior[1]:
  - Behavioral Inhibition System (BIS)
  - Behavioral Activation System (BAS)
- BIS: sensitive to signals of punishment & threat (withdrawal)
- BAS: sensitive to signals of reward (approach)
- Individual differences in BIS and BAS related to performance on working memory tasks[2,3]
- Affective state also shown to affect cognitive control performance[4]

QUESTIONS

- Trait: What is the relationship between individual differences in personality and cognitive control abilities?
- State: What is the relationship between individual differences in affect and cognitive control abilities?

METHODS

- N = 80
- Cognitive Control Measures:
  - Verbal Stroop Task
  - Nonverbal Stroop Task
- Trait Personality Measure: BIS/BAS scales[5]

Sample BIS Item

If I think something unpleasant is going to happen, I usually get pretty worked up.

1 Strongly Disagree | 2 Disagree | 3 Agree | 4 Strongly Agree

Sample BAS Reward Responsiveness Item

When good things happen to me, it affects me strongly.

1 Strongly Disagree | 2 Disagree | 3 Agree | 4 Strongly Agree

- Affect Measure: Positive and Negative Affect Schedule (PANAS)[6]
  - Assesses positive and negative moods over the past week

Sample Negative Affect Item

Distressed

1 Very slightly or not at all | 2 A Little | 3 Moderately | 4 Quite a bit | 5 Extremely

Sample Positive Affect Item

Excited

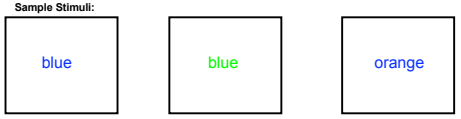
1 Very slightly or not at all | 2 A Little | 3 Moderately | 4 Quite a bit | 5 Extremely

VERBAL STROOP TASK

- Design adapted from Milham et al. (2001)[7]

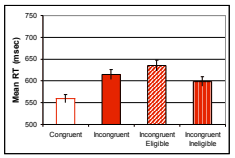
Task: Indicate font color

Sample Stimuli:



Congruent | Incongruent Eligible (Representational & Response Conflict) | Incongruent Ineligible (Representational Conflict)

Response Options:



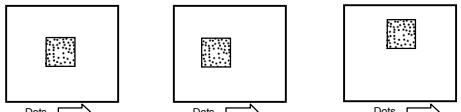
N = 80
IE Conflict: 76 ms (13 %)
II Conflict: 40 ms (7%)

NONVERBAL STROOP TASK

- Design adapted from Pomerantz (1983)[8]

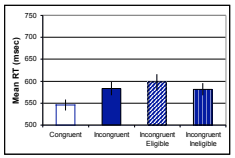
Task: Indicate direction of moving dots

Sample Stimuli:



Congruent | Incongruent Eligible (Representational & Response Conflict) | Incongruent Ineligible (Representational Conflict)

Response Options:

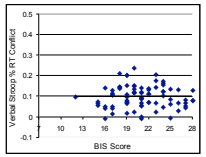


N = 79
IE Conflict: 52 ms (9 %)
II Conflict: 36 ms (6%)

RESULTS

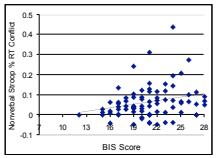
Individual Differences in Withdrawal Motivation Predict Nonverbal Stroop Performance

Verbal Stroop Task



N = 80
r = 0

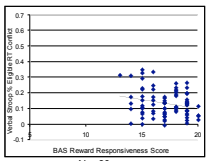
Nonverbal Stroop Task



N = 79
r = 0.26, p = 0.02 *

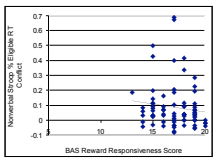
Individual Differences in Approach Motivation Predict Verbal Stroop Performance

Verbal Stroop Task



N = 80
r = - 0.24, p = 0.03 *

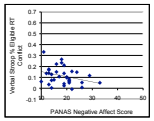
Nonverbal Stroop Task



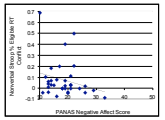
N = 79
r = - 0.12, p = 0.28

Individual Differences in State Affect Predict Stroop Performance

Negative Affect:

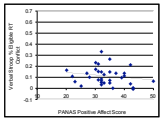


N = 33
r = - 0.31, p = 0.075

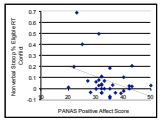


N = 33
r = - 0.24, p = 0.17

Positive Affect:



N = 33
r = - 0.19, p = 0.30



N = 33
r = - 0.36, p = 0.04 *

CONCLUSIONS

- Personality traits predict cognitive control abilities
  - Withdrawal motivational trait predicts nonverbal cognitive control abilities
  - Approach motivational trait predicts verbal cognitive control abilities
- Association between withdrawal/approach and nonverbal/verbal cognitive control abilities may stem from integration of emotion and cognition related to hemispheric specialization of lateral PFC[9,10]
  - Withdrawal: associated with greater right frontal activity
  - Approach: associated with greater left frontal activity
- Effects of negative and positive affect on cognitive control abilities in the present study may be due to arousal

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Contact

For a reprint of this poster, contact Ranjani Prabhakaran at prabhakr@psych.upenn.edu
For more information about our lab, please visit: http://www.psych.upenn.edu/stslab