DOCUMENTATION

of

BEHAVIORAL/COGNITIVE ASSESSMENTS

in

MIDUS Refresher 1 Neuroscience Project (P5)

University of Wisconsin ♦ Institute on Aging

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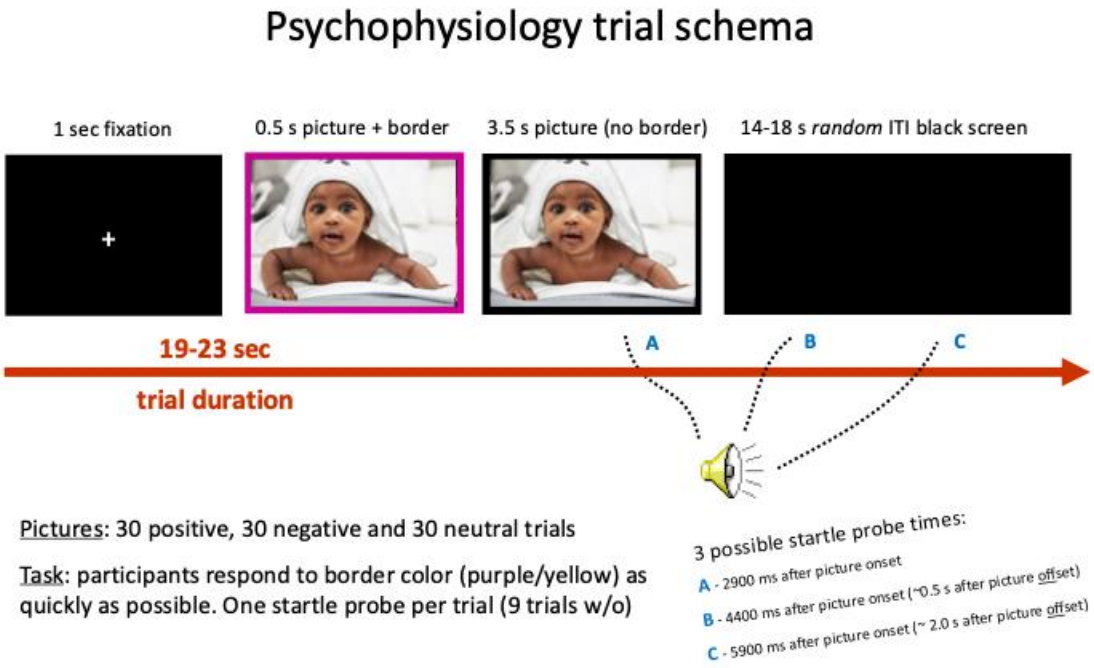
INTRODUCTION

This document is intended to provide details regarding behavioral and cognitive assessments conducted during the Neuroscience Project's (P5) MIDUS Refresher 1 sessions. Please see *MR1_P5_DOCUMENTATION_OF_PROCEDURES_20260206* for more information on the typical sequence of tasks. Partial variable names have been provided in brackets where appropriate. For further details on variable naming, see *MR1_P5_VARIABLE_NAMES_20260206.* If data could not be provided, the appropriate missing data value was listed. Missing data codes result from data not collected, technical difficulties, or inability of the participant to complete the task.

Differences Between MIDUS Waves

Most of the measures listed below were not collected in MIDUS 2 and therefore they only exist in MIDUS Refresher 1 and MIDUS 3. Please see the MIDUS 2 documentation for more information about what is available for MIDUS 2.

PSYCHOPHYSIOLOGY EMOTIONAL RESPONSE TASK



The Psychophysiology Emotional Response Task presents a series of positive, negative, or neutral images, each briefly framed with a purple or yellow border. Using their right hand, a participant presses the index finger key when the color is purple, and the middle finger key when the color is yellow. The border only displays for 500 ms while the image remains for another 3500 ms. Pictures are selected from the International Affective Picture System (IAPS; Lang, Bradley, and Cuthbert, 2005, 2008) and valence sets (negative, neutral, positive) are matched on luminosity and visual complexity and the number of images rated to be social versus non-social in content. Images are presented using a pseudorandom trial order with the requirement that no more than two pictures from the same valence category are presented sequentially. Within each valence category, stimuli were randomly ordered for each participant by the E-prime task software. The Psychophysiology Emotional Response Task was

programmed in E-Prime (Psychology Software Tools, Inc, Pittsburgh, PA) and run on a PC outside the psychophysiology booth in the Waisman Brain Imaging Core, located in the Waisman Center on the UW-Madison campus. Behavioral data were recorded on this PC using E-Prime software with simultaneous psychophysiology data recorded on another PC while the participant was performing the task.

During this paradigm, psychophysiological data (facial electromyography, electrocardiography, respiration, and electrodermal activity) are also collected. See *MR1_P5_DOCUMENTATION_OF_PSYCHOPHYSIOLOGY_20260206.*

Psychophysiology Emotional Response Task Reaction Times and Accuracy

Reaction times (RT) **[RA5R…]** were recorded as the difference between the onset time of the image and the onset time of the button press. Accuracy **[RA5A…]** is scored by summing the number of correct identifications of the border color and expressed as a proportion of the total number of trials presented to the participant.

Free Recall Task

For the Free Recall task **[RA5F…]**, participants were given *up to* 15 minutes to recall as many of the pictures seen during the Psychophysiology Emotional Response Task as possible by writing descriptions onto a blank sheet of paper. Written descriptions were carefully matched to the appropriate picture by study staff. Data are given as total number of pictures correctly recalled by valence, by social and nonsocial picture types, and overall.

Please be aware that sometimes participant recall was ambiguous describing potentially more than one picture, which was handled specially and affects categorical sums. For example, in our picture set we have more than one picture of a baby, and while each one is categorically "social" the valence differs between them (e.g. smiling chubby baby is positive, premature baby in the hospital is negative). A generic description of "baby" without further details would be counted in the total of pictures remembered and in the social total, but it would not be included in any of the valence totals. The same is true for ambiguously social descriptions that are not included in the final social or non-social totals. As a result, sometimes the sum of all three valence variables, or the sum of the social and non-social totals do not equal the total number of pictures recalled.

Picture Ratings Task

After the Free Recall task, participants were asked to rate each picture from the Psychophysiology Emotional Response Task on scales of valence and arousal using Bradley and Lang's Self-Assessment Manikin (1994).

Instructions to participant:

> *"Now you will rate the pictures you saw during the psychophysiology task. We need to know how YOU feel when you see these pictures. You will see lots of pictures showing different things that may make you feel happy or unhappy, excited or relaxed, or maybe even angry, scared, or thrilled.*
>
> *There are no wrong answers. Whatever you feel is the right answer, so simply respond as*

honestly as you can.

Some of the pictures may elicit an emotional response and others may seem relatively neutral, producing little or no emotional experience. You rating of each picture should reflect your immediate personal experience and no more.

Please rate each picture AS YOU ACTUALLY FEEL WHILE YOU WATCH THE PICTURE.

Now we will look at the ratings scales so you can get a better idea of the task.

Below you will see 9 figures displaying a range of how you many feel in response to the picture. Please look at them closely. The figures are meant to help you provide your ratings from 1-9.

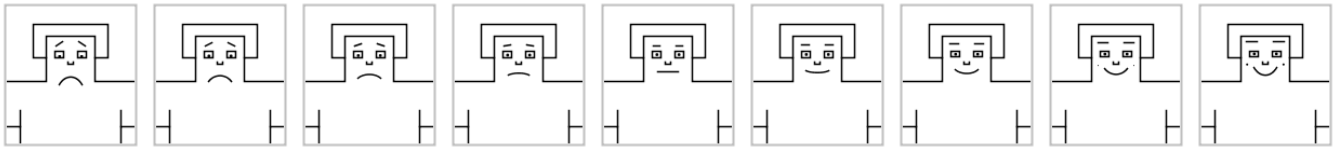
You will use these figures with associated numbers to rate EACH of the pictures on:"

Valence: Unhappy vs. Happy (Unpleasant vs. Pleasant) **[RA5TV…]**

Instructions to participant while they look at figures:

"how UNHAPPY vs. HAPPY you feel (or PLEASANT vs. UNPLEASNT) in response to the picture"

UNHAPPY <----------> HAPPY



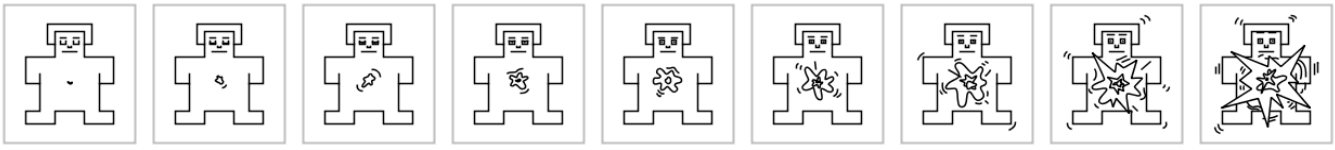
1 2 3 4 5 6 7 8 9

Arousal: Calm vs. Excited (Unaroused vs. Aroused) **[RA5TA…]**

Instructions to participant while they look at figures:

"how CALM vs. EXCITED you feel (or UNAROUSED vs. AROUSED) in response to the picture"

CALM <----------> EXCITED



1 2 3 4 5 6 7 8 9

Mean ratings of valence and arousal are provided for each category of picture valence (positive, negative, and neutral).

NOTE: Individual picture data (or, trial-by-trial data) are available via restricted access and can be requested according to the instructions described on https://midus.wisc.edu/midus-neuroscience-repository/

OTHER COGNITIVE TASKS

Cube and Paper Task

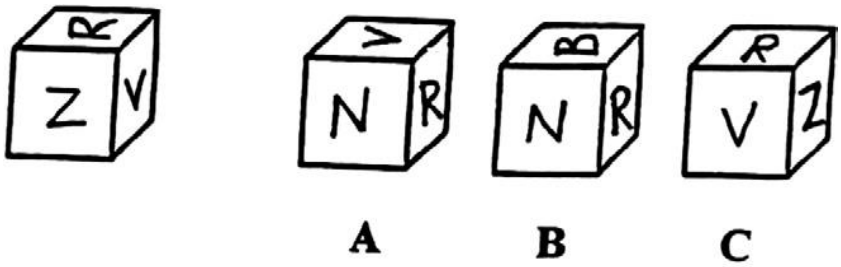
The Cube and Paper Task is a measure of spatial rotation and reasoning sensitive to differences in the hippocampal region of the brain and was used with permission by the authors Gilbertson et al. (2007) Biological Psychiatry, 62(5), 513-520. Participants were given a paper and pencil packet to complete during the psychophysiology session. The packet had two task sections: (1) Cube and (2) Paper. Both task sections had 10 questions.

Cube Task

Instructions for Cube Task:

> *"On the following pages you will see drawings of cubes that have letters, numbers, or symbols on each side. Each of the cubes has six unique sides; that is, no letter, number, or symbol appears on more than one face of a given cube. For each item, imagine that the cube on the left can be rotated in any direction. Your job will be to compare the three cubes on the right with the one on the left. Decide which of the three cubes is identical to the cube on the left, if the cube on the left was rotated in a new orientation. Circle the letter corresponding to the cube you think could be a different view of the cube on the left."*

Sample Question:



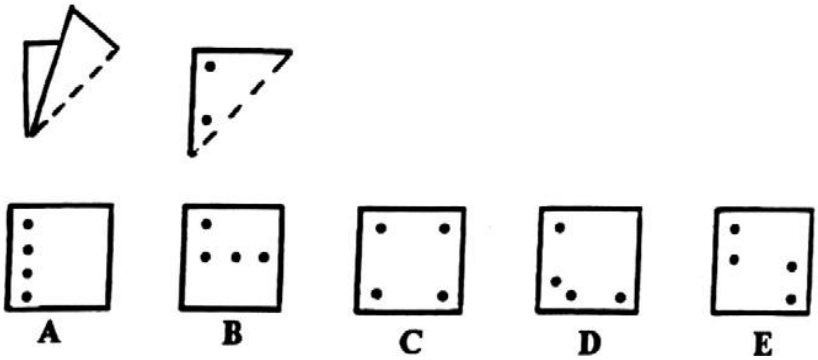
[RA5DCA]: 1 point was awarded for each correct response, constructed by totaling correct responses to the Cube questions.
[RA5DCB]: 1 point was awarded for each response, constructed by totaling number of responses in the Cube questions.

Paper Task

Instructions for Paper Task:

> *"On the following pages you will see drawings of paper with holes in it. Imagine folding and unfolding a piece of paper. Each of the items will represent a square piece of paper being folded along the dotted line shown. After being folded, imagine that one or more holes are punched through all layers of the paper. Your job will be to decide which of the five figures correctly represents how the paper would look when it is unfolded again. Circle the letter below the figure to make your choice."*

Sample Question:



[RA5DPA]: 1 point was awarded for each correct response, constructed by totaling correct responses to the Paper questions.
[RA5DPB]: 1 point was awarded for each response, constructed by totaling number of responses in the Paper questions.

Cube and Paper Total

[RA5D]: A continuous variable based on 20 items (10 cube and 10 paper), constructed by totaling correct responses to all the Cube & Paper questions.
[RA5DR]: A continuous variable based on 20 items (10 cube and 10 paper), constructed by totaling the number of responses in all the Cube & Paper questions.

CANTAB Cognitive Assessments

Cambridge Neuropsychological Test Automated Battery (CANTAB; http://www.cambridgecognition.com/) cognitive assessments **[RA5N…]** were typically administered following the Psychophysiology Emotional Response Task during day one of a participant's visit. The exception was the Cambridge Gambling Task (CGT), administered following the MRI scan on day two. Tests were performed using a Portable SlimBook Panel Touchscreen PC and presspad, equipped with CANTAB software version 5.0. For individual task descriptions with instructions and variable names see: *MR1_P5_DOCUMENTATION_OF_CANTAB_20260206.*

FMRI BEHAVIORAL TASKS

Raw data for the three behavioral tasks collected in conjunction with the functional MRI scans are available upon request:

(1) The fMRI Emotional Response Task completed during the fMRI scans (with accompanying raw imaging data and psychophysiology data – photoplethysmography, electrodermal activity, and respiration)
(2) The fMRI Picture Ratings Task (i.e., valence and arousal ratings of the pictures viewed during the fMRI Emotional Response Task) collected out-of-scanner
(3) The Face Ratings Task (i.e., memory and likeability ratings of faces viewed during the fMRI Emotional Response Task).

For more details on these tasks and instructions to request access to restricted data please see *MR1_P5_RESTRICTED_ACCESS_20260106.*

REFERENCES

Picture Ratings Task:

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25*(1), 49–59.

Cube and Paper:

Gilbertson, M. W., Williston S. K., Paulus, L. A., Lasko, N. B., Gurvits, T. V, Shenton, M. E., Pitman, R. K., Orr, S. P. (2007). Configural cue performance in identical twins discordant for posttraumatic stress disorder: Theoretical implications for the role of hippocampal function. *Biol Psychiatry, 62*(5), 513-520.

Emotional Response Task:

Lang, P. J., Bradley, M. M., Cuthbert, B. N. (2005). *International Affective Picture System (IAPS): Digitized Photographs, Instruction Manual and Affective Ratings.* Gainesville, FL: University of Florida.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2008). International Affective Picture System (IAPS): *Affective ratings of pictures and instruction manual* (8 ed., pp. 1–61). Gainesville, FL: University of Florida.