# **T**el-**A**viv **U**niversity **/ N**ational **I**nstitute of **M**ental **H**ealth

# **Attention Bias Measurement Toolbox : Protocol (Oct.2014)**

## Introduction

Below, you can review the detailed methods, installation instructions, and general guidelines for running the TAU/NIMH attention bias measurement procedures. This tutorial outlines the behavioral assessment process.

## The dot-probe task

### Overview

The dot-probe task forms the basis for both threat bias assessment and attention bias modification. Threat-related attention bias should be measured before and after the protocol.

Currently, we offer three versions of the dot-probe discrimination task:

1.  **Neutral-threat (NT) faces:** pairs of face stimuli, one angry and one neutral, are presented one above the other on the computer screen, followed by a small visual probe appearing in the location vacated by one of the face pictures. Participants are required to respond as quickly as possible to the probe without compromising accuracy. See figure below:
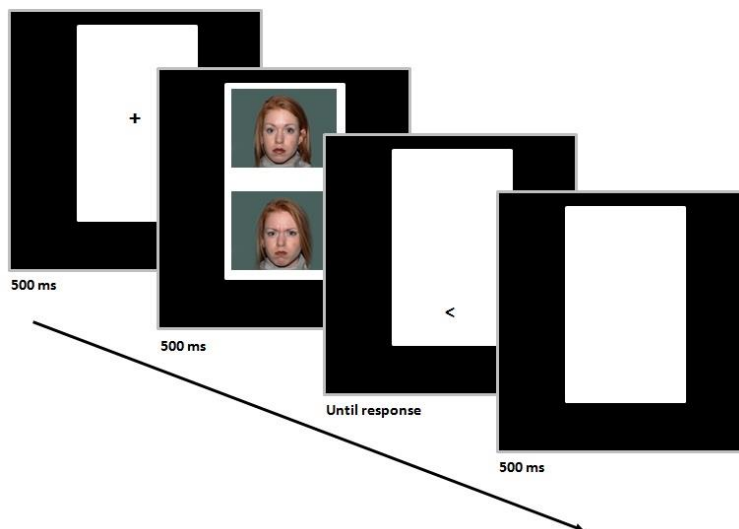


This version has been used by Sipos et al (2013).

2.  **Neutral-threat-happy (NTH) faces:** similar to the previous version, with happy-neutral face

pairs presented in addition to the angry-neutral presentations.

3. **Neutral-threat (NT) words:** a neutral-threat version, with pairs of neutral and threat words presented instead of face stimuli. In addition, there is no white rectangular frame in this version. See figure below:
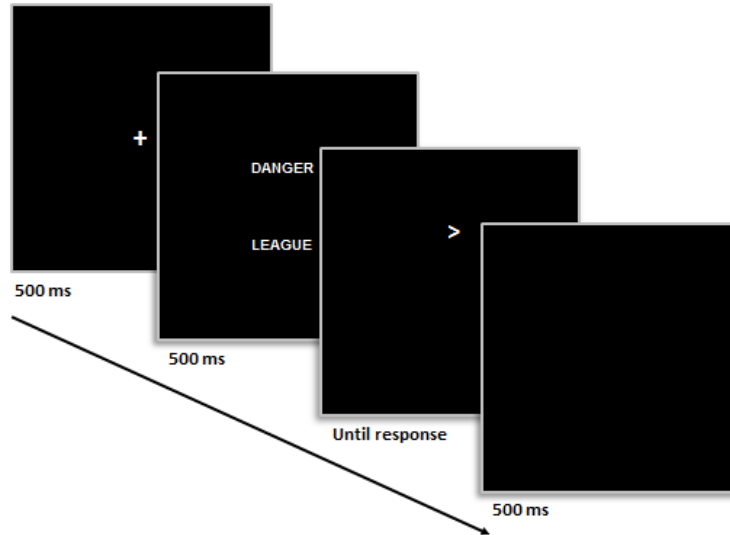


A similar version was used by Iacoviello et al (2014).

Response latencies on the task provide a "snap-shot" of the distribution of the subject's attention, with faster responses to probes presented in the attended relative to the unattended location. For example, attention bias toward threat is evident when participants are faster to respond to probes that replace threat stimuli rather than neutral stimuli. The reverse pattern indicates threat-related attentional avoidance.

Care must be taken to standardize the implementation of both the dot-probe task and attention training. The task should be administered in a quiet room with the lights dimmed. A research assistant should be present to ensure the task is being carried out as planned. Neither the research assistant nor the participant should speak during task administration.

## Stimuli

1. **Faces:**
   a. All displays are presented within a white rectangle (58mm wide by 94mm tall, when screen resolution is configured to 1280 x 768 pixels; see *Setup and Installation* section below) mounted on a black background. The white rectangle is positioned in the mid-top portion of the screen.

**b.** The face stimuli in the NT version are photographs of 20 different individuals (10 male, 10 female) taken from the NimStim stimulus set (Tottenham et al., 2009), except for one female taken from the Matsumoto and Ekman set (Matsumoto & Ekman, 1989). These were divided into two sets (A and B, see below, each featuring 10 different actors). The face stimuli in the NTH version are photographs of 12 different individuals (6 male, 6 female) taken from the NimStim stimulus set (Tottenham, et al., 2009). All faces were placed on a background as in the Matsumoto and Ekman set. Three different pictures of each individual, depicting angry, happy and neutral expressions, were selected. The face display consists of pairs of angry-neutral or neutral-neutral faces of the same individual, and additionally happy-neutral faces in the NTH version. The face photographs are presented with equal distance from the top and bottom of the fixation cross, with a distance of 14mm between them. The top photograph is positioned about 20mm from the top edge of the screen. Each face photograph subtends 45mm in width and 34mm in height.

**c.** The face pairs in the NT version were randomly divided into two sets (A and B). In the context of ABMT trial each participant should be tested for pre- and post-ABM bias with one set, and trained with the other. Set assignment should be counterbalanced within groups. In the NTH version, only one set was created.

**d.** The target-probe display consists of an arrow head pointing either left or right ("<" or ">"). The target appears at the location previously occupied by one of the faces, with a small, random jitter around the center of the face.

2. **Words:**

**a.** The task version we supply contains pairs of neutral and threat words that were taken from MacLeod et al (2002). The words are presented in size 12 Arial white font over a black background, one above and one below the location of the fixation cross, separated by 1.5 cm. Only one set was created.

**b.** Each pair of words is in fact a picture of the pair. A PowerPoint file is located in the "images" folder in which all the pairs are displayed in separate slide. You may change these word pairs with your own stimuli. However, note that each pair of consecutive odd- and even-numbered slides (e.g., slide 1 and slide 2) contains the same word pair but in reverse vertical orientation (odd: threat on top; even: threat on bottom). This order should be maintained in order for the experiment to run correctly.

**c.** The target-probe display consists of an arrow head pointing either left or right ("<" or ">"). The target appears at the location previously occupied by one of the words.

## Procedure

In each trial in the task, the participant is presented with the fixation cross (500ms), followed by the stimuli pair display (500ms), followed by the target probe display (until response). Response is followed by an inter-trial interval (500ms) composed of only the white rectangle on the black background. Across trials, each expression will equally likely be on the top or bottom position, and the probe will equally likely be < or >.

**Threat bias measurement**

The NT measurement protocol consists of 120 trials (80 angry-neutral and 40 neutral-neutral presentations). Angry-face location, probe location, probe type, and actor are fully counterbalanced in presentation. If the subject performs with less than 70% accuracy on the first 10 trials, the program will display a warning and the experiment will be aborted. This warning provides an opportunity to re-brief the subject and initiate data collection again.

The NTH measurement protocol consists of 120 trials (48 angry-neutral, 48 happy-neutral and 24 neutral-neutral presentations). Face location, probe location, probe type, and actor are fully counterbalanced in presentation.

The NT-words measurement protocol consists of 160 trials (128 threat-neutral and 32 neutral-neutral presentations). A total of 32 NT word pairs and 16 additional NN pairs were used. Word location, probe location, probe type, and actor are fully counterbalanced in presentation. There is no accuracy-based abort in this version.

# Setup and installation

## Technical requirements

- A computer running E-Prime 2.0.10.353, *E-Run* application (PST, Pennsylvania, USA; http://www.pstnet.com/eprime.cfm).
- **Note:** The experiments here were programmed in E-Prime version 2.0.10.353. If your site runs older version of E-Prime, please let us know and will try to supply an older version of the task.
- Optimal computer screen resolution: 1280 x 768 pixels (with this resolution, the white rectangle display should be 58mm wide and 94mm tall). We strongly recommend that screen resolution is configured to these values. Variation of ±6mm in the white rectangle's *width* is allowed (equivalent to ±10% variation for any of the measurements indicated above). Larger variation should be resolved with our assistance.

- Use an external mouse as the response device. The left mouse button corresponds to target "<"; the right mouse button corresponds to target ">".

## Packages set-up

- **Bias measure (NT version):**
  o Download the file *NT_Bias_Measure_(faces).zip.*
  o Unzip its contents into a folder. The contents should include:
    ▪ *Bias_measure.ebs2*: runs the bias measurement session in the NT version (E-Run 2.0 Script File).
    ▪ *images*: a folder containing 6 image files, and 2 nested folders ("A" and "B") each containing 20 additional image files.
    ▪ *Bias_measure.es2:* this is the source code for the bias measurement experiment. Please note that any changes you make to this file will then affect the experiment itself. You may make such changes, at your own risk, but note that in order to use the Analysis Tool we provide, you will need to maintain the functionality of the *ProbeBehind* (threat/neutral) and *TrialType* (NT/NN) attributes.

- **Bias measure (NTH version):**
  o Download the file *NTH_Bias_Measure_(faces).zip.*
  o Unzip its contents into a folder. The contents should include:
    ▪ *Bias_measure_NTH.ebs2*: runs the bias measurement session in the NTH version (E-Run 2.0 Script File).
    ▪ *images*: a folder containing 43 image files.
    ▪ *Bias_measure_NTH.es2:* this is the source code for the bias measurement experiment. Please note that any changes you make to this file will then affect the experiment itself. You may make such changes, but note that in order to use the Analysis Tool we provide, you will need to maintain the functionality of the *ProbeBehind* (threat/neutral/happy) and *TrialType* (NT/NN/NH) attributes.

- **Bias measure (NT words version):**
  o Download the file *NT_Bias_Measure_(words).zip.*
  o Unzip its contents into a folder. The contents should include:
    ▪ *Bias_measure_words.ebs2*: runs the bias measurement session in the NT words version (E-Run 2.0 Script File).
    ▪ *images*: a folder containing 86 image files and 1 PowerPoint file.
    ▪ *Bias_measure_words.es2:* this is the source code for the bias measurement experiment. Please note that any changes you make to this file will then affect

the experiment itself. You may make such changes, but note that in order to use the Analysis Tool we provide, you will need to maintain the functionality of the *ProbeBehind* (threat/neutral) and *TrialType* (NT/NN) attributes.

- Note: The relative location of the *images* folder in all tasks needs to remain unchanged.

## Running the procedure

### Bias measurement (NT version)

- Double-click *Bias_measure.ebs2* to run a bias measurement session.
- Session sequence:
  - A series of input dialog boxes will prompt the experimenter to enter:
    - Research site number (should be provided by the coordinator)
    - Subject number (1-32767)
    - Session number
    - Stimuli set to use (A or B)
    - Summary of startup info (read only)
  - Instructions slide (see *Appendix* for instructions text)
  - 120 trials (no breaks) - ~4 minutes
  - Goodbye message
- Output: two output files bearing the subject and session numbers will be generated in the same folder following a complete run:
  - .edat file (output in E-Prime *Edat* format)
  - .txt file (text log file, generated even when experiment is aborted)

### Bias measurement (NTH version)

- Double-click *Bias_measure_NTH.ebs2* to run a bias measurement session
- Session sequence:
  - A series of input dialog boxes will prompt the experimenter to enter:
    - Subject number (1-32767)
    - Session number
    - Summary of startup info (read only)
  - Instructions slide (see *Appendix* for instructions text)
  - 120 trials (no breaks) - ~4 minutes
  - Goodbye message

- Output: two output files bearing the subject and session numbers will be generated in the same folder following a complete run:
  - .edat file (output in E-Prime *Edat* format)
  - .txt file (text log file, generated even when experiment is aborted)

## Bias measurement (NT-words version)

- Double-click *Bias_measure_words.ebs2* to run a bias measurement session
- Session sequence:
  - A series of input dialog boxes will prompt the experimenter to enter:
    - Subject number (1-32767)
    - Session number
    - Summary of startup info (read only)
  - Instructions slide (see *Appendix* for instructions text)
  - 160 trials (no breaks); ~7 minutes
  - Goodbye message
- Output: two output files bearing the subject and session numbers will be generated in the same folder following a complete run:
  - .edat file (output in E-Prime *Edat* format)
  - .txt file (text log file, generated even when experiment is aborted)

**General Note:**

- A session cannot be paused midway.
- Use Ctrl+Alt+Shift to abort the session only if absolutely necessary. The .edat file will not be created for the trials run before the abort command; use *E-Recovery* application to transform the text log file into .edat format

## Modifying the tasks

You may make modify these tasks to suit your needs using the .es files provided.

Whether or not you choose to make any changes to the tasks, we strongly urge you to thoroughly test the tasks and their output before starting your study. While we have tested these tasks ourselves, we cannot be held responsible for any unforeseen fault in them.

In case you do make changes to the tasks, note that that in order to use the Analysis Tool we provide, you will need to maintain the functionality of the ProbeBehind (threat/neutral) and TrialType (NT/NN) attributes.

## Data analysis

Threat bias scores and other behavioral indices can be directly generated using the provided *Data Analysis Tool (v2.0)*, a MATLAB standalone utility.

## Referencing the toolbox

*Abend, R., Pine, D.S., Bar-Haim, Y. (2014). The TAU-NIMH Attention Bias Measurement Toolbox. Retrieved from http://people.socsci.tau.ac.il/mu/anxietytrauma/research/.*

## Attention training

In order to access the ABM training protocol, please contact tau.nimh.abmt@gmail.com.

## Contact

- ➲ Registration and technical support: tau.nimh.abmt@gmail.com
- ➲ General inquiries: Rany Abend / abend@tau.ac.il
- ➲ TAU Director: Yair Bar-Haim / yair1@post.tau.ac.il
- ➲ NIMH Director: Daniel Pine / daniel.pine@nih.gov

# References

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Tottenham, N., Tanaka, J., Leon, A., McCarry, T., Nurse, M., Hare, T., . . . Nelson, C. B. (2009). The NimStim set of facial expressions: Judgments from untrained research participants. *Psychiatry Research, 168*, 242-249.

# Appendix

Instructions provided to subjects at the beginning of the bias measurement session:

**In each trial, a + sign will appear in the center of the screen, followed by a pair of faces\*, and then by a target: < or > .**

**If the target is < , press the left mouse button.**

**If the target is > , press the right mouse button.**

**Respond as quickly as you can without making mistakes.**

**Use only your dominant hand.**

**Press any button/key to start.**

\*"words", in the case of the NT words version.