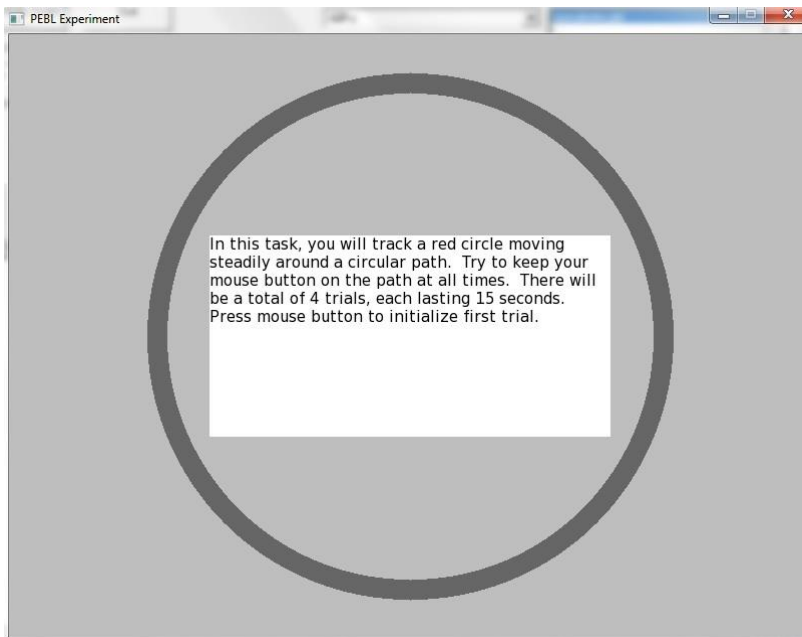


1 **Supplementary Figure 1.** Psychology Experiment Building Language (PEBL) screen-shots
2 including Pursuit Rotor (A), Time-Wall (B), Trail-Making Test (C), Digit Span (D), Wisconsin
3 (Berg) Card Sorting Test (E), Mental Rotation (F), Tower of London (G), Dexterity (H), and the
4 Test of Attentional Vigilance (I). The source code (*.pbl files) is also at:

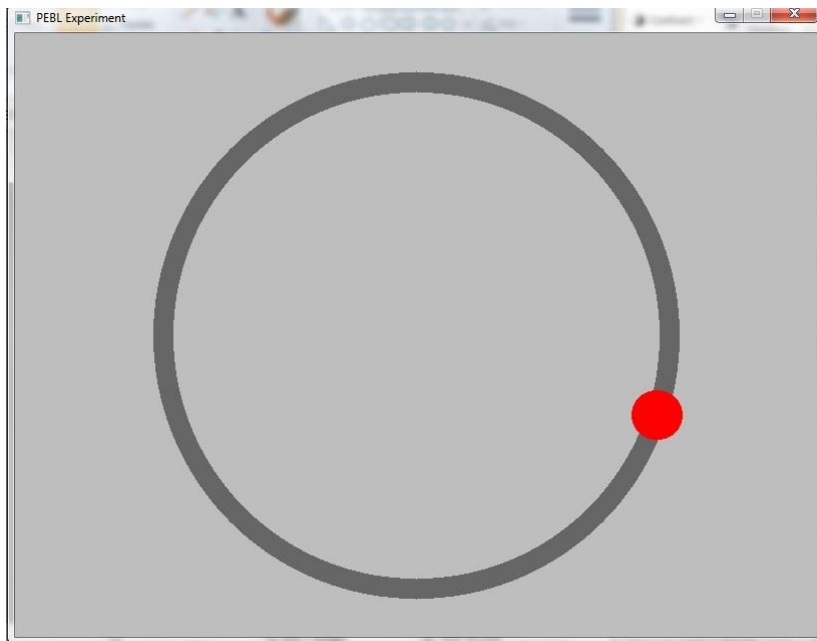
5 <https://github.com/stmueller/pebl-custom>

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7 A) Pursuit Rotor, a test of fine-motor learning, instructions (top) and example trial (bottom).

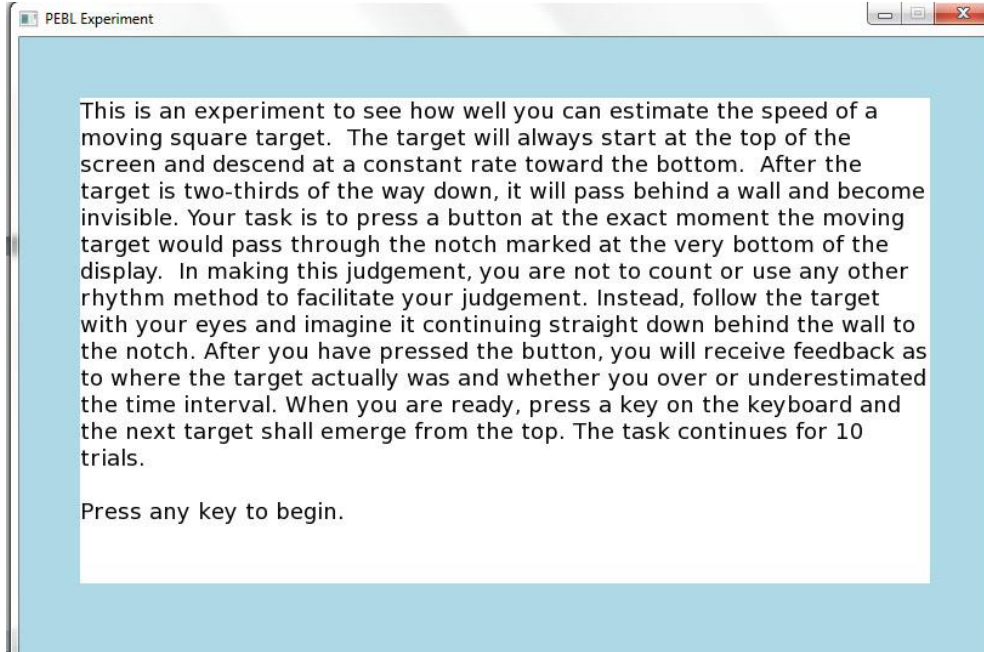


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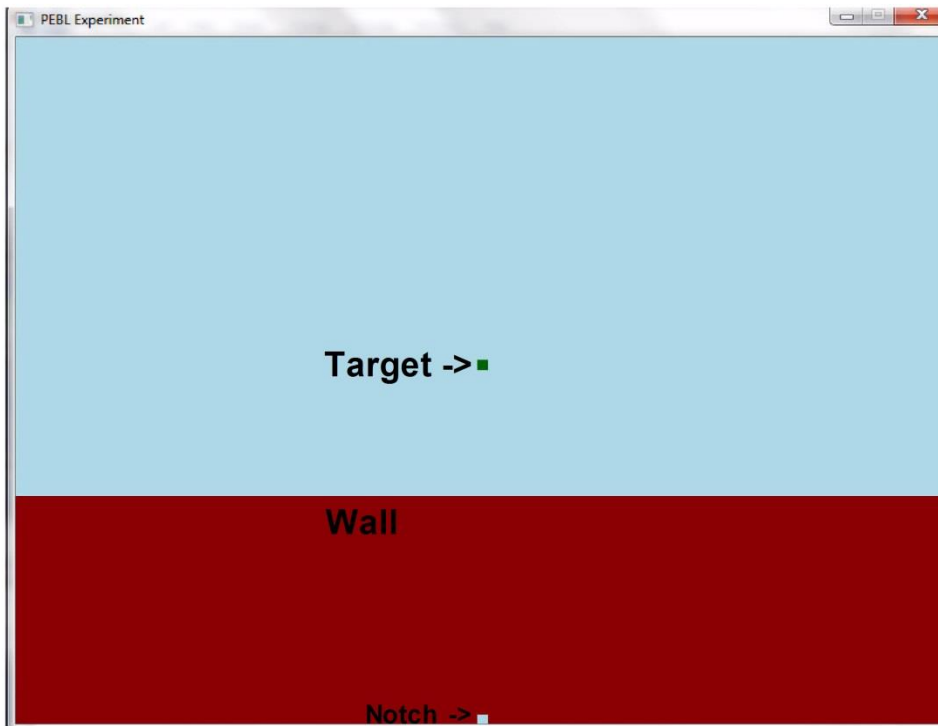


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- 11 B. Time-Wall, an index of attention and decision-making, instructions (top) and trial (bottom).



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- 16 C. PEBL Trail-Making Test, a measure of executive function (set-shifting), instructions (top)
 17 and example B trial (bottom).

PEBL Experiment

In this experiment, your goal is to click on each circle, in sequence, as quickly as you can. When you click on the correct circle, its number will change to boldface, and a line will be drawn from the previous circle to the new circle. On some trials, the circles will be numbered from 1 to 25, and you should click on them in numerical order (1-2-3-4, and so on). On other trials, the circles will have both numbers (1 to 13) and letters (A through L), and you should click on them in an alternating order (1-A-2-B-3-C and so on). If you click the wrong circle, no line will be drawn. The trial will continue until you have successfully clicked on all of the circles in the correct order.

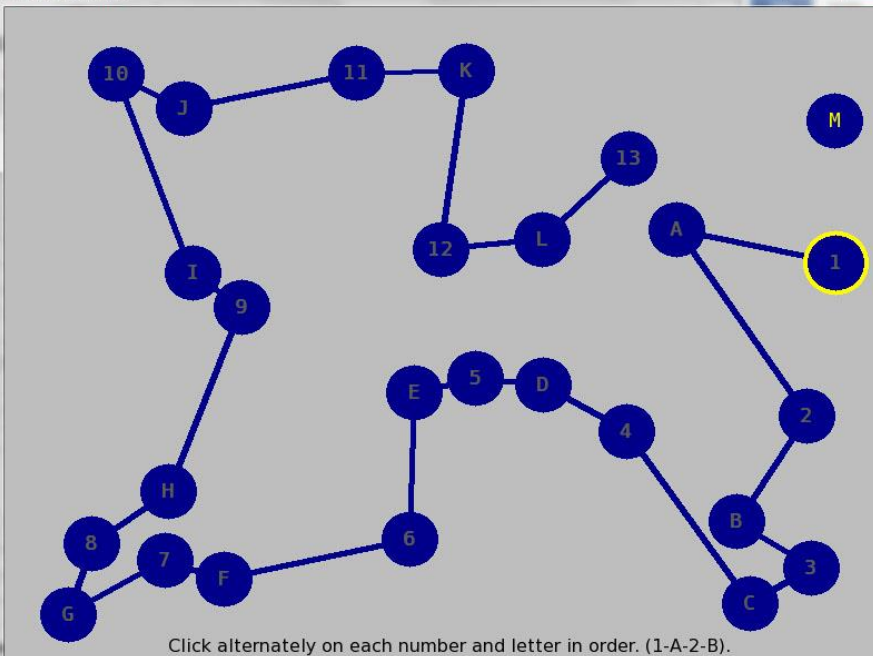
After the display appears, you can examine the circles as long as you want. Timing will not begin until you click on the first circle, which is labeled '1' on every trial.

Ask the experimenter if you have any questions.

Press the mouse button to begin.

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PEBL Experiment



Click alternately on each number and letter in order. (1-A-2-B).

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22 **D. PEBL Digit Span, a measure of working memory, instructions.**

You are about to take part in a memory test. You will be presented with a sequence of digits, one at a time on the screen. Each digit will occur only once during a list. You will then be asked to type the list of digits exactly in order. If you do not know what digit comes next, you can skip over it by typing the '-' key. Once entered, you cannot go back to edit your responses. You will start with a list of three items, and will get three different lists at each length. If you are able to recall two out of three lists completely correctly, you will move on to the next longest list length.

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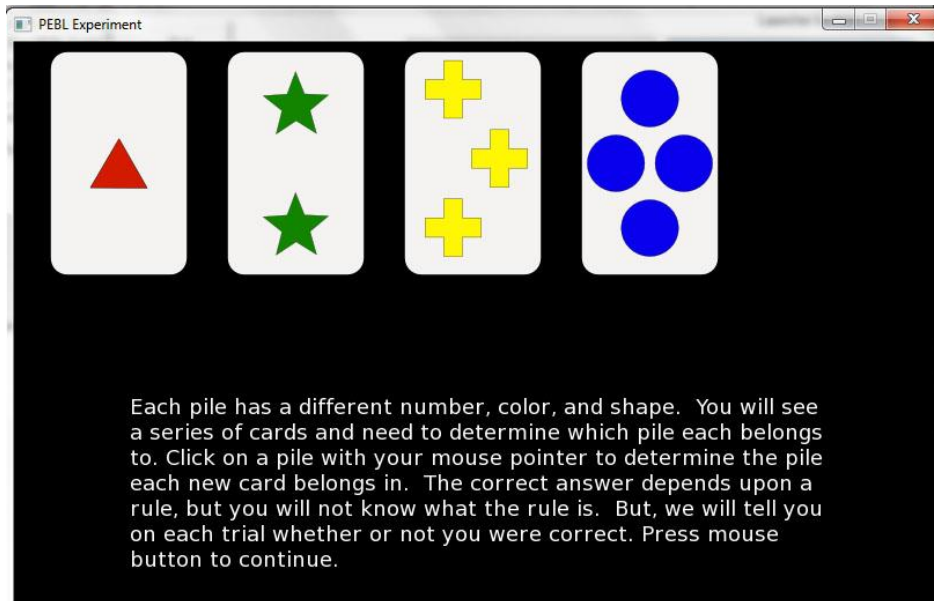
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- 37 E. PEBL Berg Card Sort Test, a test of executive function (set shifting), instructions (top and
 38 middle) and example trial with color as the current rule (bottom).

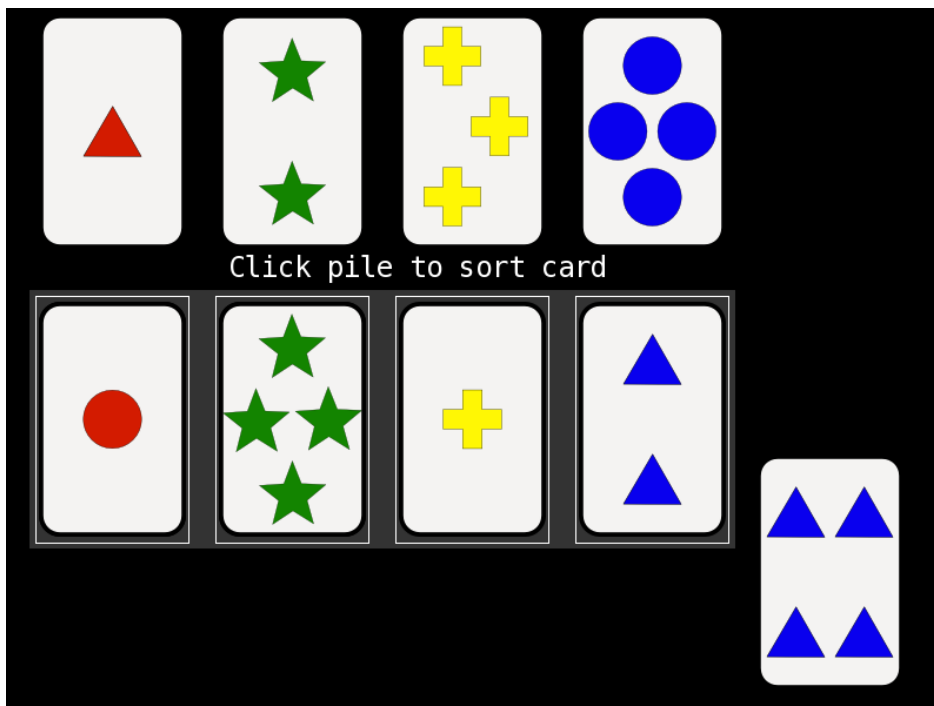
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You are about to take part in an experiment in which you need to categorize cards based on the pictures appearing on them. To begin, you will see four piles (press the mouse button to see the four piles.)

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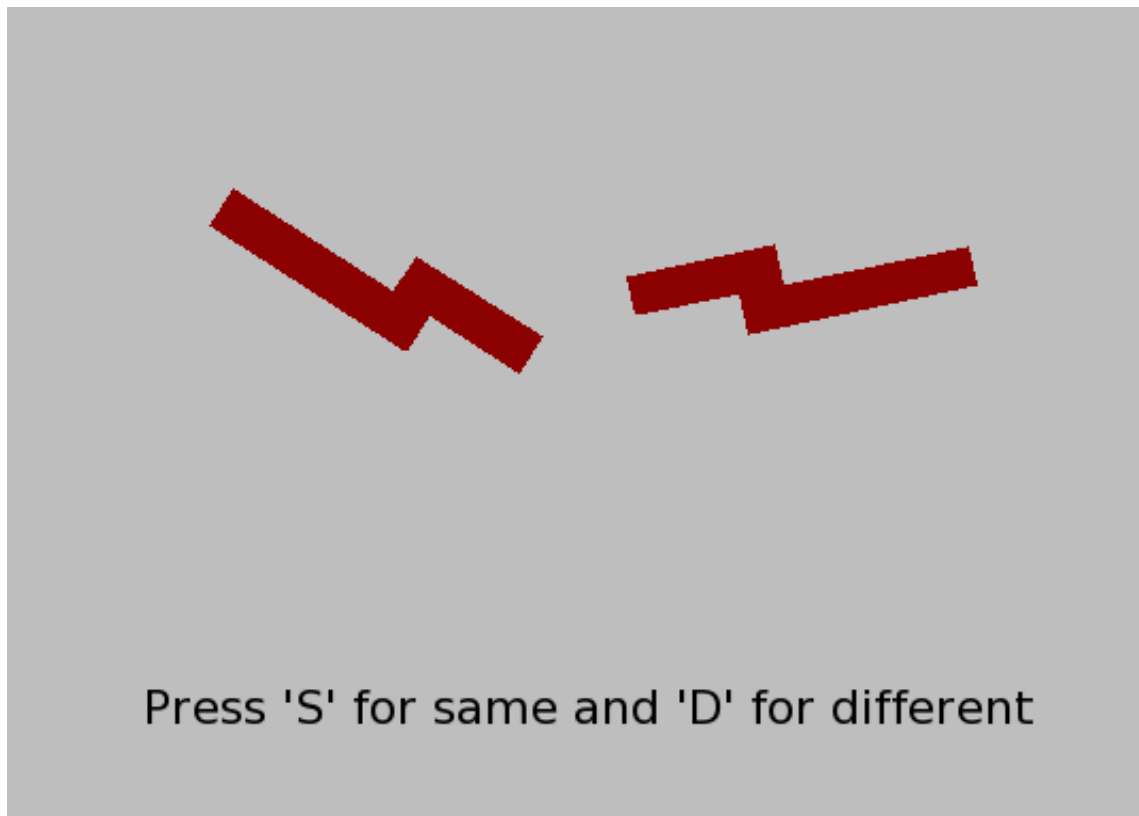
43 **F. Mental Rotation**, an index of executive functioning, instructions (top) and example stimuli

44 (bottom).

This experiment will examine your ability to mentally rotate one figure to compare it with another. You will see a 5 by 5 grid, with five of its cells lighted. You should learn the pattern as quickly and as accurately as possible, and then press a button on the keyboard when you are sure you know the pattern. As soon as you press the key, a new pattern will be presented. If the new pattern is the same as the old pattern, but turned 90 degrees to the left or right, press the left shift key on the keyboard. If the pattern is not a 90 degree left or right rotation of the old pattern, press the right shift key on the keyboard. If you have any questions, please ask the experimenter now.

Press any key to begin

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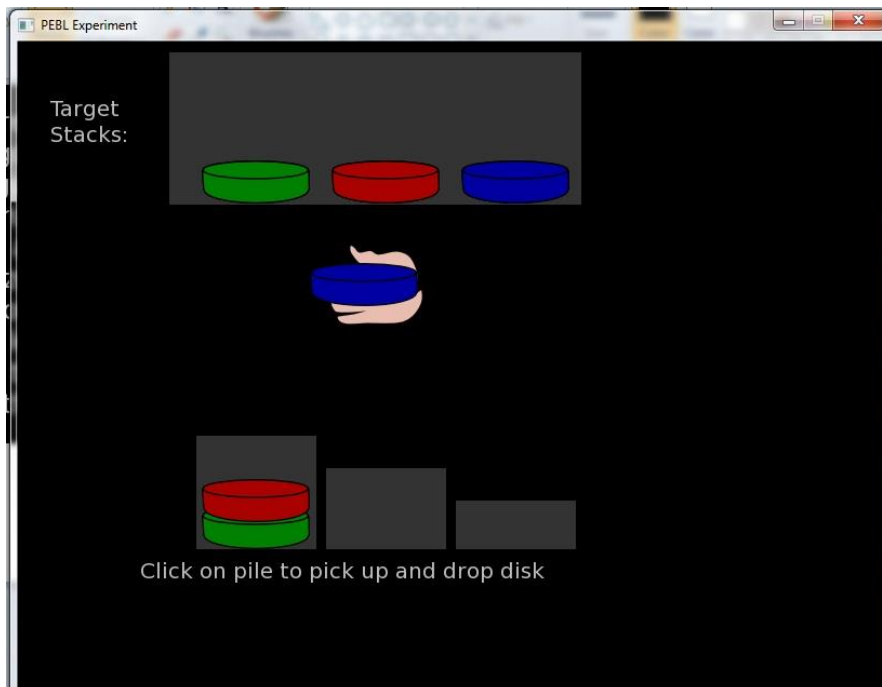
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- 52 **G.** PEBL Tower of London, a measure of executive-function (planning), instructions (top) and a
53 sample trial (bottom). This version was used in Study II.

You are about to perform a task called the 'Tower of London'. Your goal is to move a pile of disks from their original configuration to the configuration shown on the top of the screen. You can only move one disk at a time, and you cannot move a disk onto a pile that has no more room (indicated by the size of the grey rectangle). To move a disk, click on the pile you want to move a disk off of, and it will move up above the piles. Then, click on another pile, and the disk will move down to that pile. Click the mouse to begin.

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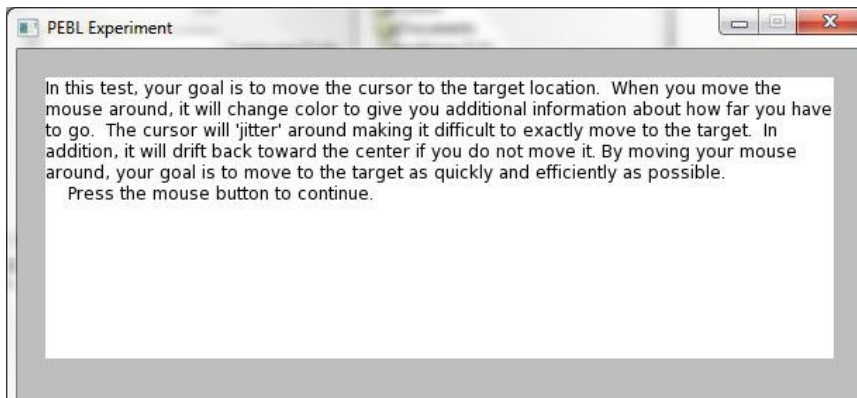


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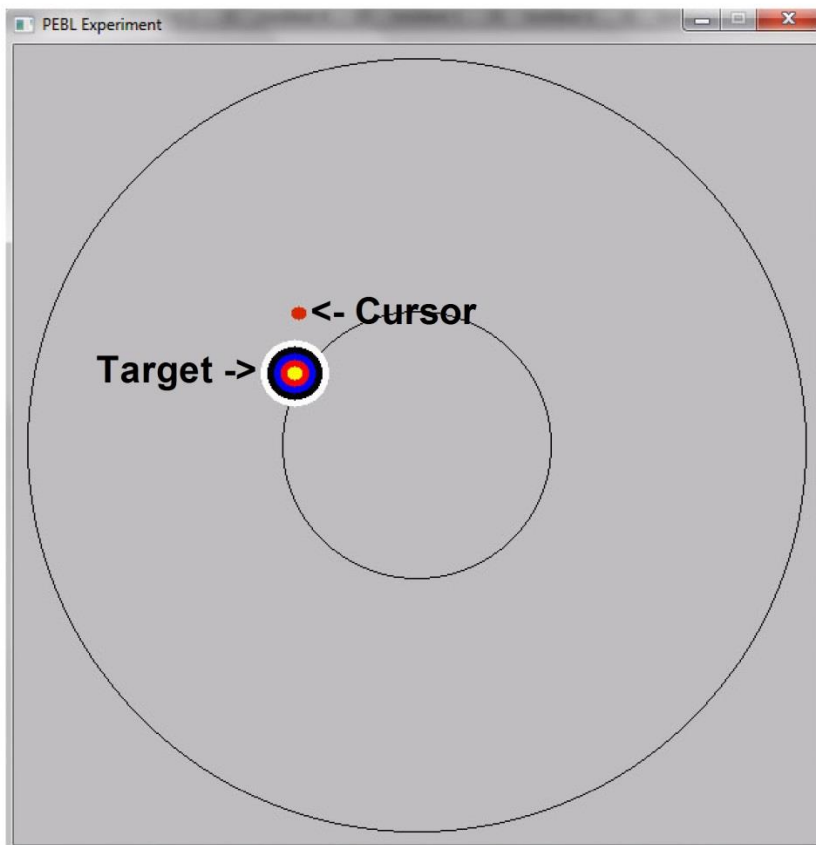
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58 **H.** Dexterity, a test of fine motor ability, instructions (top) and example trial (bottom). Dexterity
59 is a recently developed test of fine motor function which consists of a circular coordinate plane
60 with the center of the circle (demarcated by a thin black line) at x,y positions 0,0. The goal is to
61 move the cursor (depicted as a colored ball) to a target located at various positions. Movement of
62 the cursor is affected by a “noise” component complementing the directional input from the
63 analog mouse to create the effect of interference or “jittering” motion. The effect is such that
64 successful navigation of the coordinate plane using the mouse encounters resistance to
65 purposeful direction, requiring continual adjustment by the participant to maintain the correct
66 path to the target. Visual feedback is given by the use of a color system, wherein the cursor shifts
67 gradually from green to red as proximity to the target becomes lesser. The task consists of 80
68 trials (10 per “noise” condition), ten seconds maximum in length, with preset noise factors
69 (ranging in intensity) and target locations standardized for consistency between participants. A
70 lack of input from the participant results in a gradual drift towards the center. At the conclusion
71 of each trial, the cursor location is reset to the origin. Completion time and Moves were recorded
72 with Moves defined as the change in the vector direction of the mouse while course correcting
73 toward the target. The radius of the circular coordinate plane is defined as a function of the
74 screen size and resolution as 300 arbitrary units, the cursor as 2.5 units, and the target as 12.5
75 units. Distance to the target is computed using those arbitrary units. Cursor velocity is defined
76 externally as “intermediate” in the Windows XP Service Pack 2 settings.



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84 **I. Test of Attentional Vigilance (TOAV), a measure of sustained attention, example trial. The**
85 instructions were as follows:

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87 On each trial, you will see one of two stimuli on the screen. Each will be a white square with a
88 black square inside it. On some trials, this inner square will be near the top of the white square;
89 on other trials it will be near the bottom. Press any key to see the stimuli.

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91 When the square is on the top, it is a target. During the task, you should press the space bar
92 whenever you see the target stimulus. Press any key to continue.

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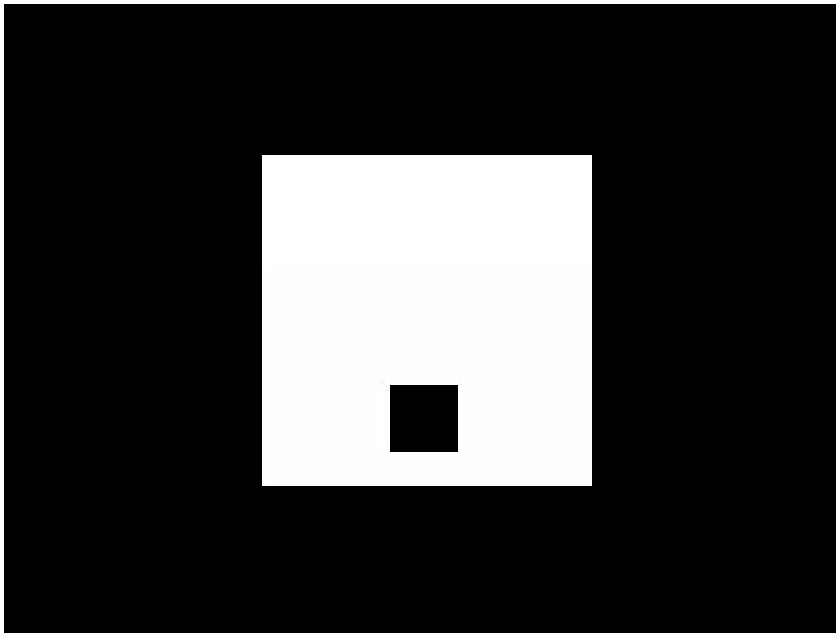
94 When the square is on the bottom, it is NOT a target. During the task, you should not press the
95 space bar when the non-target is displayed. Press any key to continue.

96

97 During the task, you will see a series of targets and non-targets. Press the space bar as quickly as
98 you can whenever you see a target (top square). Do nothing when you see a non-target (bottom
99 square). The task lasts approximately 6 minutes, so you need to concentrate on the task in order
100 to perform well. Press the space bar to begin.

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