

Sternberg Item Recognition Paradigm (SIRP)

Total task time: 7:27 (includes 2 DDAs w/TR = 3s)

Time Frames: 149

The SIRP is a working memory task that consists of four conditions: 3 working memory (WM) and 1 arrows condition. Total task time: 441s (not including 6s for discarded acquisitions). Stimuli are projected onto a screen positioned on the head coil with E-Prime programming software. Subjects respond by pressing a keypad with their thumbs on either side, e.g. the subject's left thumb will press button "1" and the right thumb, button "4". Subjects are to respond as accurately and quickly as possible.

The order of the four conditions will pseudorandomly. In between conditions, subjects fixate on a flashing cross. Psychophysical data include button box responses. Data is analyzed in E-Data Aid using the analysis file: meanacc1.anl. The screen is set for 1024x768.

WM conditions: Each WM condition begins with the prompt "LEARN [*]", with 1, 3, or 5 asterisks and a 2s duration. This alerts the subject to memorize the digit(s) that follow, and to indicate how many targets there are. If there are 5 targets, the display shows:

LEARN

Likewise, if there are 3 targets, the 5 asterisks are replaced by "-***-" so that the same visual extent is used. If there is 1 target, "--*--" is displayed.

This prompt is followed by an "encode" epoch consisting of the sequential presentation of a set of targets (digits). The targets are presented in red. The inter-digit time interval between targets is 2.7 s. This consists of a random jitter ranging from 0.3 to 1.6s, and a 1.1s display of the target digit.

Following the encode epoch, there are a 2.7 s "delay" and a longer "probe" epoch. During the probe epoch, subjects are shown 14 WM probes in green. Half the subjects respond with a right trigger press if the digit is a target (a member of the memorized set) and a left trigger press, if the digit is a foil (not a member of the memorized set). The other half the subjects respond to targets and foils with the opposite hands. Within each WM condition, half of the probes are targets, half are foils, and each member of the target set is presented at least once. The timing of the probe digits is the same as in the encoding interval: 2.7 s, made up of random jitter around a 1.1 s display. The probe epoch lasts 37.8 s.

Arrows condition: The arrows condition also lasts 37.8s, and consists of the display of 14 sequentially presented arrows pointing right or left (half point right and half point left, selected at random). Subjects respond by pressing the corresponding button (left button press for arrows that point to the left and a right button press for arrows that point to the right). The timing of each arrow is the same as the targets and probes; the interval between targets is 2.7 s and consists of a random jitter ranging from 0.3 to 1.6s, and a 1.1s display of the target. Arrows are presented in green. This condition requires a visually-guided rather than a memory-guided motor response.

Fixation condition and timing: During fixation epochs, a single, flickering cross-hair (“+”) appears at which time the subject relaxes. The flickering interval is 2s: 1.85s on, and 0.15s off, (with exception to the first interval, which lasts 2.8s). A fixation epoch occurs at the beginning of each block of the WM and Arrows conditions (8 fixation epochs total).

There are two forms of the E-Prime script for this task:

1. SIRP_[version number].es (script initiates scanner)

The scan sequence begins by sending out a scan trigger on line 5, counts down 6s (2 TRs), and starts with a fixation block.

To modify the scan trigger line in E-Prime, double click on the “ScanTrig” icon found in the structure pane (if you do not see this pane already, go to “View” located in the program toolbar, and select “Structure”). In the ScanTrig window, delete the number “5” in: “SRbox.lamps ‘5’” and type in a new number.

2. SIRP_wait_[version number].es (scanner initiates script)

The scanner is started manually and launches E-Prime by sending a script trigger on line 5. The wait object in E-Prime delays the program until it receives a trigger from the scanner on line 5.

To modify the E-Prime trigger in E-Prime, double click on “Wait1” icon found in the structure pane (if you do not see this pane already, go to “View” located in the program toolbar, and select “Structure”). In the Wait1 window, modify the “Allowable” field under “Response Options.” Click “OK.”