

Stimuli are flashed on the left, right or both sides. Although fixation isn't required, the brevity of the display makes compensation difficult. Relative difficulty on simultaneous trials suggests "extinction" or "hemi-neglect."

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Purpose  
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SDSST is one of the "PERFIELD" tasks for evaluating "functional peripheral visual fields." It represents an intermediate point in the spectrum of informational density / attentional demand: from REACT (the simplest) to SEARCH (the most complex). Bender used the classic confrontation procedure to test for the "extinction" phenomenon. This computerized procedure tests for extinction in the visual modality. The idea is to test for responsivity in both visual fields, presenting stimuli singly and, on other trials, two simultaneously. Extinction is said to occur when the individual responds to all single stimuli, but on double simultaneous trials fails to report one of the stimuli, usually the one which was on the affected side. Extinction is important because it suggests an attentional component to the hemi-field impairment, as opposed to a purely sensory loss.

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Materials  
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Responses can be entered by keyboard (arrow keys) or mouse. The keyboard is more reliable. For evaluations it is suggested that the examiner make the entry; however, for repeated assessments or therapy, it is suggested that the patient learn how to enter responses.

After each trial, use the side and vertical arrows to bring the highlight (white box) to the response on the left and right side of the display. If the patient is verbal and the examiner is entering the responses, it is helpful to encourage the person to say what was seen on the left side before reporting what was on the right side, e.g., 'minus equals' or 'nothing equals.'

Check that the patient's response is shown on the display above the line, then press <ENTER>.

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Procedure  
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In SDSST, on each subject-initiated trial, either (-) or (=) symbols may appear on either the left, the right, neither, or both sides. The subject indicates which occurred. Feedback is available at the examiner's option, and is useful for a therapeutic application.

The first two trials are written off to practice, although the

patient may not notice when the trial counter resets after two trials. If the individual does not seem to have caught on to the task, attempt to delete one of the practice trials by hitting the SPACE bar when

prompted during the display of the score (you have to be quick) and pressing the MINUS sign.

Alternatively, if the person requires more practice and help, and finally catches on after several trials, press <ESC> to quit and start over. Take the time to enter under the final comment: 'Discount this as practice.'

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Settings  
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1...Instructions Default value: YES

Read and amplify the instructions for the patient. The first two trials are considered practice and not counted. Delete subsequent trials by pressing the minus key, until the person understands the task.

2...Feedback Default value: NO

For people who have and are unaware of significant lateral visual field losses the feedback can be emotionally overwhelming. Always start without feedback until you know what problems exist and can introduce feedback gradually.

3...Response Device Default value: KEYBOARD

Use the arrow keys to indicate what was seen. Alternative: mouse - point and click in the direction of the stimulus choices on left and right side of the lower video display. Examiner does this for assessment. Pt may learn later.

4...Symbol Duration Default value: 100

This value is in 1/100 ths of a second. Default is about .6 second. Norms are based on this value: don't change it.

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Results  
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NOTE: If printed output was selected when you first started the COGREHAB programs, then

- (1) the printout will contain whatever is displayed on the screen.)
- (2) you may pause the display by pressing the <SPACE> bar. Freezing the display is useful for discussing the results with the patient

Results screen 1: Stimulus - Response Matrix

The computer keeps track of responses for all types of trials which it summarizes in a stimulus-response table. The numbers in this chart represent the number of times a given stimulus combination was followed by a given response. Each column corresponds to one of the nine possible stimulus combinations. Locate a number in a given column and then trace across to the row label (far left) to find out what the response was.

Correct responses are reflected in the diagonal of this display; off-diagonal responses are errors.

By examining the stimulus-response table, one can differentiate response patterns indicative of hemianopia (omissions on one side of the display for both single and double presentations) and extinction (omissions and confusions on double presentations only).

Results screen 2: Error summary and analysis.  
Here performance is broken down by type of error. "Omissions" occur when a stimulus is not reported; while "confusions" occur when the patient recalls the wrong stimulus. Confusions may be associated with suboptimal acuity, or, if much more common on one side of the display, indicative of a relative (not absolute) visual hemi-field impairment.

Lateral differences are significant and are usually associated with a lateralized neurological impairment in the contralateral hemisphere.

A technical detail: To keep the total number of errors constant, partial credit is taken off for double stimuli, where one is confused and one is omitted: overall, only one trial is wrong.

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Clinical Findings  
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SDSST is very sensitive to lateralized differences in peripheral visual response. Compensation is almost impossible, given the short exposure time for the stimuli.

Generally, responding should be nearly perfect (no more than 5 errors out of 45 trials), as long as the individual understood the task and had sufficient practice.

If there is a relative visual field loss, it will be elicited by reduced contrast (either by using 1% light transmitting goggles, neutral density filters, or, informally, by reducing the contrast of the computer monitor). Such patients will respond normally with full contrast, but not with reduced.

Confusional errors usually are associated with reduced near point acuity. Sometimes this happens when an individual attempts to do SDSST while fixating on the center. Similarly an individual with a left homonymous hemianopia who fixates on the extreme left of the monitor (to attempt compensation) will often report the stimuli on the right incorrectly, but never misses them altogether.

SDSST : Single and Double Simultaneous Stim. (09/03/1997) p. 4

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Normative Findings  
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Recent findings by Hall (Touro) with young adults confirm Matheson's earlier findings with the Apple version, and our clinical experience with SDSST, namely, that neurologically intact individuals make no more than a handful of errors on the full 45 trial run of SDSST. Mean correct = (sd= ). It is usually clinically significant if the individual has fewer than 40 correct.

Measure	Mean	StDev	Cutoff
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SDSST   :   Total                43.79   1.32   41.15
N = 20: 27.4 yrs                Source: C. Hall

SDSST   :   Total                40.70   4.27   32.17
N = 20: 75 yrs                  Source: C. Hall

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Miscellaneous
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Our usual practice is to run SDSST one time with normal contrast. If other procedures (e.g., REACT, perimetric visual field testing) suggest that a relative field loss is present, then we may run through again with reduced contrast displays. If a lateralized pattern of impairment is seen with reduced contrast, but not with normal contrast, suspect a relative (not absolute) visual field impairment.

This program does not run under Windows. You must exit Windows completely, or, in Windows 95, set the properties of the shortcut to force the program to run in DOS mode with a maximized window.

The reason for this requirement is that this program involves precision timing which WINDOWS (an inherently timesharing/multitasking program environment) does not do well. We have opted to maintain the program's timing over the convenience of running in Windows. However, we regret this inconvenience and continue to seek a better solution.

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References
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 Disorders of visual perception. In M. J. Meier, L. Diller, & A. L. Benton (Eds.), Neuropsychological Rehabilitation. London: Churchill Livingstone. (Published by Guilford Press in US)

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Variables Saved in *.CUM Disk File
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Note: The information below is for use in reading the saved data into a spreadsheet, such as Quattro Pro. With this information one can identify what each measure represents. These procedures are somewhat technical, but useful for comparing performance across sessions.

Seq	Variable	Description	I/D	Chrs		Example
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1	TASK	PROCEDURE NAME	I	8	D	SDSST
2	NAME	LAST NAME	I	10	D	DOE
3	1ST	FIRST INITIAL	I	1	D	J
4	WHEN	DATE/RUN NO.	I	8	C	05079501
5	THGP	THERAPIST/GROUP	I	8	D	RG\TBI