

v s PEPPER r t

Visual Skills For Reading Test

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LUVReading Series _____

The Pepper Visual Skills for Reading Test, Third Edition, 2010
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Preface to the Third Edition

In this third edition of the Pepper Visual Skills for Reading Test, the font and sizing have changed slightly. The original Pepper Test was developed using print technology that is no longer available, and the original printing plates were inadvertently destroyed. Further, the original Pepper Test cards were printed and published prior to the concept of "critical print size" for reading, and the advent of acuity and reading charts with logarithmic size progression of symbols for more accurate testing. The authors and publishers have created a new set of print cards that are as close to the original Pepper Test as can be managed using computer-generated fonts and chart sizes that correspond to logarithmic steps in visual acuity charts. This third edition of the Pepper Test is an updated but faithful rendition of the original.

In addition, we have responded to requests from the field to print the test cards on a more durable material, and we have double-sided the cards to make the test easier to use and more light-weight for peripatetic professionals.

If you have any questions about this improved version, please contact the publishers.

Purpose and Rationale of the Pepper VSRT

The purpose of the Pepper Visual Skills for Reading Test (VSRT) is to provide the low vision therapist with an accurate and reliable estimate of a reader's ability in the visual components of the reading process. The instrument can also indicate areas of potential problems that may be addressed in an instruction program. The Pepper VSRT has been developed to assess the reading performance of adult readers who were reading efficiently before the onset of macular disease that creates central scotomas which inhibit efficient reading.

The low vision individual who has developed macular disease and who wishes to use vision for reading presents the low vision therapist with some unique challenges. This individual has two functional problems. First, visual acuity is reduced when scotomas obscure central vision. As a consequence, small print is no longer recognizable. The second problem stems from the fact that macular disease results in damage to the central portion of the visual field which was formerly used for reading and other near visual tasks. Therefore, when the individual looks directly at the target, it will look unclear or disappear. Even if the reading material is made large enough to overcome the difficulty caused by reduced acuity (through the use of large print or magnification), there still remains the difficulty caused by the central scotoma. Many individuals with macular disease learn to view eccentrically by developing and using a new preferred retinal locus that functions as a pseudofovea. That is, they learn to shift the eye or turn the head in order to use some undamaged portion of the visual field. Unless the individual learns to position each successive area of text eccentrically with ease and consistency, efficient reading is not possible. Some individuals learn efficient eccentric viewing from practice on their own, while some learn to view with another position but are not able to use that position consistently. Still others are unaware of the possibility of moving the central scotoma and viewing with another portion of the visual field.

The task of learning to read after the onset of macular disease is considerably different from the task presented to the beginning reader who is normally sighted. Whereas the beginning reader must be taught how the written language represents the spoken language and strategies necessary for understanding print, individuals with macular loss have already learned these components of reading. Instead, individuals with macular loss must re-learn those aspects of reading that depend upon visual processing abilities such as eye movement control and word recognition. The reader must also

learn to develop new cognitive strategies for reading comprehension, but that is beyond the scope of this test.

Prior to the Pepper VSRT, there were no reading assessment instruments for individuals with low vision that were designed to isolate and quantify the visual skills needed to recognize printed symbols. Single letter or number acuity charts do not measure an individual's ability to look at and identify the consecutive words on a line with a consistent viewing position nor do they enable an assessment of whether an individual can make an accurate return sweep eye movement to read the next line of text. Tests that present individuals with continuous text are not appropriate for visual skills assessment since the contextual clues that can be derived from such material enable readers to guess words based on the sentence structure. Obviously, guessing will mask any visual recognition problem an individual is having.

The Pepper VSRT was conceptualized to measure the visual skills necessary for text navigation since these components cannot be assessed by any of the near acuity assessment instruments or sentence charts presently available. The VSRT measures **visual word recognition ability** by presenting individuals with a series of unrelated letters and words to read aloud. Since successive, unrelated items on the VSRT offer no syntactic or semantic clues, readers are forced to rely exclusively on whatever visual information they can gather from the printed page. The task of word recognition is made increasingly difficult by presenting readers with words that systematically increase in length. For example, single letter items are presented on line 1, 3-4 letter words are presented on line 5, and 7-10 letter words are presented on line 7.

Another visual component of reading that is assessed by the VSRT is the use of **saccadic and return sweep eye movement control**. Reading requires two different kinds of eye movements and the VSRT is designed to make each of these increasingly more difficult as the reader progresses through the test. Saccadic eye movements that enable reading the successive words on a line are made increasingly more difficult by decreasing the spacing between symbols and words as the test progresses. Return sweep eye movements that take the eye from the end of one line to the beginning of the next line are made increasingly difficult by decreases in the spacing between successive lines of print. Readers who "scroll" a page of print from right to left when reading, rather than exhibiting fixations and saccades while reading a motionless card, may be inducing eye movements that are similar to optokinetic nystagmus. The examiner may want to note use of the scrolling technique on the score sheet when administering the test. This strategy is adaptive and can be an advantage in efficient reading with central scotoma.

Finally, the VSRT can provide the practitioner with information regarding **how well the reader can position the central scotoma** so that it does not obscure the field of view necessary for reading. A relatively large number of compound word items were included in the VSRT to provide readers with an opportunity to make errors that may be indicative of poor scotoma placement while reading. Words such as “cowboy” or “blueberry” might be misread as “cow” and “blue” suggesting that the individual was positioning the scotoma so that it obscured the rightward visual field. On the other hand, misreading the same items as “boy” and “berry” might suggest that the individual was positioning the scotoma so that it obscured the leftward visual field.

In summary, the VSRT has been designed to assess **visual word recognition, saccadic eye movement control, return sweep eye movement control, and effective positioning of the scotoma in relation to the words to be read**. These are visual components of reading that may be particularly problematic for individuals with macular loss. In addition, the errors that an individual might make on the VSRT will provide the instructor with important information for eccentric viewing and reading instruction.

Characteristics of the Pepper VSRT

1. The VSRT measures the visual skills used in reading by low vision individuals who formerly were able to read to their satisfaction. These individuals have sustained damage to the macula which has made reading difficult to perform as they were formerly able.
2. The VSRT is to be used in conjunction with other assessments, e.g., the reader's eye report, low vision examination report, the individual rehabilitation plan, the medical report, reading comprehension testing, psycho-social reports, etc., in order to obtain a more complete picture of the rehabilitation needs of the reader.
3. The VSRT was designed so that items are arranged in order of difficulty. The single letter, black border beginning is considered to be the most easily localized and recognized of all print. However, due to the nature of the task, their visual impairment, and former reading ability, some readers may practice specific ways of moving their gaze, and may perform better on the word items, recognizing them more easily due to practice on earlier items and the shape of the word.
4. The VSRT is intended to be an individually administered test. This enables the examiner to establish a more personal relationship with the reader and elicit an optimal performance, especially with the individual who is not accustomed to using her vision after experiencing macular loss. Further, the examiner can put the nervous reader at ease. Some readers may be uneasy about reading, feeling that their performance is not "up to par", and would highly object to reading in front of others.
5. The VSRT uses a vocabulary of approximately sixth to eighth grade level, as that is the reading level of most popular reading materials for adults, such as many newspapers and magazines. It was designed to cover the wide range of word lengths that the reader might be required to read, from 1 to 10 letters in length.
6. The VSRT can be quickly administered and scored. Thus, the test can be given as a part of a more extensive testing battery.
7. The VSRT is a timed test. Although the reader is not unduly hurried, allowing too long a time to complete the test could exhaust or discourage the reader. If the reader's visual skills do not allow recognizing the VSRT in 10 minutes or less, the reader, even though reading correctly, will require help in reading more rapidly.

8. Completely objective error marking, which is accomplished while the test is being administered, allows the test to be easily scored in a few minutes following the test administration. Precise standards are provided on the test to reduce scoring variability. It is recommended that the examiner audio record the first few examination sessions in order to compare her scoring ability in listening to the reader responses a second time via the audio recording. This allows the examiner to become proficient in scoring even the most rapid reader.
9. The VSRT is administered to measure print recognition and navigation skills only. Because comprehension is not addressed with this test, no information about comprehension can be derived from its score. The low vision therapist is directed to the Morgan Low Vision Reading Comprehension Assessment for a standardized measurement of comprehension ability for this population.

Potential Uses of the Pepper VSRT_____

The VSRT was designed to be used by a wide variety of professionals for several different purposes.

1. The VSRT will aid in individualizing instruction. The test will establish a baseline performance for readers who have sustained macular loss and wish to read again. It will predict the kinds of reading recognition and text navigation errors the reader will make with print reading material. The low vision therapist can tailor a training program to increase the reader's awareness of problematic areas and to remediate these problems. If the recognition problems cannot be adequately met in the instructor's present program, a more accurate referral can be made.
2. The VSRT can provide an objective measure of progress for training programs in which the goal is more accurate reading. Once the reader has honed visual skills so that reading recognition is adequately achieved as measured by the VSRT, then comprehension and speed building can take over as the focus of instruction. At that point, a standardized reading comprehension test can be administered if desirable.
3. The VSRT can be used as a measure of the effectiveness of instruction programs. The reader's achievement on post-test administration should reflect improvement if an appropriate intervention strategy has been applied. In this way, failures to progress can be documented without continuing to struggle with ineffective procedures.
IMPORTANT NOTE: A reader's failure to progress or worsening performance on

the VSRT could possibly indicate active pathology or more vision loss, and in such case, the examiner should refer the reader to her eye care specialist as soon as possible.

4. The VSRT can be used as a measurement tool in research. Here the instrument should fill a serious need in testing the effectiveness of various methods, conventional and experimental, which are designed to help readers with macular loss to read more effectively.

Qualifications of the Examiner

While no formal training is required to administer the VSRT, it is important that certain prerequisites be met. The detailed administration and scoring instructions outlined below should be studied thoroughly by persons preparing to administer the test for the first time. (Experienced examiners should also review these from time to time to insure the continued use of appropriate techniques.) For the scoring to be appropriate, it is crucial that all of these instructions be followed precisely, including use of the recommended spoken text for administering the test. It is also imperative that the examiner be completely familiar with the test materials and the appropriate procedures for handling them. The examiner must practice giving the instrument prior to its use as a measurement tool. If the examiner is able to establish rapport with the reader to elicit an optimal performance, and if directions are followed precisely, meaningful results should be obtained with VSRT.

Because no formal training is needed to administer the VSRT, a broad range of professionals in low vision services should be able to administer the test accurately. Technicians or inexperienced professionals should be effective in administering the VSRT and obtaining accurate numerical scores if administering according to the directions. However, if clinical insights into the rehabilitation or educational needs of the reader are required, then experienced low vision therapists should be better able to discern significant response patterns which will indicate the type of instructional program the reader may require.

Test Materials

The following materials are needed to administer the Pepper Visual Skills for Reading Test:

1. The Pepper Visual Skills for Reading Test

Three forms of the Pepper Test are provided to enable repeat testing without the reader's memorization of the test cards. The three forms of the test are equivalent in size, spacing, as well as symbol and word construction, but use different letters and words. Five test sizes are provided for each form. Each five card set correspond to the following logarithmic sizes:

- 1.0M (corresponding to the size of newspaper print),
- 1.6M (typewriter print),
- 2.0M (large print),
- 3.2M (newspaper sub-headlines), and
- 4.0M (newspaper headlines).

2. Score Sheets

The score sheets found at the end of this manual can be reproduced as needed. The score sheets contain a record of the reader's performance for each test. The score sheets also contain a legend that indicates how each error is to be recorded, and how the test should be scored. The circumstances under which the test should be terminated are also noted on the score sheet.

3. The Instruction Manual

The Instruction Manual is designed to give clear and concise information regarding the administration, scoring and interpretation of the Pepper VSRT.

4. A stopwatch is required to time the administration of the test. A stopwatch is not supplied with the Pepper Test.

Suggested Additional Items

There are several other items that make the test more easily administered and will make the reader more comfortable. Some readers will appreciate a chair with a high sturdy back upon which to lean the head for steadiness. Likewise, arms on the chair upon which the reader may wish to prop her elbows will also be appreciated for comfort and steadiness in holding the card.

Some readers will require the use of a reading stand if an optical device requiring a close focal distance is used. The reading stand will also eliminate shadows on the card caused by the reader's head as she leans over the card placed on a desktop.

The use of special illumination controls will also be required for some readers. Those readers who are photophobic may require filters, sun lenses, visors, etc. The use of flex-arm or goose neck lamps, illuminated optical devices, or bright sunlight directed over the reader's shoulder may meet the lighting needs.

In any case, if any of the illumination controls or non-optical devices are required for the most optimal reading conditions, these conditions should be duplicated on successive administrations of the test if performance is being compared.

The authors suggest the use of an audio recorder to capture the administrations until the examiner is comfortable with the scoring mechanisms. Errors and timing of the test may be taken from the audio recording until the examiner is experienced.

Time Requirements

The VSRT is designed to be administered in approximately 10 minutes. The reader should not be unduly hurried; however, if there is no response on a particular item after 10 seconds, the reader is instructed to do the best she can and go to the next item. If the reader has not finished the test in 10 minutes, the test is terminated, and the remaining items are scored as errors. Therefore, only approximately 15 minutes or less are usually required to administer and score the test.

Preparation of the Test Setting

Prior to the administration of the VSRT, the examiner should obtain as much information as possible about the reader. If the reader is using special optical devices, the examiner should ascertain the reader's skill in using the devices. If the reader is unskilled and/or uncomfortable with a device, the test can be administered without it. If a non-optical device is being used or introduced in the examination, the reader should be instructed thoroughly in its use. The reader's preferred level of illumination should be determined and illumination control provided. The reader should be made as comfortable as possible, and the test setting should be a quiet, undisturbed place where there is no noise or traffic. The examiner should be seated where she can see the reader's eyes if possible, can monitor the lighting to assure that there are no shadows or glare on the test card, can hear the reader's responses and can score the test as the reader reads.

General Rules for Test Administration

1. Good rapport is crucial. There is no special formula for establishing rapport; it depends considerably on the personality of the examiner, his or her test administration sophistication, and thorough familiarity with the test material and procedures. Best results will be obtained when both the reader and the examiner are in a relaxed frame of mind. Yet, the examiner should be business-like, while being pleasant, encouraging and reassuring.
2. The examiner should select the appropriate test size based on the reader's acuity and critical print size. The appropriate VSRT size is at least one size larger print than the reader's acuity. The authors recommend using two sizes larger than acuity for best performance. Therefore, if the reader's acuity is 2.0M, the 3.2M test is appropriate, but the 4.0M may give better reading ability. If the reader is using an optical device to read the test, then the appropriate test size is one or two sizes larger than the aided reading acuity. That is, if the reader is using a 5X microscope with an aided reading acuity of 0.8M, the 1.0M or 1.6M test should be administered.
3. To stimulate the reader to do her best, and to reduce the stress of the testing situation, encouragement can be given consistently at the end of each line read, or when the reader asks for feedback. Such comments as, "*Good; keep going*", "*You are doing well*" or, "*That's fine*" are effective. However, praise can be overdone. Most

adults know when they are beyond their skills. The sensitive examiner will strive to learn the appropriate amount of encouragement to elicit maximum performance from a particular reader.

4. Before the test is begun, the examiner should tell the reader that the test cannot be discussed until it is completed, that it is important that the reader keep reading until the test is finished. These procedures are important both to motivate the reader, and to allow spontaneous changes in answers, which are accepted. The examiner should be as responsive and positive with incorrect as with correct responses. Also, the examiner should be careful not to let the reader know when she is right or wrong either by a glance, expression, tone of voice or the sound of the mistake being marked on the score sheet.
5. The reader should be handed the appropriate test, provided the best illumination and instructed to call the letters and words aloud. If the reader is using a low vision device, assure that she knows the correct focal distance before administering the VSRT. She should be instructed to hold the card as close or far away as needed to see the symbols clearly. If necessary, the examiner should point out the beginning of the first line as a localization clue.
6. The examiner should say to the reader:

I am going to show a card to you with unrelated letters and words on it. The letters and words are not sentences; they have no meaning when read together. The first line has a black border around it as a visual guide, the rest of the lines do not. I would like you to say the letters and words aloud as you see them. Please read the entire test. The first two lines will be letters, on the third line there will be words. When you see a word, please say the word, do not spell it. While you are reading the test, I cannot answer questions about how you are doing, but as soon as you finish we will talk about how you did. Do you have any questions before we begin?

7. The examiner should -time the test for speed using a stopwatch. Timing begins as soon as the reader has the card in focus and is fixating on the beginning letter. It is crucial for the examiner to watch the reader closely in order to determine the appropriate start of the stopwatch. This may occur before the reader says the first letter out loud.
8. If a reader asks about the correctness of an answer or how she is doing on the test, the examiner should give an ambiguous, non-committal response such as, **“You are doing a fine job; keep going.”**
9. If the reader spells the first word instead of saying the word, the instructor should indicate that the item is a word and ask the reader to pronounce the word instead of spelling it. If the reader is able to pronounce that word, no error is scored. After this however, if the reader spells the word instead of saying it, the examiner should score a “spells word” error.
10. Readers should be encouraged to guess test items if they are not immediately recognizable. If there is no response to an item after 10 seconds, the examiner should say, **“Even if you are not sure, just tell me what it looks like.”** If the reader is still struggling, make such a remark as **“That is difficult, go to the next item.”** If the reader did not read the item, it is considered an error of omission and it is scored as such.
11. The last answer given is the one that is scored. Thus, if the reader spontaneously corrects an incorrect answer, even after leaving the item, credit is given. NOTE: The examiner may want to place a parenthesis around the corrected word or symbol for the sake of tracking these corrections. A correction is not scored as an error. If the reader changes to a wrong answer, the item is scored as incorrect.
12. The VSRT should be administered in one sitting. It is not useful to administer the test in more than one sitting. If the reader is tired, or for any other reason unable to finish the test, the examiner should decide whether to re-administer the test at another time (because of extenuating circumstance), or score the remainder of the test as errors and count the administration as the pre-test, and indicative of the reader’s best performance at the time.
13. As soon as the reader pronounces the last word on the test, or the test is terminated, the timing of the test is completed.

Directions for Scoring the Pepper VSRT

A list of errors and their notations are found in the key at the bottom of the VSRT score sheets. These items include:

- **MISIDENTIFICATION**

e.g., 


If the reader does not give the response indicated by the printed item, it should be recorded as an error of misidentification by writing in the word or letter the reader said above it. A misidentification may be partial or whole.

- **SPELLS WORDS**

e.g., 

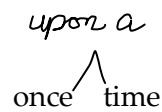
If the reader spells a word after the first prompt to pronounce a word instead of saying the letters, an error is recording by writing “sp” above the word spelled.

- **OMISSION**

e.g., 

If the reader unknowingly misses or skips over a test item, it should be recorded as an error of omission by circling the missed test item.

- **INSERTION**

e.g., 

If the reader adds a word or part of a word, it should be recorded as an error of insertion by placing a caret at the point of insertion and writing the word above it.

- **REPETITION**

e.g., saw


If a reader repeats a response to an item, it should be recorded as a repetition error by underlining it with a wavy line.

- **JUMPING OR CHANGING WORD OR LETTER ORDER**

e.g., to of a


If the reader jumps or changes the order of the test items this should be recorded as an error by indicating the direction of the jump by a curved line with an arrow. More than one jump can be indicated by the appropriate number of lines. If the reader jumps, and also omits letters in the process, then not only jumping errors, but also omission errors are marked.

- **CONNECTS WORDS**

e.g., eye_sight


If the reader reads two separate words as one word, this should be recorded as an error by connecting the last letter to the first word to the first letter of the second word with a straight line.

- **SEPARATES WORDS**

e.g., cowboy


If the reader breaks up compound words and reads them as separate words, this should be recorded as an error by placing a diagonal line at the breakage.

- **LINE SKIP**

e.g., —→quiet

If the reader skips a line or reads the same line twice, this should be recorded as an error by placing an arrow to the skipped or re-read line.

- **TERMINAL OMISSIONS**

e.g., ~~—suit—face—y—empty—~~

If the test is terminated prematurely, the remaining words should be recorded as errors by placing a continuous line through the remaining letters and words.

General Rules for Test Scoring

1. If the reader makes more than one error on a single test item, record only the last error.
2. The test is terminated under several circumstances:
 - a) The reader is fatigued and unable to continue. In this case, the test administration is postponed, or, the remainder of the test is scored as terminal omission errors. This is up to the discretion of the examiner. If she feels this is the reader's best performance, then it can be established as such by accepting the present level of performance of the VSRT.
 - b) The reader makes 10 errors in a row. If the reader makes more than 10 errors in a row, and appears to be performing as well as she can, then the test should be terminated and the remainder of the test scored as terminal omission errors. It is possible that the reader is unable to use the preferred retinal locus with consistency, the print size of the test may be too small, if the reader is using an optical device it may be out of focus, or the illumination may need controlling. Under these circumstances, an instructional program to overcome these problems may be warranted before re-administering the test.
 - c) The reader is unable to stay on the appropriate line of the test in order to read it. The examiner may prompt the reader in locating the first, second and third lines of

the test by pointing to their beginning if necessary. If the reader loses the line and is unable to continue reading the words/letters, the examiner may prompt her one time. If the line is lost again, the test is terminated and the remainder of the test is scored as terminal omission errors.

d) If the reader requires more than ten minutes to complete the test, the test should be terminated after a total of 10 minutes, and any remaining items scored as terminal omission errors.

Line Scoring

Line 3, 8, and 13 of the VSRT are “dummy lines” used to establish the appropriate spacing requirements for lines 4, 9, and 12. Responses on these lines are not included in mean percent correct.

The total number of items read correctly on each line of the test is added at the end of the line and a percentage read correctly for each line is obtained. In this way, the lines which contained more words and therefore less items can be given equal weight with the lines with more letters and therefore, more items.

A total test score may be obtained as a percentage of the total of 83 items on the test. For example, if the reader got 40 of the 83 items correct, the total test score would be 48%.

The total number of specific errors should be tallied and ranked. For example, the most frequent error for a particular reader may be omissions; the next most frequent error may be jumping and changing word order, and so on. The line by line mastery should be scrutinized for performance related to word and line spacing. Was the reader able to master lines with symbols of more than 1, 2, 3-5, 8-10, letters in length? Was the reader able to master lines where the spacing between lines was single or double? These factors should be noted on the score sheet in the appropriate places.

Interpretation and Implications of Test Results

The VSRT provides two measures of a reader's reading performance: an accuracy measure and a rate measure. Accuracy is scored in terms of mean percentage correct. The percentage correct for each completed line of the VSRT (except "dummy" lines) is calculated and then the average of these percentages is obtained as the mean percent correct.

Rate (in correct words per minute) is calculated by adding up the number of words correctly identified (including "dummy" lines) and dividing this sum by the total time in minutes. Total time on the stop watch (e.g., 4 minutes 30 seconds) must be converted to total time in minutes (e.g., 4.5 minutes).

Note that the Pepper VSRT reading rate measures oral reading and should not be regarded as equivalent to a silent reading rate.

At the end of the scoring, the examiner should have a profile of the reader's performance that contains the following:

1. Accuracy of performance (mean percent correct)
2. Reading rate (number of correct words/minute)
3. Line mastery for:
 - symbol length
 - symbol spacing
 - line spacing
4. Prevalent errors

An evaluation of both the accuracy and rate scores for each reader can provide the instructor with information to make a preliminary categorization of the reader's reading performance. Typically, low vision readers will be reading either inaccurately and slowly, accurately but slowly, or will be reading with both speed and accuracy. Initial studies on the VSRT can only suggest guidelines that may aid the low vision therapist in making these categorizations. Observations of the VSRT performance of individuals with macular disease suggest that accuracy scores below 75-80% correct may be indicative of inaccurate performance (mean accuracy performance among the pilot sample was 79.1%) and rate scores below 20 words/minute may be considered slow performance (mean rate among the pilot sample was 23.9 words/minute).

The standard error of estimate for accuracy on the Pepper VSRT was determined in its reliability study to be 8.7 percent. The standard error of estimate for rate was determined to be 4.4 words per minute. Any change in performance outside this standard error of estimate may be regarded to be a true change in performance.

It is only possible for the authors to suggest implications of certain error patterns based on their clinical experiences and research in reading with low vision. Given the reader's former success with reading (prior to the onset of vision loss), and all other aspects (lighting, correct focus and use of any optical devices, etc.) being equal, the difficulties encountered with the VSRT will probably be related to the reader's inability to maintain eccentric viewing and use appropriate visual skills. Certain errors may be remedied in an instructional program. Some of these possible interpretations are as follows:

ACCURACY SCORE

Reveals————Numerical rating on overall test performance.
Implications————The accuracy score may have predictive value for determining the reader's ability to read. If the accuracy score is relatively high, the reader may be capable of recognizing continuous text with few problems. Training may be needed to improve performance and speed.

TEST RATE

Reveals————How rapidly the reader is able to recognize symbols correctly.
Implications————Research in the field of reading with low vision has established that reading rate is unrelated to reading comprehension. Therefore even readers with very slow reading rates may understand what they have read well, while those who are recognizing words rapidly may not be deriving meaning from the print. Comprehension should be evaluated separately from reading rate, for this reason. Readers in the validity study of the VSRT read continuous text aloud 1.6 times faster than their Pepper rates.

LINE MASTERY

- **SYMBOL LENGTH**

Reveals—————The length of the word the reader will be able to correctly recognize in print of this size.

Implications—————If the reader is unable to recognize words of lengths up to 8-10 letters, then he/she might be unable to comprehend reading material in this size effectively. Words of this length are commonly interspersed in adult reading materials such as newspapers and magazines.

- **SYMBOL SPACING**

Reveals—————“Crowding phenomenon”

Implications—————Whether the reader is able to successfully master lines and symbols with single or double spaces will possibly indicate whether the reader will experience this crowding phenomenon when reading regular print in this size.

PREVALENT ERRORS

Common problems with print recognition that may be caused by difficulty maintaining eccentric viewing and other visual skills are listed below as follows:

- **MISIDENTIFICATION**

Implications—————Misidentifications can be indicative of the direction of eccentric viewing, or the inability to eccentrically view. If the misidentification is a letter or word similar to the correct word or letter, notice how the two are alike or different. For example, if the word “traffic” is misread as “truck”, the reader may be seeing the “tr” beginning of the word and not the ending, perhaps suggesting that the scotoma is positioned to the right and obscuring the remainder of the word. The examiner should look

for consistency in the phenomenon. If there is no pattern to the misidentification, the reader may be scanning randomly, with no apparent eccentric viewing established for reading. A misidentification may also indicate that the print was out of focus.

- **SPELLS WORDS**

Implications———If the reader has not recognized that the spacing between letters and words is different, an error of this type occurs.

- **OMISSIONS**

Implications———If the reader omits small words and letters this may indicate that correct and consistent fixation and scanning has not been established. This, along with the pattern of misidentifications, can have implications for an instruction program.

- **INSERTIONS**

Implications———Adding words to the line may be indicative of the reader's attempt to make sense of random symbols, or scanning rapidly and inconsistently; she "sees" letters twice, or letters that are not there.

- **REPETITIONS**

Implications———These errors may indicate that the reader "sees" the same symbol twice, due to unsteady scanning back and forth.

- **JUMPING OR CHANGING WORD ORDER**

Implications———Same as repetitions. This indicates wider scanning errors. The reader may not see words/letters until he has scanned past them. As they 'catch" her eye, the reader may scan backward to correct herself.

- **CONNECT WORDS/CONNECT LETTERS**

Implications———In this case, the reader is seeing the words correctly, but ignores spacing, especially if a compound word out of two words “makes sense”.

- **SEPARATES WORDS**

Implications———This error also indicates the reader’s inability to gauge the correct spacing between letters and words.

- **TERMINATION OMISSIONS**

Implications———The examiner terminated the test due to the reader’s exhibiting fatigue, making 10 errors in a row, skipping or re-reading a line of print more than once, or exceeding the 10 minute limit of the test. The examiner must make a decision about whether this was the best ability the reader could muster at that time and accepting this as reader’s best effort, or whether extenuating circumstances requires rejecting this administration and providing the reader another test administration.

Summary of the Reliability Evaluation of the Pepper VSRT

Subjects

A total of forty-eight subjects were recruited for this study, and all were confirmed to have central vision loss. This group had a mean age of 72.8 years.

Methods

The subjects were tested individually in a single session that lasted approximately one hour. Subjects were presented with one of the three forms of the Pepper Visual Skills for Reading Test. Each read it aloud as the experimenter recorded the subject on tape, noting any reading errors and timing how long it took to read the test. Subjects first read one of the three forms from the VSRT, then were given a twenty minute rest period and finally were asked to read a second form of the VSRT.

The appropriate print size for each VSRT reading was determined by either acuity assessments from previous examinations, or by reading a form of the VSRT other than the form to be used for testing. Each subject read the VSRT in a print size one size larger than their best acuity, either aided or unaided.

The lighting conditions, the viewing distance and the use of optical devices were kept constant throughout the two administrations of the test. Each of the three forms was represented equally.

Results

For each of the 48 subjects, accuracy measures (mean percent correct) and rate measures (correct words-per minute) were used in a correlational analysis. The percentage of items correct for each line was averaged across the successive lines of the VSRT in order to derive a mean percentage correct. Rate measures were derived on the basis of the number of items correctly recognized within the time taken to complete the test.

Separate correlation analyses were conducted on the accuracy measures for each administration of the VSRT, and the rate measures for each administration. The Pearson-product moment correlation observed for the accuracy measures was found to be highly significant, $r(46) = 0.90$, $p < .01$. The test-retest correlation among accuracy scores for

those who had performed below the median ($n=26$) was somewhat lower than the correlation observed on the total sample, but was still highly significant, $r(24) = 0.82$, $p < .01$. The VSRT, can, therefore, be considered a reliable measuring instrument across all levels of performance accuracy. The rate scores achieved by each subject from both readings were examined. The Pearson-product moment correlation among these data was also found to be highly significant, $r(46) = 0.97$, $p < .01$.

The standard error of estimate for accuracy was 8.7 percent; for reading rate it was 4.4 words per minute. Both of these standard error estimates are useful guidelines for determining the significance of any change of reading performance.

The VSRT produces both an accuracy measure and a rate measure of each subject's performance because both measurements are crucial to an adequate assessment of reading performance. The distribution of each subject's rate score as a function of his/her accuracy score on the first administration of the VSRT identifies three different categories of readers: 1) readers who are inaccurate and slow; 2.) readers who are accurate but slow; and 3.) readers who are both relatively accurate and quick.

Because the VSRT was designed to be progressively more difficult in terms of the requisite visual processing abilities, an analysis was undertaken to verify whether the manipulations introduced into the test did, in fact, cause increased difficulty for readers with macular loss. If successive lines of the VSRT are increasingly difficult, one would expect that the rate at which subjects read successive lines should steadily decrease.

Rate measures in words/minute were computed for each subject for each line of the VSRT. These data were then averaged across subjects to derive the average rate (in words/minute) for each line. The data supports the hypothesis that manipulations of line spacing, item spacing, and word length affect the reading ability of readers with macular loss. Since the most obvious decrease in reading rate was found between lines 1-7, it may be the case that word length is a more significant rate limiting variable than line spacing.

Summary of the Validity Evaluation of the Pepper VSRT——

Subjects

This study tested thirty-eight subjects with confirmed central field loss, and with a mean age of 69.3 years.

Methods

Each subject read a single form of the Pepper Visual Skills for Reading Test and a single sixth-grade paragraph from the Gray Oral Reading Test. The print size for each subject was determined according to their acuity, and the appropriate size was used for each test. Subjects chose preferred viewing distance and lighting conditions, and both were kept constant for each reading.

Subjects were scored for both accuracy and rate on each of the tests. They were also asked to answer four comprehension questions regarding the Gray Oral paragraph. One half of the subjects read the Pepper VSRT first, and the other half read the Gray Oral Reading Test first. All three forms of the Pepper VSRT and the four forms of the Gray Oral were represented equally.

Results

Reading rate measures were based on the number of items correctly recognized within the time taken to complete the test. Mean reading rate for the Pepper VSRT was 38.2 words/minute, and mean reading rate for the Gray Oral was 60.3 words/minute. Reading rates with meaningful text were 1.6 times faster than reading rates with unrelated text.

The Pearson-product moment correlation for the reading rates of both tests was significant, $r(36) = 0.82$, $p \leq .05$. Reading rate on the Pepper VSRT accounted for 67 percent of the variability in reading aloud meaningful text.

To assess the contribution of contextual information, reading rates for the unrelated letters and words from the Pepper VSRT were plotted as a function of the increase in reading rates obtained with meaningful paragraphs from the Gray Oral Reading Test. Inspection of the data indicates the wide amount of individual differences in the use of

context and the increase in rate an individual might demonstrate with contextual material is not predictable from the speed at which they identify unrelated letters and words. The correlation between rate increase and Pepper VSRT rate was small, $r(36) = 0.32$.

The Pepper VSRT has been standardized and shown to be both reliable and valid when used as an evaluation tool in reading for individuals with maculopathies who formerly read at least at a sixth grade level.

References

Baldasare, J., Watson, G., Whittaker, S. Miller-Shaffer, H. (1986). The Development and Evaluation of a Reading Test for Low Vision Individuals with Macular Loss. *Journal of Visual Impairment & Blindness*, (80), 785-789.

Watson, G., Baldasare, J., Whittaker, S. (1990). Validity and Clinical Uses of the Pepper Visual Skills for Reading Test. *Journal of Visual Impairment and Blindness*, (84) 119-123.

Pepper VSRT Form 1 Score Sheet

Line		# correct # item	percent correct
1	d l a p m s e r z o n f w t b	_____ /15	_____ %
2	g c h i x j q u k v y m h r e	_____ /15	_____ %
3	did be of ate l to ten in s t my x	_____ /12	dummy
4	by if e he go up o p we m as f it	_____ /13	_____ %
5	good camp fire our fear less gust hot	_____ /8	_____ %
6	always cowboy funny shells weaver night	_____ /6	_____ %
7	blueberry flowers eyesight instrument	_____ /4	_____ %
8	red great slender fix truth awful k no	_____ /8	dummy
9	seesaw stale louder score radish overly	_____ /6	_____ %
10	postcard automation rainbow devilish	_____ /4	_____ %
11	hand some midshipman hamper minnow tuner	_____ /6	_____ %
12	frighten rabbit mustard crab grass difference	_____ /6	_____ %
13	completion d cast butter start scar homeland	_____ /7	dummy

Total Number Correct (add lines 1–13) = _____

Mean Percent Correct (sum of percentages / 10) = _____ %

Total Test Time = _____ min _____ sec (Time in Minutes) = _____

Corrected Reading Rate = _____ Total # Correct / Total Time (in min) = _____

Test termination

- 10 consecutive errors
- skipped line twice
- fatigue of reader
- exceeded time limit

Notations

Misidentification—substitution written above item—e.g. *true*
truck

Spells words—"sp" placed above word item spelled—e.g. *sp*
cat

Omission—circle item omitted—e.g. *(the)*

Insertion—caret placed where insertion occurs—e.g. once *upon a* time

Repetition—wavy line placed below item repeated—e.g. *saw*

Changing order—arrow to where item was read—e.g. to *of* a

Connects words—line underneath indicating connection—e.g. eye sight

Separates words—slash indicating separation—e.g. cow/boy

Line skip—arrow to skipped line—e.g. —> quiet

Terminal omissions—continuous line across remaining items—e.g. as ~~face~~ y

Pepper VSRT Form 2 Score Sheet

Line		# correct # item	percent correct
1	o g c a f h r e p b v t l d x	_____ /15	_____ %
2	j m i s w j x q f i g m c u s	_____ /15	_____ %
3	h i s y h e w e a v a m o r i n p t	_____ /12	dummy
4	i n m e l n n m e t i f a s i t t r d o	_____ /13	_____ %
5	a r t s a m e r e a d f o r g e t l e s s h o w e v e r	_____ /8	_____ %
6	b l a c k c u r l s c h a n g e c a n n o t m i l e s p e r s o n	_____ /6	_____ %
7	t h e a t e r r e m e m b e r n e w s p a p e r d e p e n d a b l e	_____ /4	_____ %
8	a d r i n k r i n g e r c i d e r h o t g g l o w i n g o f t e n	_____ /8	dummy
9	p e a r s t h r e e m a k i n g b e c o m e m e a n s a c r o s s	_____ /6	_____ %
10	w i t h o u t c h i l d r e n i m p o r t a n t p o l i t i c i a n	_____ /4	_____ %
11	l o c k s m i t h s l e e p e r s h o w m i c r o p h o n e r i n g	_____ /6	_____ %
12	m a i n l a n d n e w s p r i n t s l e e p e r h o w d u r a t i o n	_____ /6	_____ %
13	s l i d e s t u d i o q u e s t i o n h i t d r i n k c o l d s h o e s	_____ /7	dummy

Total Number Correct	(add lines 1–13) = _____
Mean Percent Correct	(sum of percentages / 10) = _____ %
Total Test Time = _____ min _____ sec	(Time in Minutes) = _____
Corrected Reading Rate =	Total # Correct / Total Time (in min) = _____

Test termination

- 10 consecutive errors
- skipped line twice
- fatigue of reader
- exceeded time limit

Notations

Misidentification	_____ substitution written above item	_____ e.g.	<i>true</i> truck
Spells words	_____ "sp" placed above word item spelled	_____ e.g.	<i>sp</i> cat
Omission	_____ circle item omitted	_____ e.g.	(the)
Insertion	_____ caret placed where insertion occurs	_____ e.g.	once <i>upon a</i> time
Repetition	_____ wavy line placed below item repeated	_____ e.g.	<i>saw</i>
Changing order	_____ arrow to where item was read	_____ e.g.	to <i>of</i> a
Connects words	_____ line underneath indicating connection	_____ e.g.	eye <u>sight</u>
Separates words	_____ slash indicating separation	_____ e.g.	cow/boy
Line skip	_____ arrow to skipped line	_____ e.g.	—> quiet
Terminal omissions	_____ continuous line across remaining items	_____ e.g.	as face y

Pepper VSRT Form 3 Score Sheet

Line		# correct # item	percent correct
1	x g a j p m u l c d s b r h o	_____ /15	_____ %
2	f w z i t b k e n q v y a m r	_____ /15	_____ %
3	yes so j pop sat d at c am h in so	_____ /12	dummy
4	oh of n to am g k in u do of s b	_____ /13	_____ %
5	fire side past gold fish own sky help	_____ /8	_____ %
6	advice badger slide anyone table mirror	_____ /6	_____ %
7	understudy sportsman campground fenders	_____ /4	_____ %
8	bad z navy specific g show dog amber	_____ /8	dummy
9	narrow today penny cream hopped honest	_____ /6	_____ %
10	meantime upbringing summertime splendid	_____ /4	_____ %
11	quick sand spiteful outlast stops winds	_____ /6	_____ %
12	side walk tracking readily overshadow employ	_____ /6	_____ %
13	story milk bunny college crayons idea gotten	_____ /7	dummy

Total Number Correct	(add lines 1–13) = _____
Mean Percent Correct	(sum of percentages / 10) = _____ %
Total Test Time = _____ min _____ sec	(Time in Minutes) = _____
Corrected Reading Rate =	Total # Correct / Total Time (in min) = _____

Test termination

- 10 consecutive errors
- skipped line twice
- fatigue of reader
- exceeded time limit

Notations

Misidentification	_____ substitution written above item _____ e.g.	<i>true</i> truck
Spells words	_____ "sp" placed above word item spelled _____ e.g.	<i>sp</i> cat
Omission	_____ circle item omitted _____ e.g.	<i>(the)</i>
Insertion	_____ caret placed where insertion occurs _____ e.g.	once <i>upon a</i> time
Repetition	_____ wavy line placed below item repeated _____ e.g.	<i>saw</i>
Changing order	_____ arrow to where item was read _____ e.g.	to <i>of</i> a
Connects words	_____ line underneath indicating connection _____ e.g.	eye <u>sight</u>
Separates words	_____ slash indicating separation _____ e.g.	cow/boy
Line skip	_____ arrow to skipped line _____ e.g.	—> quiet
Terminal omissions	_____ continuous line across remaining items _____ e.g.	as face y

