# DETERMINING APPROPRIATE PRINT SIZE FOR STUDENTS WITH LOW VISION, DECISION MAKING GUIDE: A Guide to Print Size Selection

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## Purpose

To provide a system to select appropriate print size that can be individualized for use with various non-optical, optical, and digital reading systems

## Overview

## Decision-Making Guide Provides:

## Explanation of principles behind an evidence-based assessment method to determine optimal print size

## Assessment material based upon Bailey-Lovie design principles for various age ranges where task is constant from one size level to the next

## Easy to administer and record results

# Why We Use It?

## Rationale

### Evidence-Based

* Conducted three studies over several years with children who have low vision
* Looked at reading speed, fluency, size, and distance as well as accommodation needs (i.e., focusing needs at near)
* Design principles applied to the charts are research-based

### Goal

* Ensure that students are not using print that is either too large or too small thereby decreasing reading accuracy, efficiency, and stamina

## Rationale

### Data Collection Tool

* + Methodical way to collect and present print reading data
	+ Accepted design principles for students who have low vision
	+ Examines reading speed of print sizes at various distances from the reader

### Starting Point

* There are other factors that also determine optimal print size for a student
* Reading efficiency is task dependent

## Rationale

### Integration of Data with Learning Media Assessment

* Coordinate findings with other collected data
* Ensures a more complete picture of how to present print for various home, school, community tasks

### Monitor Change Over Time

* Monitor any changes as student matures and competence increases
* Monitor any changes as task demands change as student matures

## BACKGROUND

### Methods For Achieving Appropriate Print Size

* Large print
* Optical magnification
* Electronic magnification
* Changing viewing distance

## BACKGROUND

* People with different visual abilities require different optimum print sizes for particular tasks
* Bigger is not necessarily better
* Print smaller or larger than an optimal range of print size can result in slower reading speeds

## BACKGROUND

* Starting from very small print, reading speed increases as print size increases, then plateaus
* Not shown on diagram is that reading speed decreases as print size becomes even larger

## BACKGROUND

* The green arrow shows the point at which reading speed plateaus for reading text aloud (and slows down when print gets smaller as person reads down a reading chart)
* This is what we are measuring with the Decision Making Guide
* It is called Critical Angular Size

## BACKGROUND

### Point Notation/M Notation Equivalents

* 9 point Times = 1.0 M = 1.5 mm = 1/16 inch (approximate size for 1.0 M = newsprint*)*
* 18 point Times = 2.0 M = 2.9 mm = 1/8 inch
* 36 point Times = 4.0 M = 5.8 mm =1/4 inch

**Point Size Varies with Style of Font**20 point Arial

20 point Times

20 point Geneva

# What’s in the Program?

## MANUAL CONTENTS

Brief review of critical concepts related to print size

List of charts and their composition

How to use charts and what to watch for when using the charts

## MANUAL CONTENTS

Worksheet to record data and sample worksheet

Record sheet to determine size/distance relationships

How to apply the system with electronic screen displays

Conversion Table for print size notation

# What Charts are in it?

## SENTENCE CHARTS

Three versions of the Bailey-Lovie Sentence Charts

3rd grade reading level

Times New Roman font

5.0M to .16M (45 Pt to 1.5 Pt)

60 characters/spaces per row

Size progression is same proportion at each size level

## WORD CHARTS

Three versions of the Bailey-Lovie Word charts

3rd grade reading level

Times New Roman font

5.0M to .16M (45 Pt to 1.5 Pt)

49-51 characters/spaces per row

Size progression is same proportion at each size level

## PASSAGE SAMPLES

Five passage samples at the 1st, 3rd, 4th, 6th, & 7th grade reading levels

3.2M (28 Pt) TO 0.8M (7.2 Pt.)

Times New Roman

251 to 1275 words per passage

4th grade passage is shown

Determined by Flesch-Kincaid system (uses sentence and word length to determine reading level)

## PRE-PRIMER SENTENCE CHARTS

Two pre-primer sentence charts

4.0M (36 Pt), 2.5M (22.5 Pt), 1.6M (14.4.Pt)

50 words

## When to Use the Different Charts

Pre-Primer Charts: For early readers

Sentence Charts: Simulate reading tasks and provide contextual cues. Closer to real reading tasks.

Word Charts: Don’t provide contextual cues because you can’t guess what is coming next with non-related words. Reading speed is more consistent without context cues. Use is a consistent reading speed measure is required.

Text Charts: Help to examine reading stamina. Determine most appropriate print size and then check stamina at this size with charts. Can determine if larger/smaller print sizes makes a difference with reading stamina. For some with low vision, reading can be tiring over time.

# How do I sort the charts?

## CHARTS

Charts arrive in a stack

## CHARTS

Suggest sort charts prior to using the program

I use single file folders for each chart type

## CHARTS

# Slip these single file folders into a larger expanding folder by category: word charts, sentence charts, pre-primer sentence charts, and passage charts by size and grade level

## CHARTS

All this fits into a banker’s box or other container that’s easy to carry

Then… you can pull out only the charts you will need for a specific student and replace them in order when done

Can also place chart into a non-glare plastic cover to protect it

# How Do I Use it?

## IN A NUTSHELL: HOW DOES IT WORK?

Preparation:

Allow chart to be held with both hands (Do not lean arms on table top when possible)

Wear eyeglasses if prescribed for reading tasks

## IN A NUTSHELL: HOW DOES IT WORK?

### With the sentence charts:

* Determine distance needed to read the smallest print possible on chart. (student can read 2.0M print at 10 inches)

### But… We want to find the reading distance needed for sustained reading

* So, we multiply that distance needed to read the smallest print possible by 1.5 to find the best close viewing distance (that is 1.5 X 10 inches or 15 inches)

## IN A NUTSHELL: HOW DOES IT WORK?

Give the student the card. The student reads from 5.0M sentence down to 2.0M sentence. The 2.0M sentence is the “smallest print read is 2.0M at 10 inches”

## IN A NUTSHELL: HOW DOES IT WORK?

Then… at this new comfortable reading distance, ask student to read down the chart and you determine smallest print size that first provides best reading speed, beginning with the top line on the chart

To do this: Note when reading speed first begins to slow down

## IN A NUTSHELL: HOW DOES IT WORK?

Chart held at 15 inches (comfortable reading distance)

Student reads from top row down the chart

Slowdown first occurs at 2.5M (22 Pt) print

## IN A NUTSHELL: HOW DOES IT WORK?

Line above that first slowdown is the student’s most efficient print size for that reading distance (15 inches)

It provides the first estimate of the optimal print size best suited for the comfortable reading distance.

### Manual Provides Worksheet to Record Results

1. At comfortable reading distance
2. Record where slowdown first occurs (1.25M) and move up one line of print (1.2M at 20cm)
3. This is the Critical Angular Size (CAS) used to determine Optimal Print Size at different reading distances.
4. In this new example Critical Angular Size is 1.6M at 20 centimeters or about 8 inches

# What if the reading distance changes?

## DETERMINING PRINT SIZES FOR DIFFERENT VIEWING DISTANCES

Image on retina is same size for each letter: the angle of letter height & distance from eye for an 8M, 4M, and 2M letter is the same in this diagram

## DETERMINING PRINT SIZES FOR DIFFERENT VIEWING DISTANCES

* If eye is in good focus, visual acuity remains constant:
* At 40 cm reads 8M (16 inches reads 72 points)
* At 20 cm reads 4M (8 inches reads 36 points) so reducing the distance by half means the smallest legible print is also halved
* At 10 cm reads 2M (4 inches reads 18 points)

These examples all proportionately make the same visual angle due to their height and distance from the eye

NOTE: If the distance reaches a student’s limit of accommodation (which may be reduced in some students with low vision) then plus lenses may be needed to maintain good focus

## DETERMINING PRINT SIZE FOR DIFFERENT VIEWING DISTANCES

## Example: Print Size and Viewing Distance to Maintain Critical Angular Size

Viewing distance: 10 equals 2M most efficient print size

Viewing distance: 20 equals 4M most efficient print size

Viewing distance: 30 equals 6M most efficient print size

## Determining Screen Font Size

Letter height depends on the size of the screen and settings

The letter size on the screen is likely not the same as the font size indicator in the software program which tells you the size in the printed document

## Determining Screen Font Size

To determine size of font from letter height on screen (using M units):

Measure the height of the lowercase ‘e’ in millimeters and divide it by 1.5

There is a table in the Appendix to the Manual that coverts this measure to M-units or Point size

Always remember to determine the most appropriate print size for use with electronic devices

# How do I infuse this information into Learning Media Assessments?

## Considerations to Optimize Literacy

Because optimal print size is task dependent, examine and adjust for different reading/math tasks

Adjust for different styles of font

Consider student preference for size and distance to ensure each student is involved print size selection. Use critical angular size findings as a starting point

Ensure that reading stamina is optimal: Can check this with the passage charts and with classroom reading tasks

## Considerations to Optimize Literacy

Make sure lighting is optimal

Check out the use of typoscopes, other line guides, or other ways to highlight print to see if these methods help or are distractors

Examine color of font, color of any word outlining methods, and contrast of font color with background color to optimize these when possible

## Considerations to Optimize Literacy

Explore placement of reading material to adjust for lower field impairments, left or right hemianopias or any visual neglect issues noted in FVA and medical records

Determine if students with CVI need to use of smaller screens for reading (i.e., phone or tablet rather than desktop or laptop). This may help some students with certain types of CVI focus their visual attention and may be more beneficial than an increase in font size

## LMA Example Report

1. Use of sensory channels
2. Reading skills & efficiency
3. Handwriting
4. Literacy tools
5. Technology
6. Summary of findings
7. Recommendations

## Reading Skills & Efficiency: 5th grade student with low vision named Ming

Threshold: 1.0M (9 pt) at 5.25 inches away

Best close viewing distance: 8 inches

Slow down in reading: 1.25M at 8 inches

Most appropriate print size (CAS): 1.6M at 8 inches

Uses CCTV at 16 inches

Uses computer screen at 24 inches

## Summary of Findings: 5th grade student with low vision named Ming

## Prior to assessment, Ming was given 3.0M printed material (equivalent to 24 point) and he held materials at a distance of approximately 8-10 inches. Assessment results revealed that Ming is able to comfortably read hardcopy printed material when the page is held at 8 inches and the print size is 1.6M Times New Roman (equivalent to 14 point). His reading speed slows noticeably when he reads smaller print, 1.25M (equivalent to 11 point) at 8 inches.

## Recommendations: 5th grade student with low vision named Ming

Appropriate print size/distance determination for hardcopy print

* Viewing distance 8 inches and most efficient print size 1.6M (14 point)
* Viewing distance 16 inches and most efficient print size 3.2M (28 point)
* Viewing distance 24 inches and most efficient print size 5M (44 point)

Appropriate print size/distance determination for electronic devices

* Viewing distance 16 inches (CCTV) and most efficient Letter Size 4.5mm
* Viewing distance 24 inches (Computer) and most efficient Letter Size 7.3mm

# Key Points to Remember

#  Points to remember

## Student Needs

Be sure the student is in best focus with prescribed glasses that are used correctly

Understand how a student’s visual condition comes into play when administering print size charts and evaluating findings

## Print Size

Optimal print size is tied to viewing distance

Optimal print size will increase or decrease in proportion to an increase or decrease in distance 1) Distance doubles, so does optimal print size 2) Distance is halved, so optimal print size can be halved

## Print Size

If print is too small, it slows down reading speed

If print is too large, there are fewer words per row, and this slows down reading speed

## Print Size

Readers are often accustomed to using very big print sizes on the assumption that bigger is better, but this method may demonstrate to a reader that smaller print can be read efficiently

It may take time for the reader to get accustomed to reading a smaller size of print

## Print Size

If the person reads very slowly across all print sizes and this is not related to cognitive or other concerns, there are likely other compromising factors

* If this happens, record the print size that is one or two lines larger than the smallest print read at the best close viewing distance
* Consider alternative reading methods as primary or secondary reading modes when print reading is very slow at all print sizes due to these concerns

## Print Size

Print size needs to be adjusted for task, font style, difficulty of reading task, and personal preferences of the student

If print is held too close, it can become blurry (the reader may not be able to accommodate to see small print clearly this distance). It is better to increase the print size and hold the reading material further away

## Thank you!

It is our hope that this program can be used within Learning Media Assessments to quickly and effectively pinpoint the print reading needs of your students