PSY 4036
Week 6: Reading and Low Vision

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Topics:

- Methods for measuring visual reading performance.
- Print size and display size.
- Fonts and spacing.
- Impact of central-vision loss and other forms of low vision on reading.
- The visual span for reading.
- Impact of digital devices for low-vision reading accessibility.

Glass Half Full

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Flashcard (6 sec, 100 wpm)

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6 seconds

100 WPM

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Flashcard (3 sec, 200 wpm)

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3 seconds

200 WPM

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Flashcard (2 sec, 300 wpm)

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2 seconds

300 WPM

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Flashcard (1.5 sec, 400 wpm)

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1.5 seconds

400 WPM

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Flashcard (1 sec, 600 wpm)

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1 second

600 WPM

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Flashcard method for measuring reading speed

- A sentence is presented for a given exposure time T.
- N is the number of words read correctly in time T.
- Reading speed is computed as N/T

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- Example: 8 words are read correctly in 2 seconds
- Reading speed= 8/2=4 words/sec =240 words/minute

RSVP: 250 wpm

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RSVP: 500 wpm

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RSVP: 1000 wpm

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RSVP Method

- RSVP Method for Measuring Reading Speed (Rapid Serial Visual Presentation)
  - Words of a sentence are presented sequentially at the same location on the display
  - Exposure time is varied to determine the value of T for 80% word recognition.
  - Reading speed is computed from this exposure time
- Example: A subject achieves 80% word recognition when T is 0.2 sec. This means that 5 words are presented in one sec, 4 are read correctly in one sec, and the corresponding reading speed is 240 word/minute

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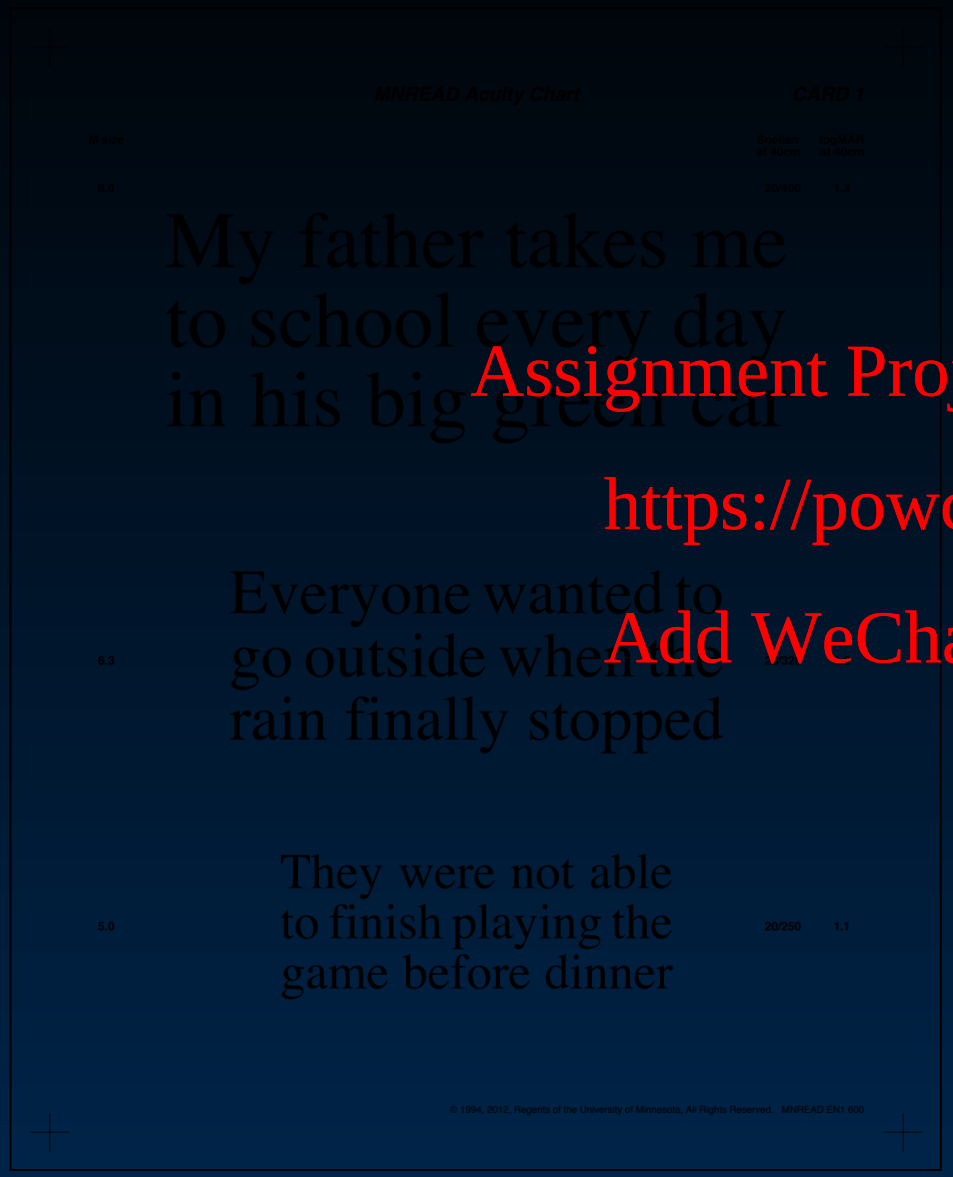
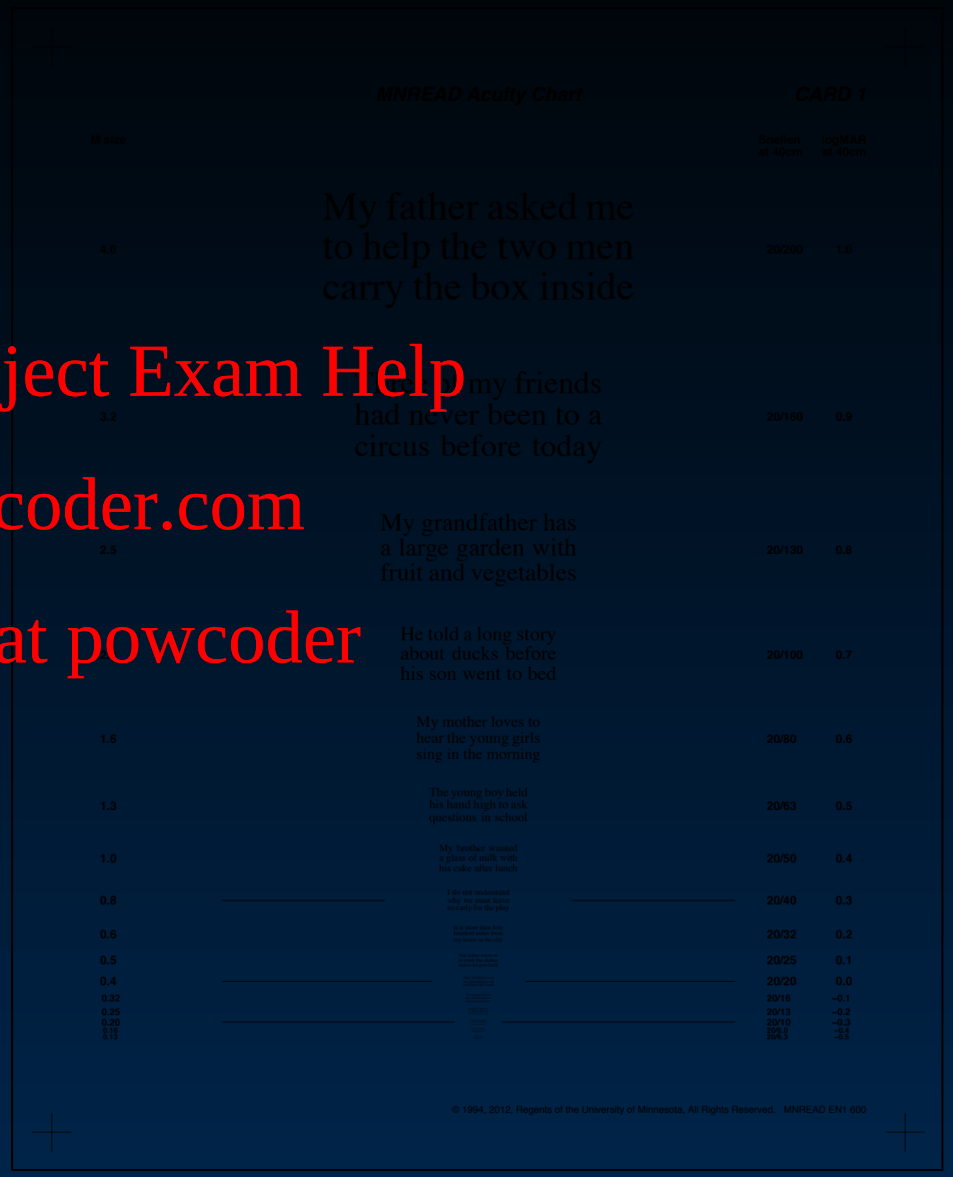
MNREAD English





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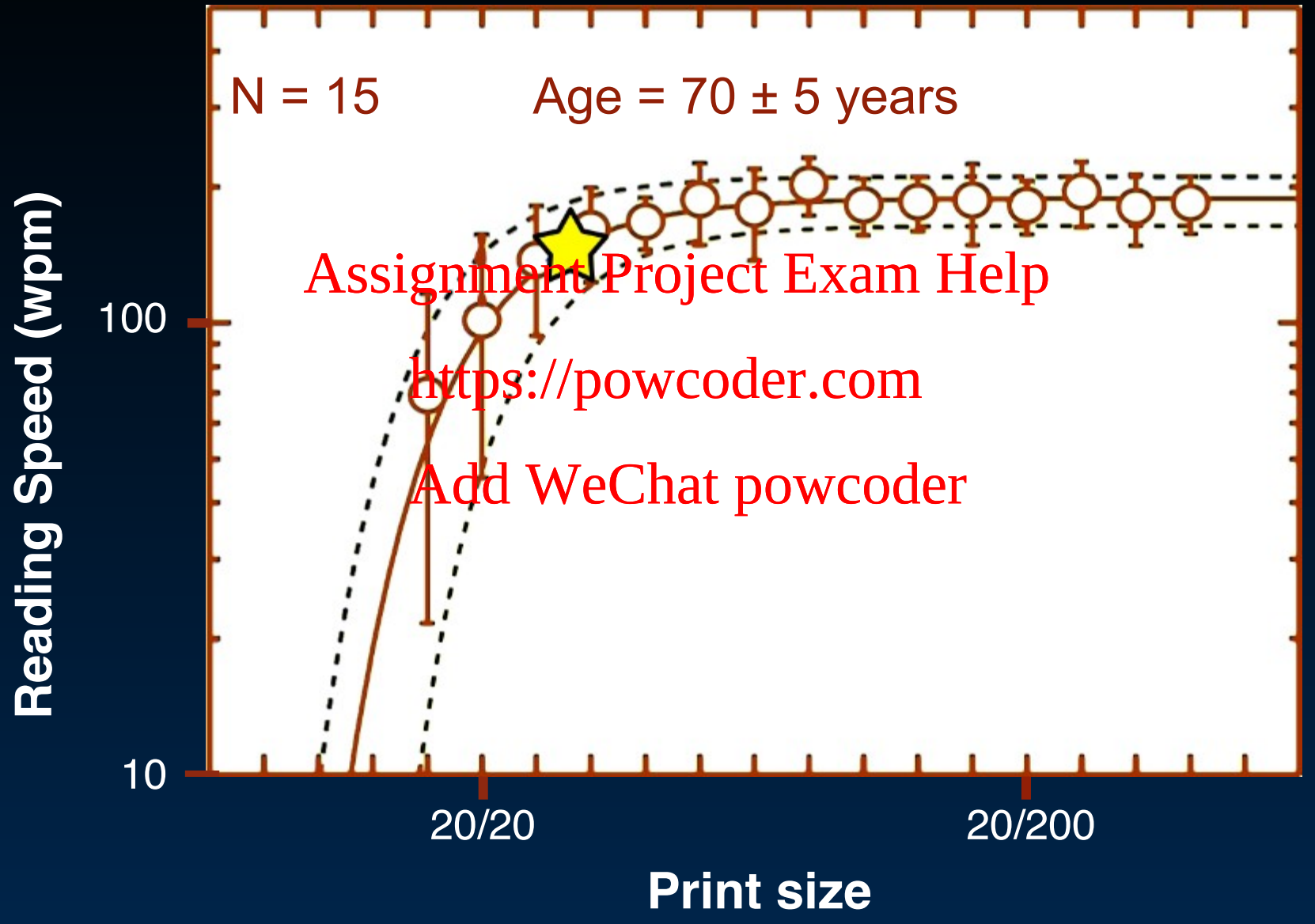
Measuring Normal Reading Vision



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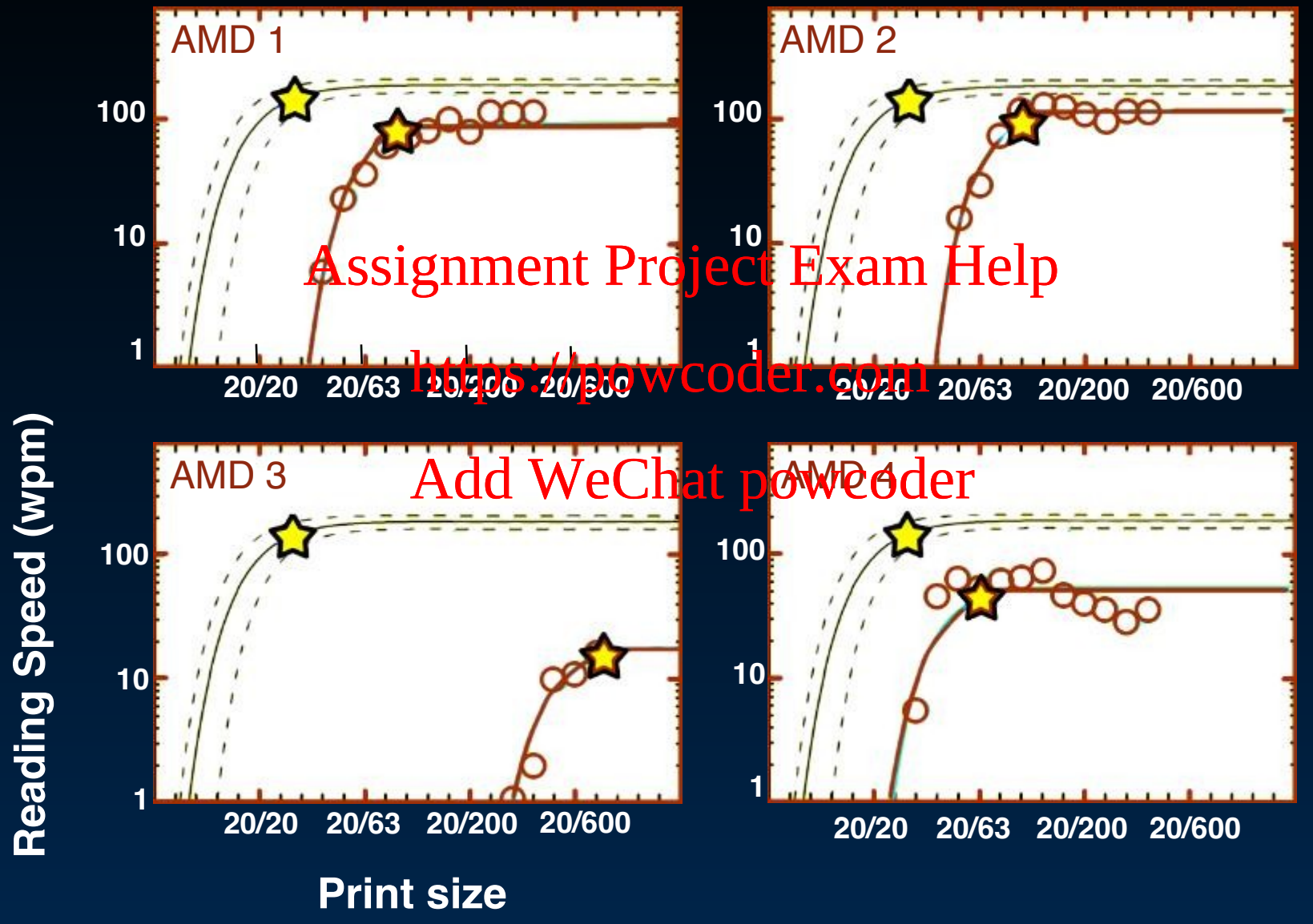
Reading with AMD



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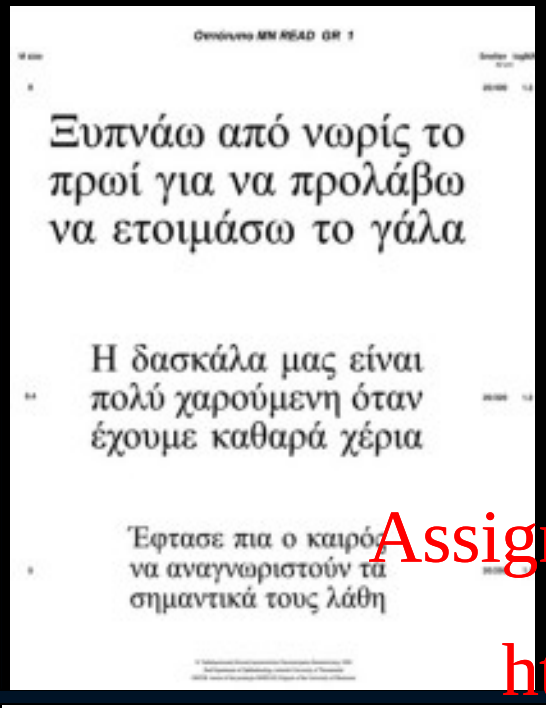

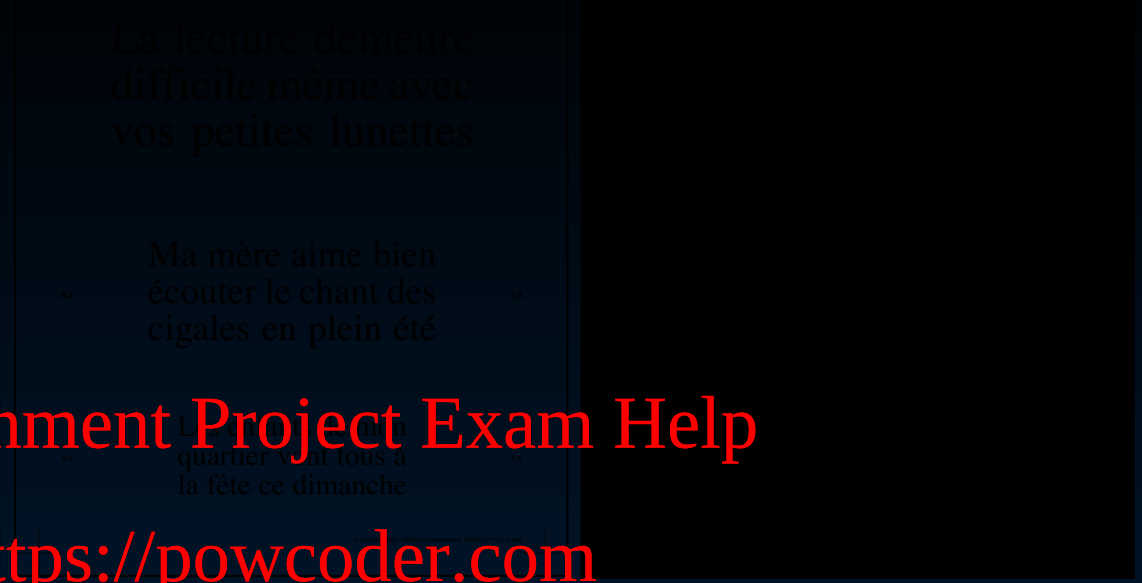

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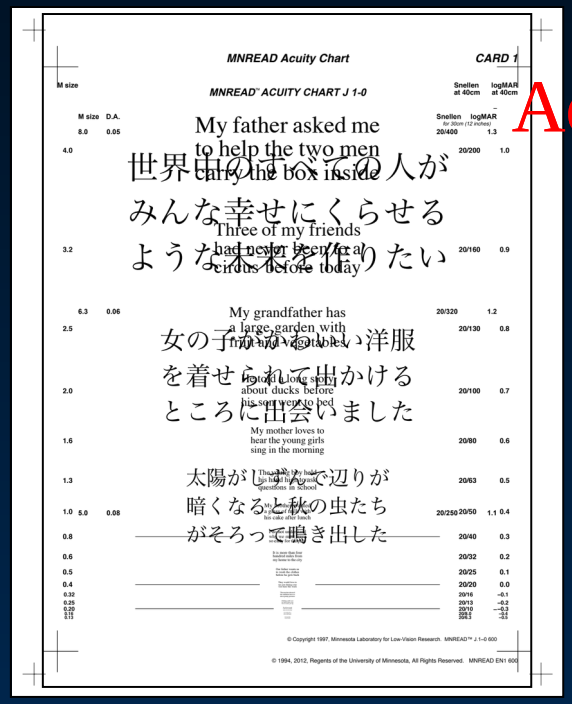

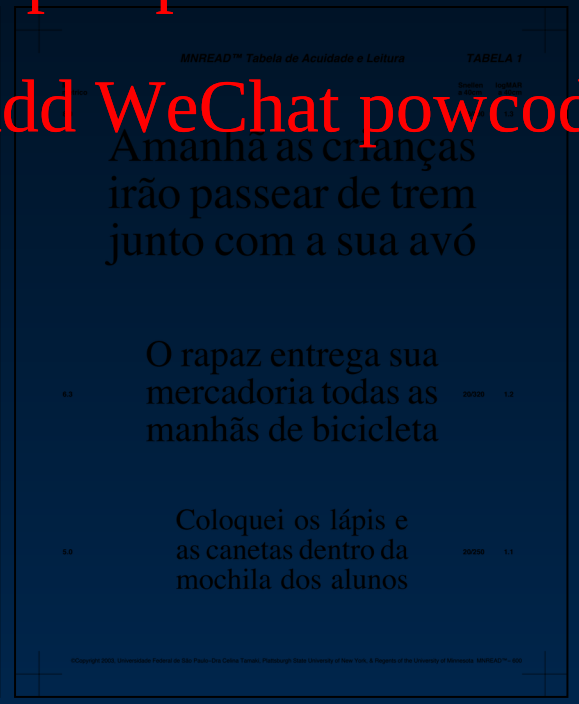

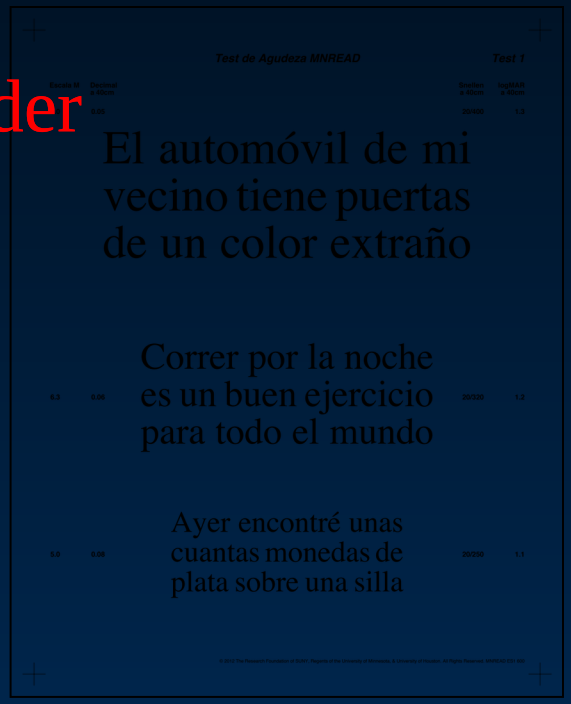

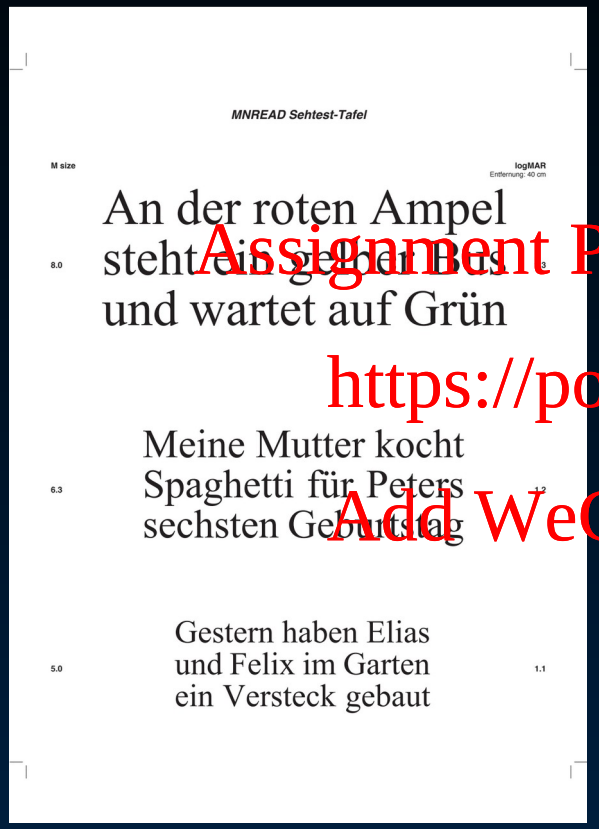

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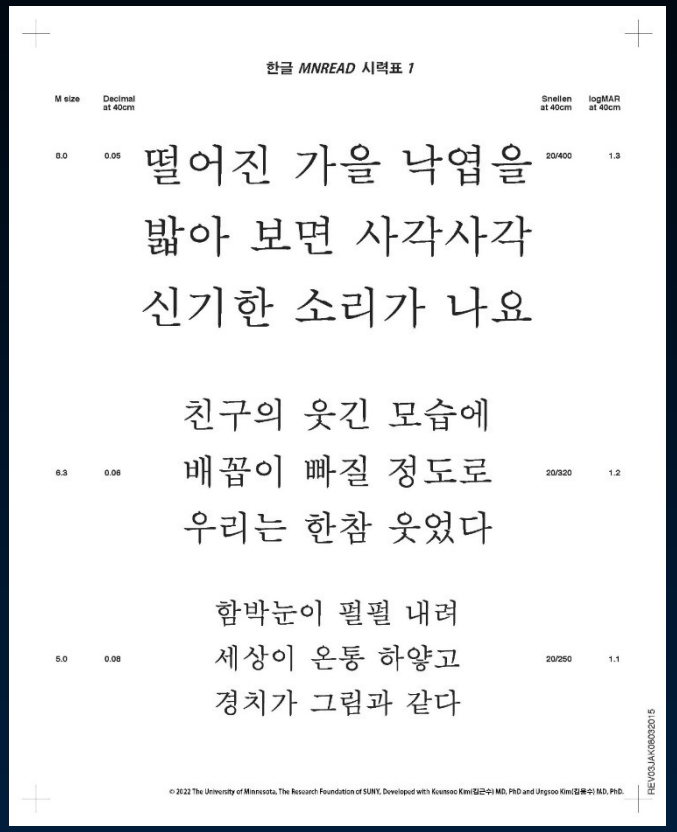
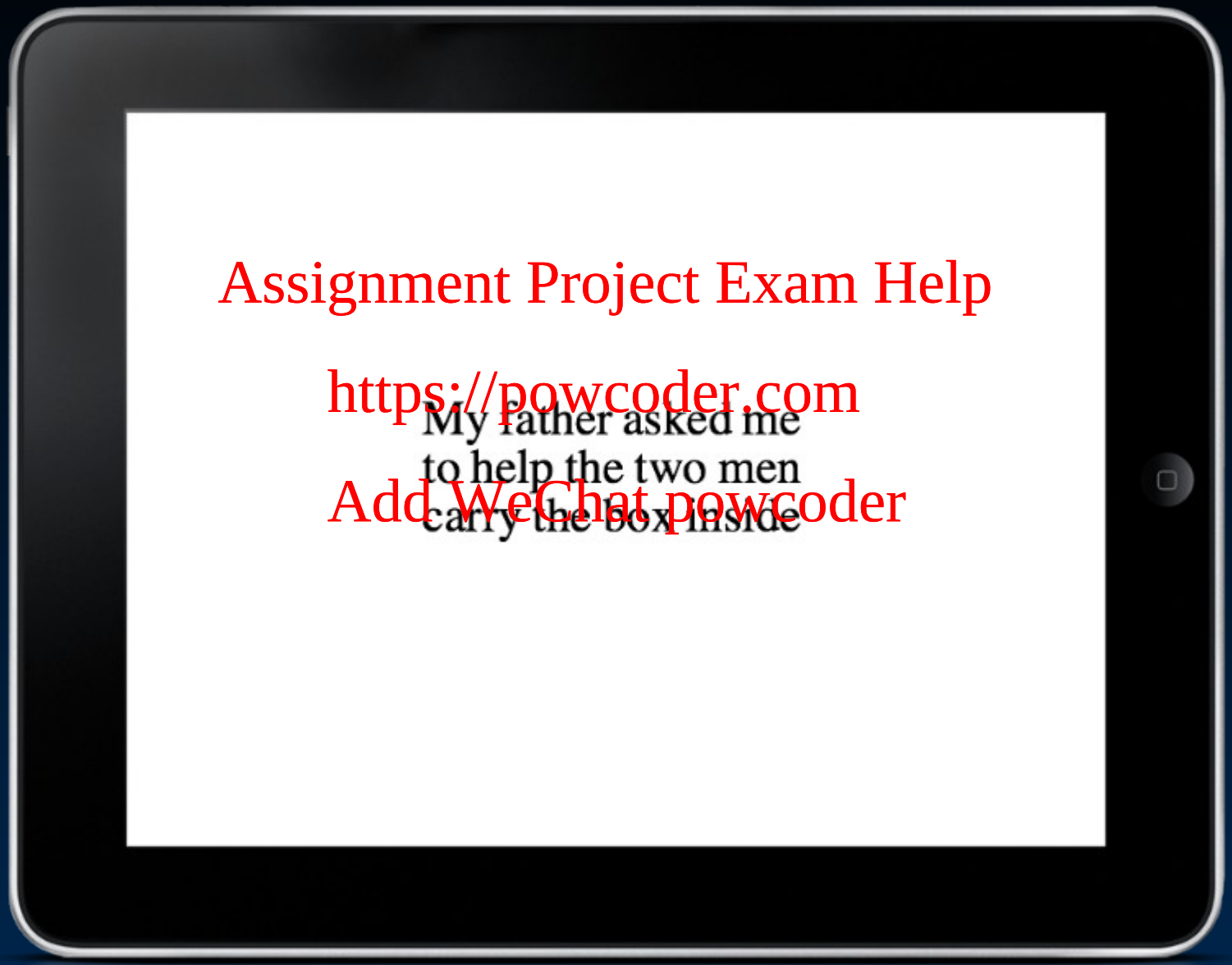


iPad Version of MNREAD



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Three Dimensions of Vision Measurement and Loss

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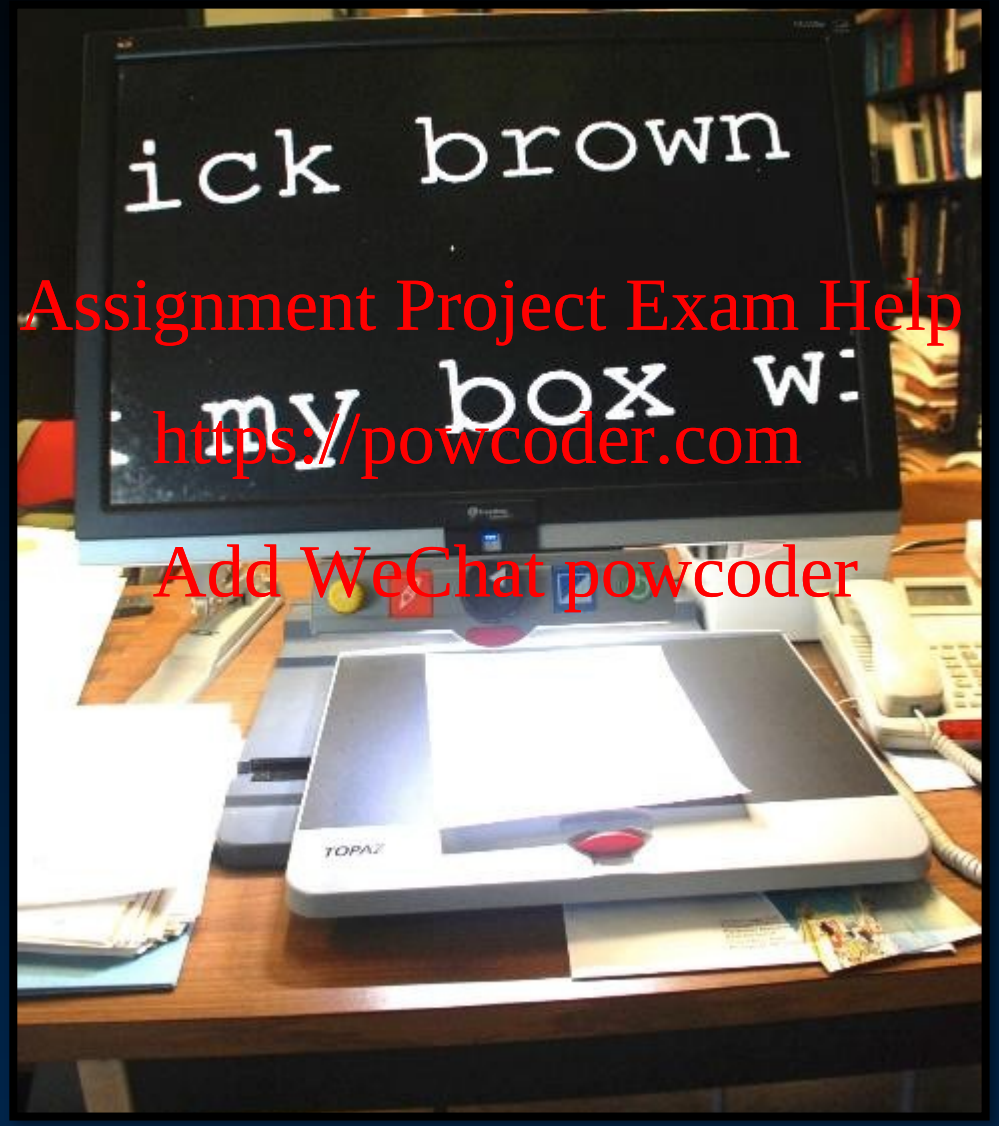
- Low vision is usually discussed in terms of:
  - Reduced acuity
  - Reduced contrast sensitivity
  - Visual-field loss.

Gordon's Video Magnifier



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Computer Screen Magnification Using ZoomText

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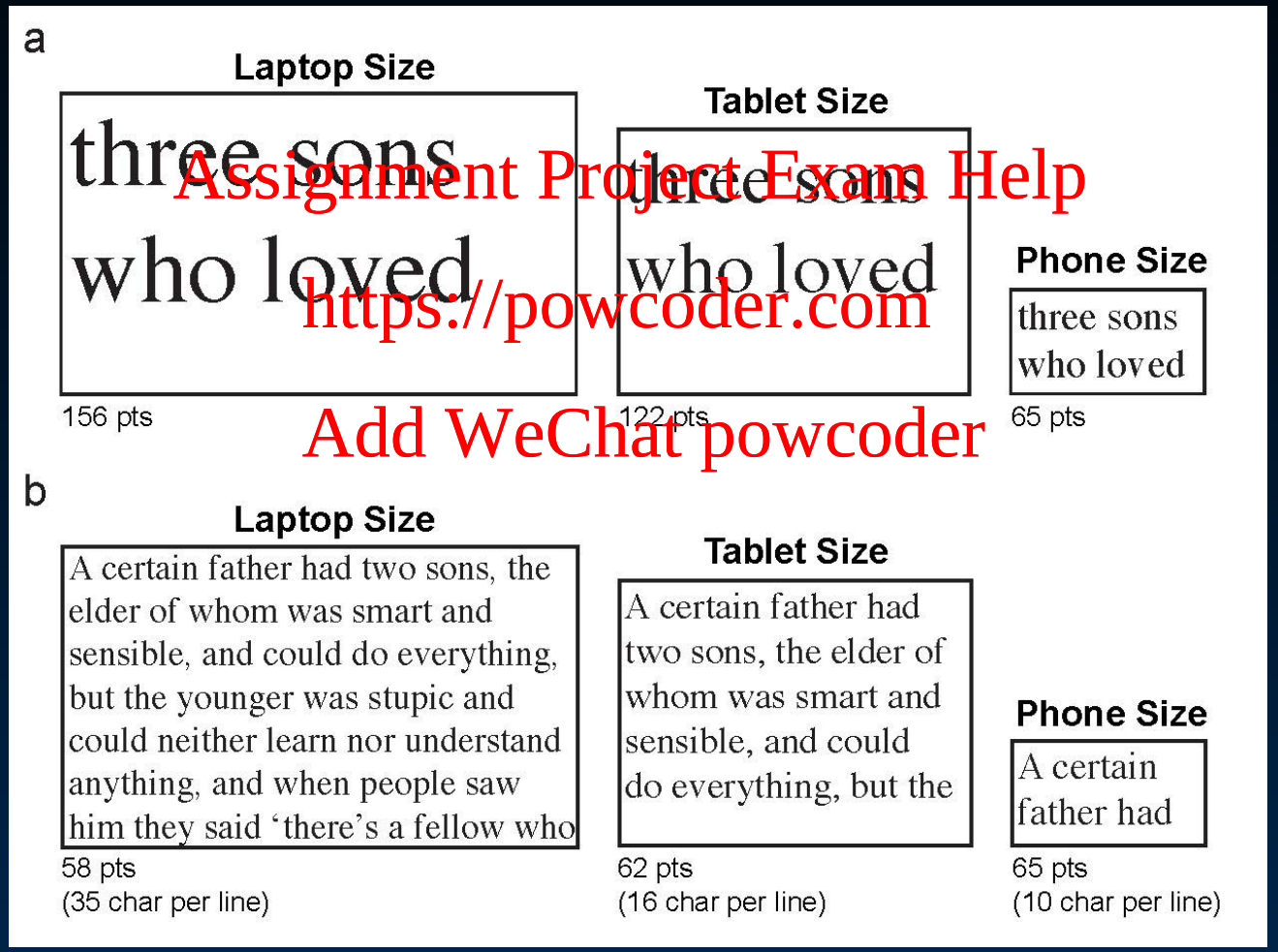
Trade-off Between Print Size and Screen Size



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Flashcard (2 sec, 300 wpm) contrast level 90%

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90% contrast(2 sec.)

Flashcard (2 sec, 300 wpm) contrast level 10%

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10% contrast(2 sec.)

Flashcard (2 sec, 300 wpm) contrast level 3%

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3% contrast(2 sec.)

Flashcard (2 sec, 300 wpm) contrast level 1.5%

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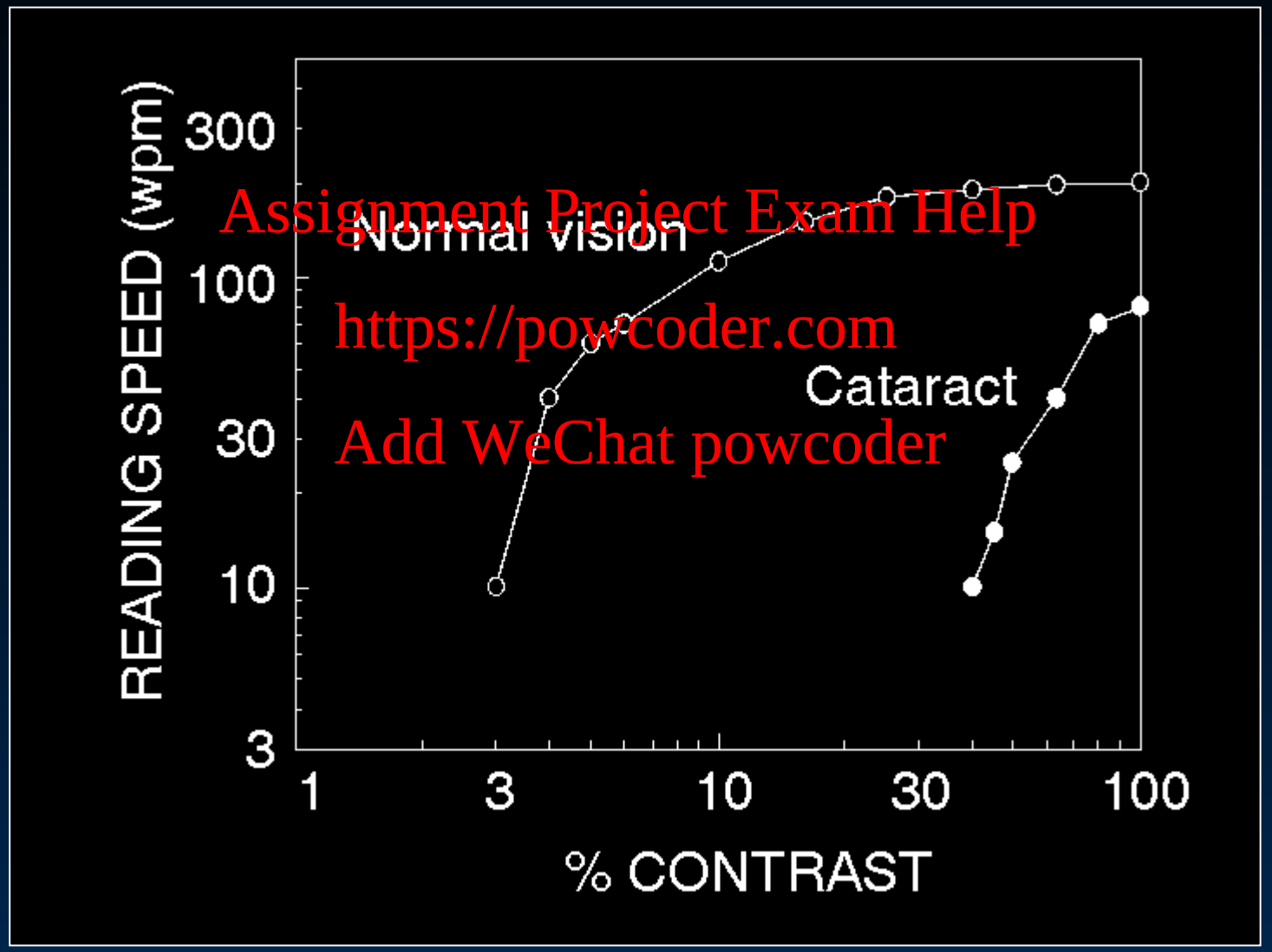
1.5% contrast(2 sec.)

Reading speed vs. contrast
Normal and cataract



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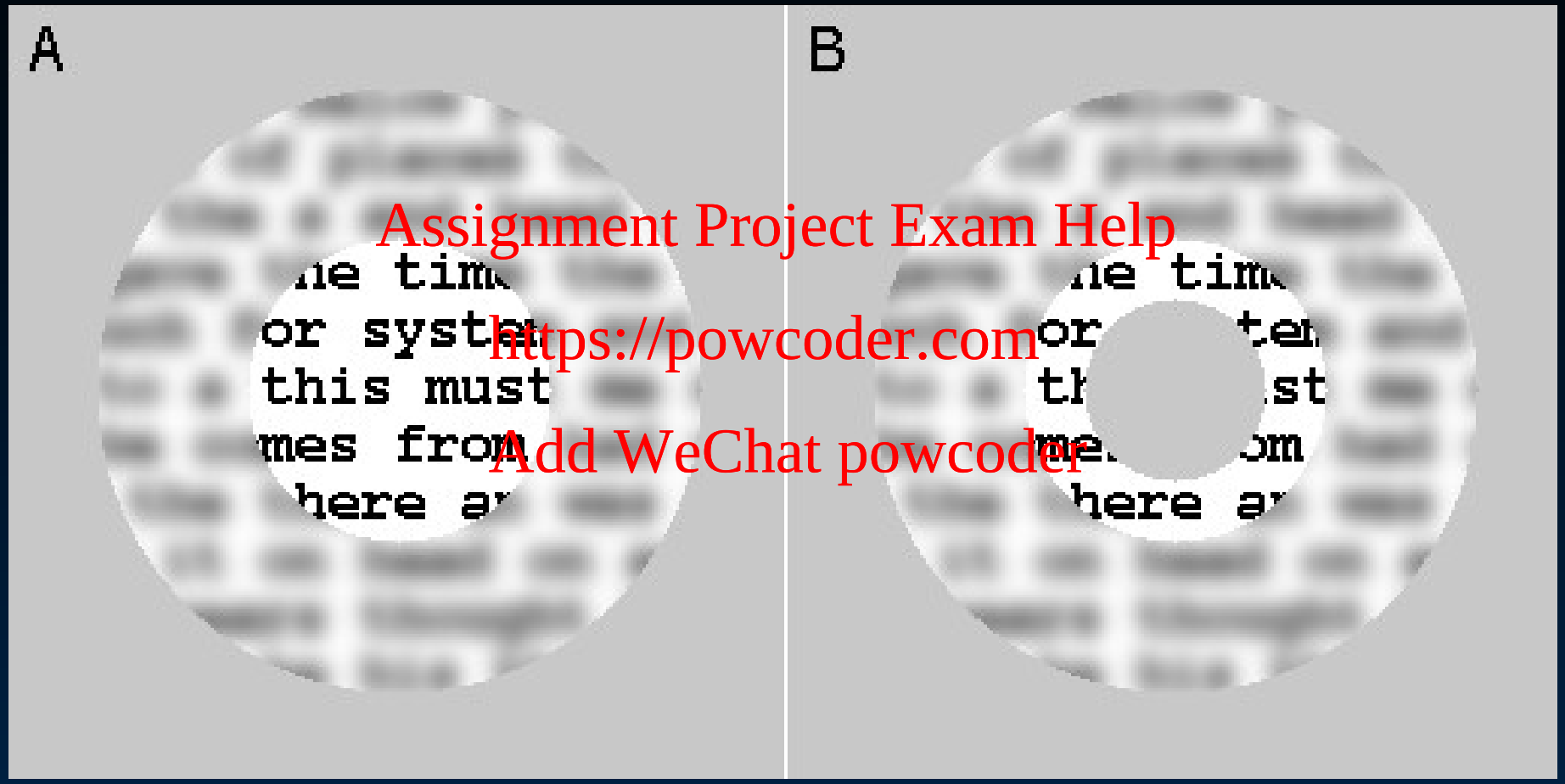
Visual span model



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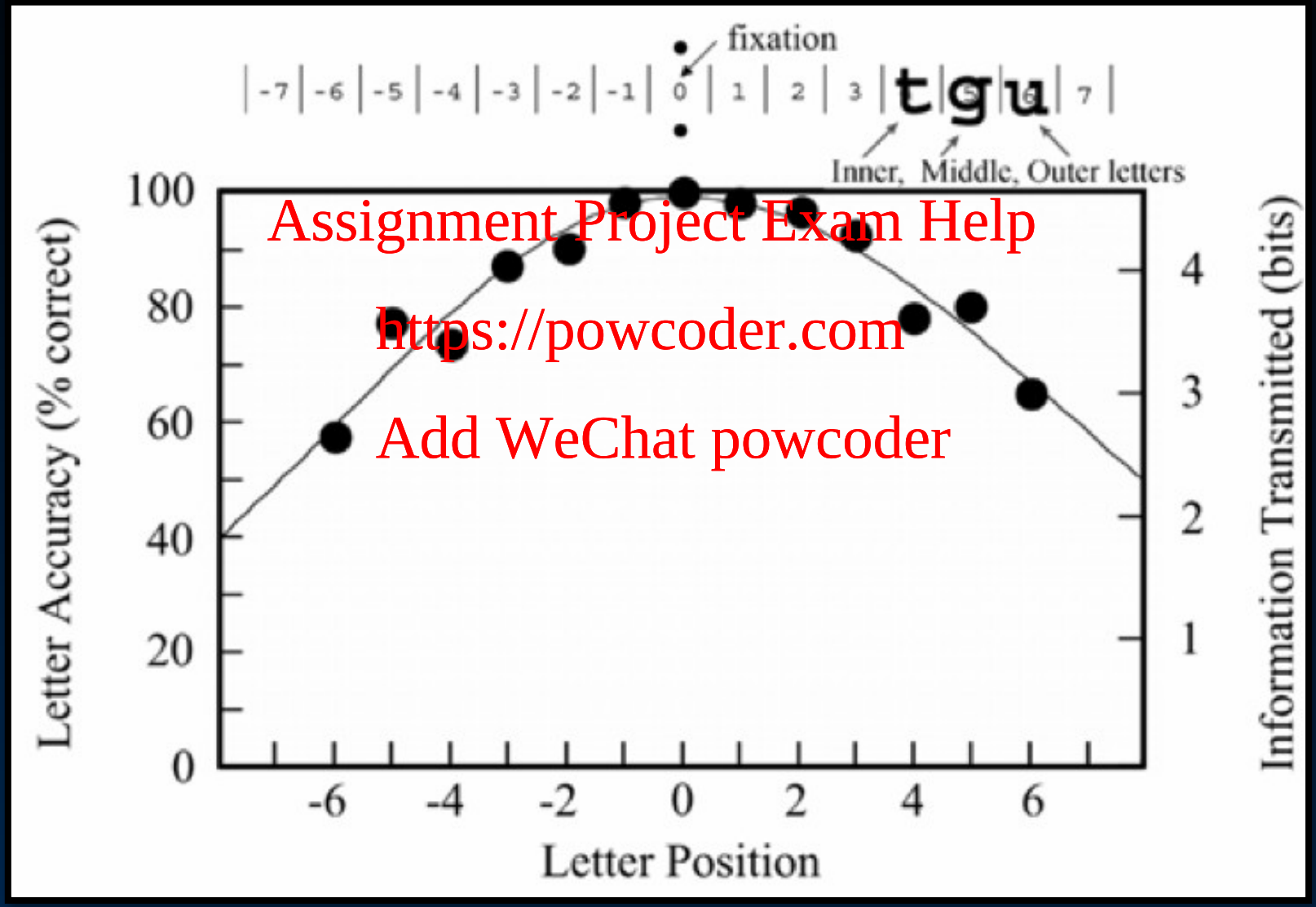
The Trigram Method and Visual Span Profile



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Trigram (Central Vision)

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Trigram (Central Vision)

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Trigram (Central Vision)

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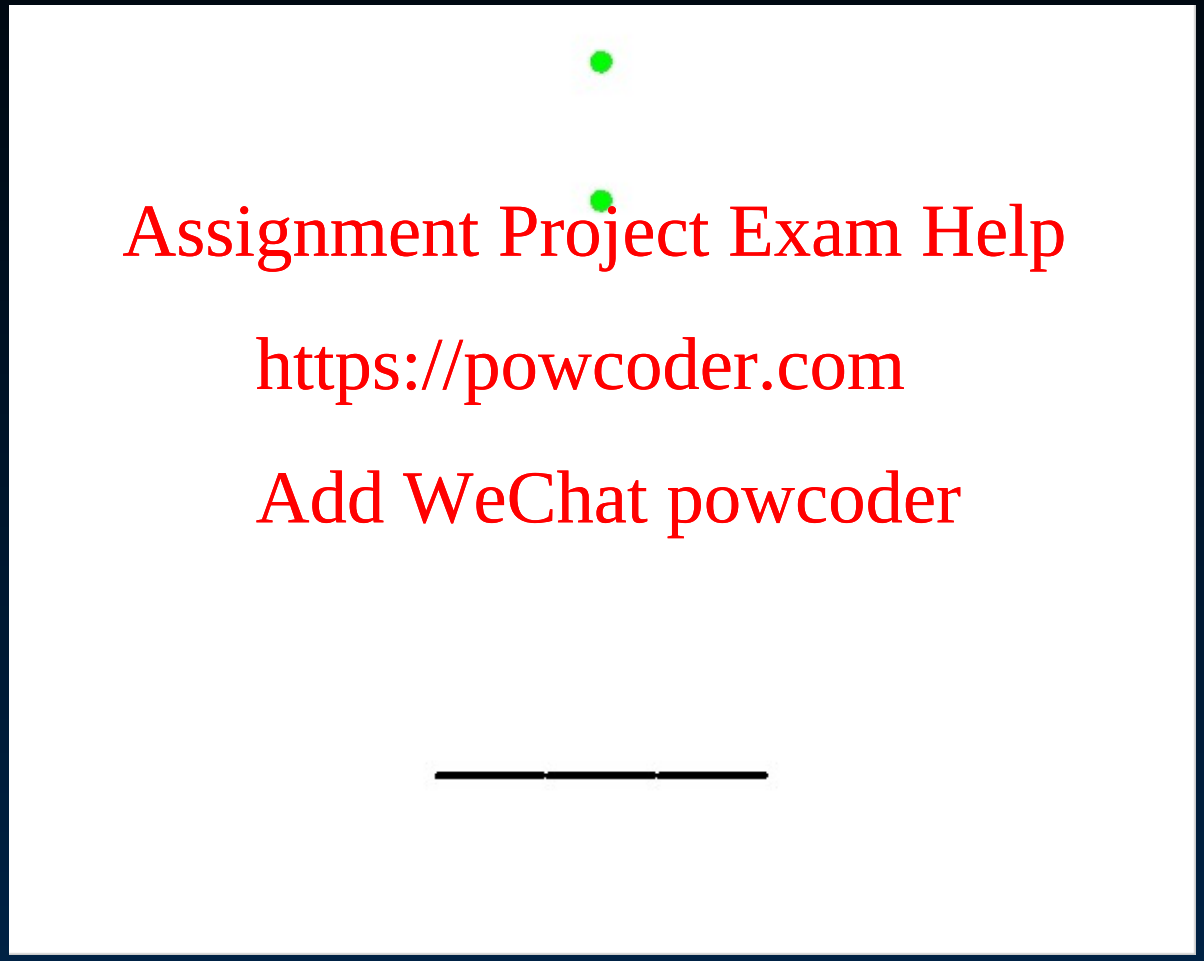
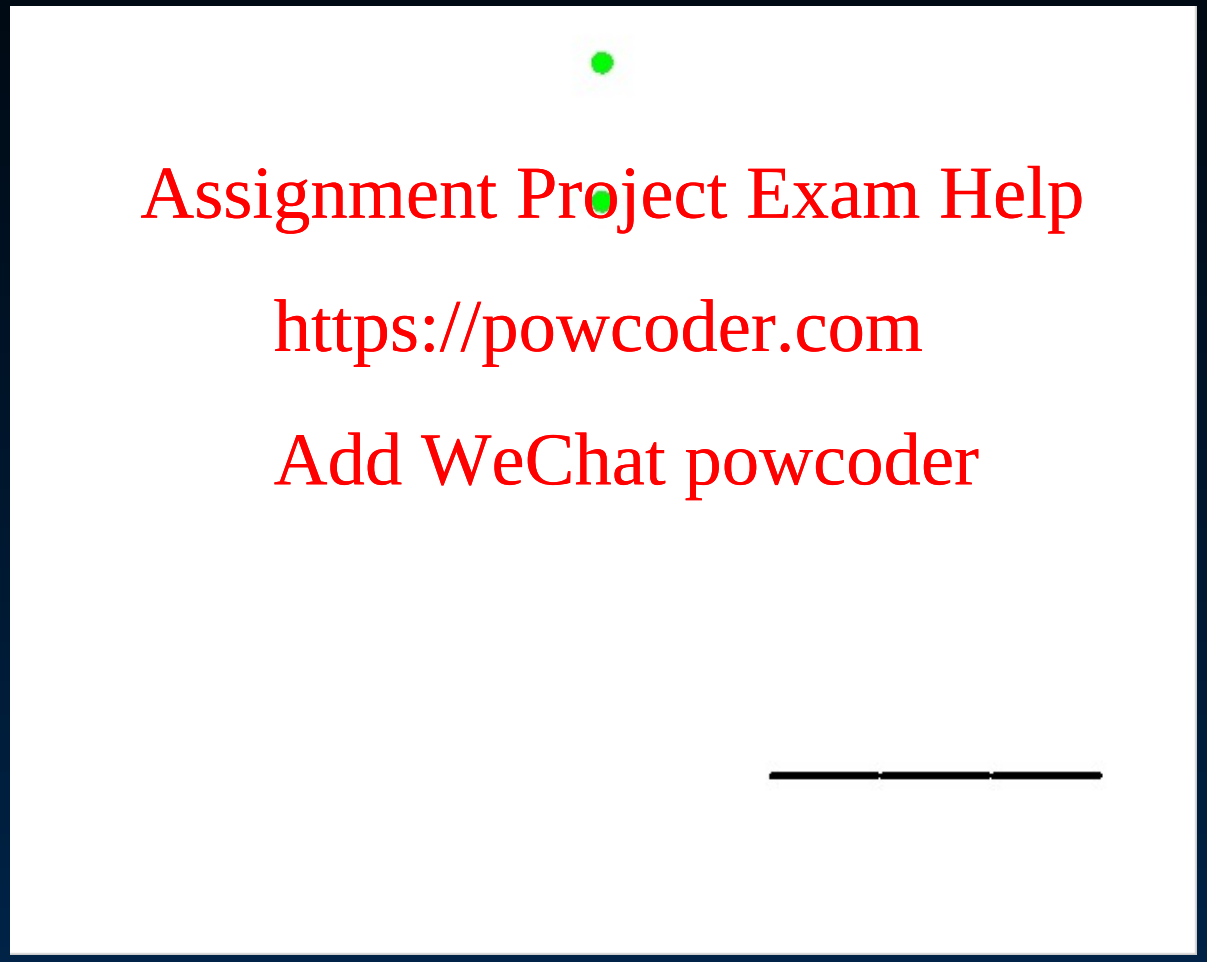
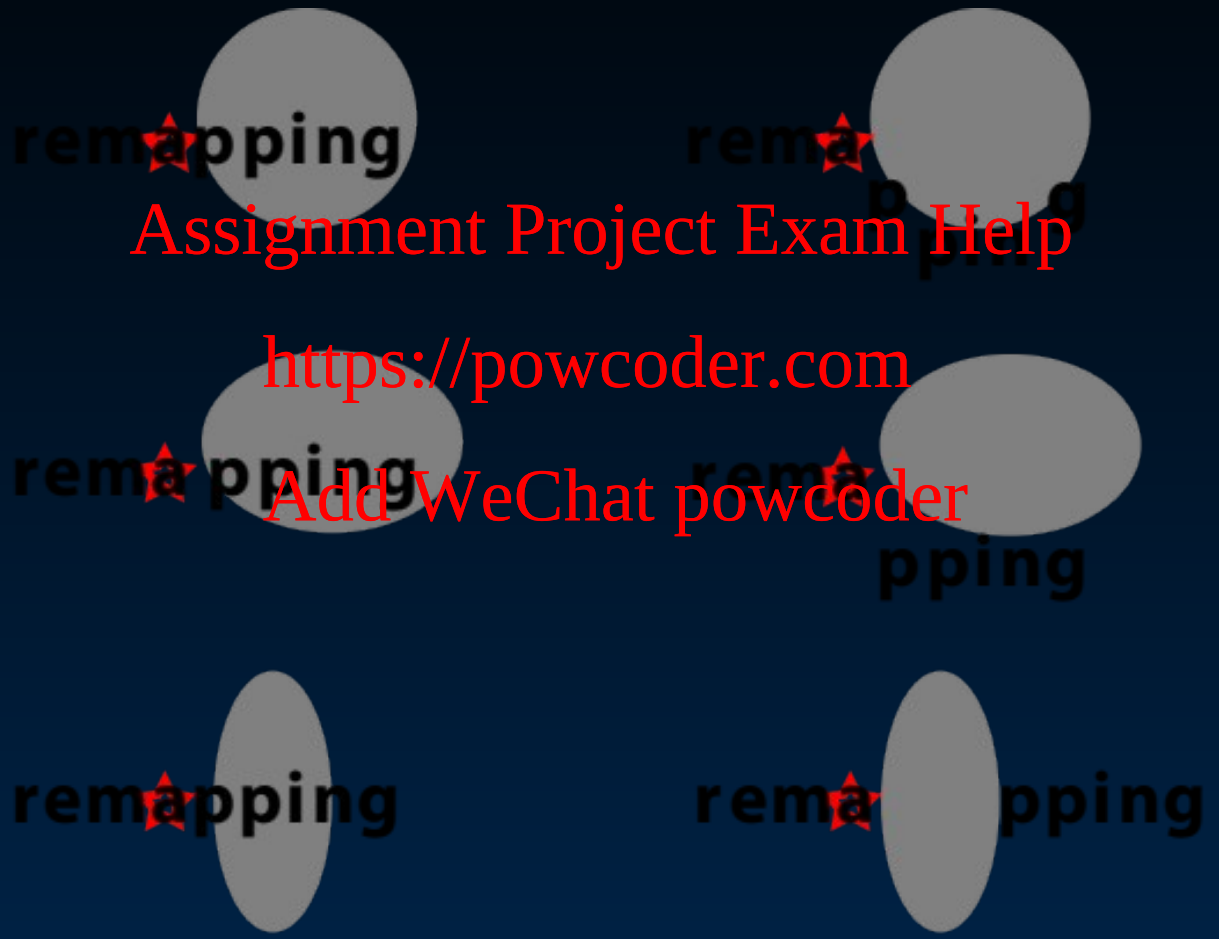
Trigram (peripheral vision)



Trigram (peripheral vision)



Personalized Remapping Schemes



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Conclusions

- Most people with low vision are able to read print, but with varying degrees of difficulty.
- Reading problems in low vision can be studied with computer-based tests and reading-acuity charts such as MNREAD.
- Three visual dimensions can account for most reading deficits in low vision: decreased spatial acuity, contrast limitations, and field loss, especially central field loss.
- The visual span is the number of letters that can be recognized on each reading fixation. In peripheral vision the visual span gets smaller. This shrinkage of the visual span helps us understand why people with central-field loss from macular degeneration read slowly.

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