

PSY 4036

Week 6: Reading and Low Vision

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Topics: <https://powcoder.com>

- 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

Flashcard (3 sec, 200 wpm)

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3 seconds
200 WPM

Flashcard (2 sec, 300 wpm)

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2 seconds
300 WPM

Flashcard (1.5 sec, 400 wpm)

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Flashcard (1 sec, 600 wpm)

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1 second
600 WPM

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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X X X X X X X X X X
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RSVP: 500 wpm

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X X X X X X X X X X
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RSVP: 1000 wpm

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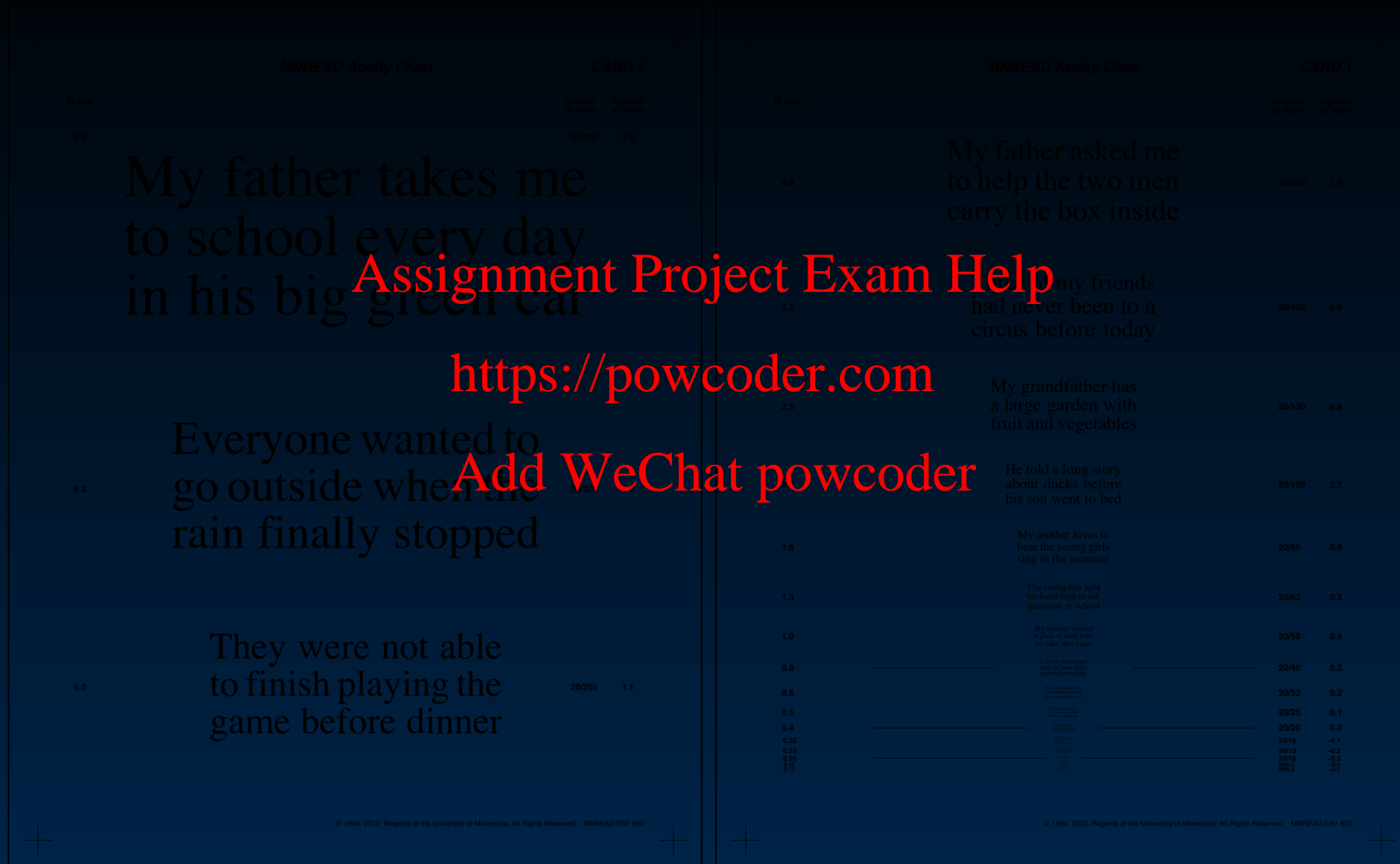
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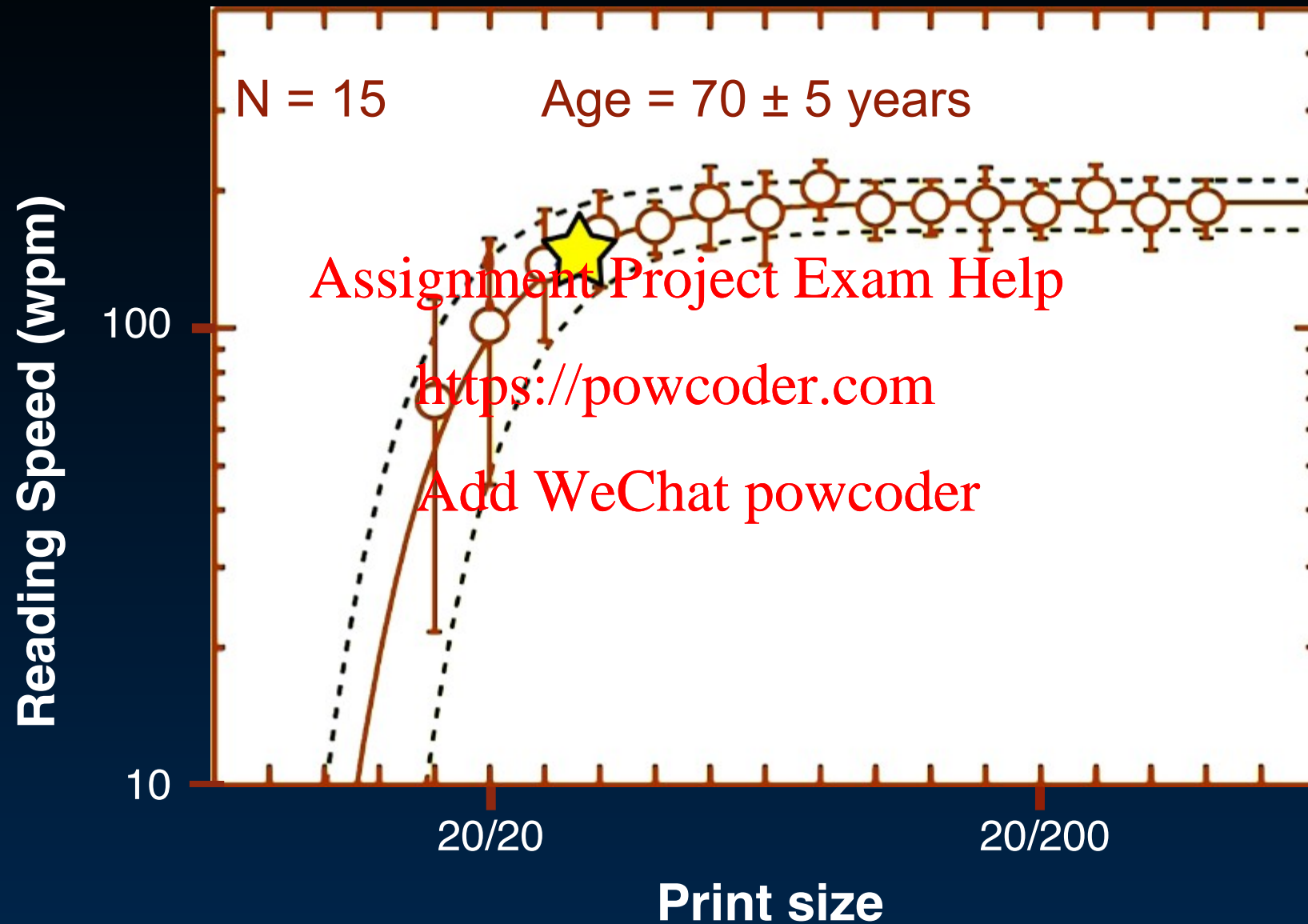
RSVP Method

- 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

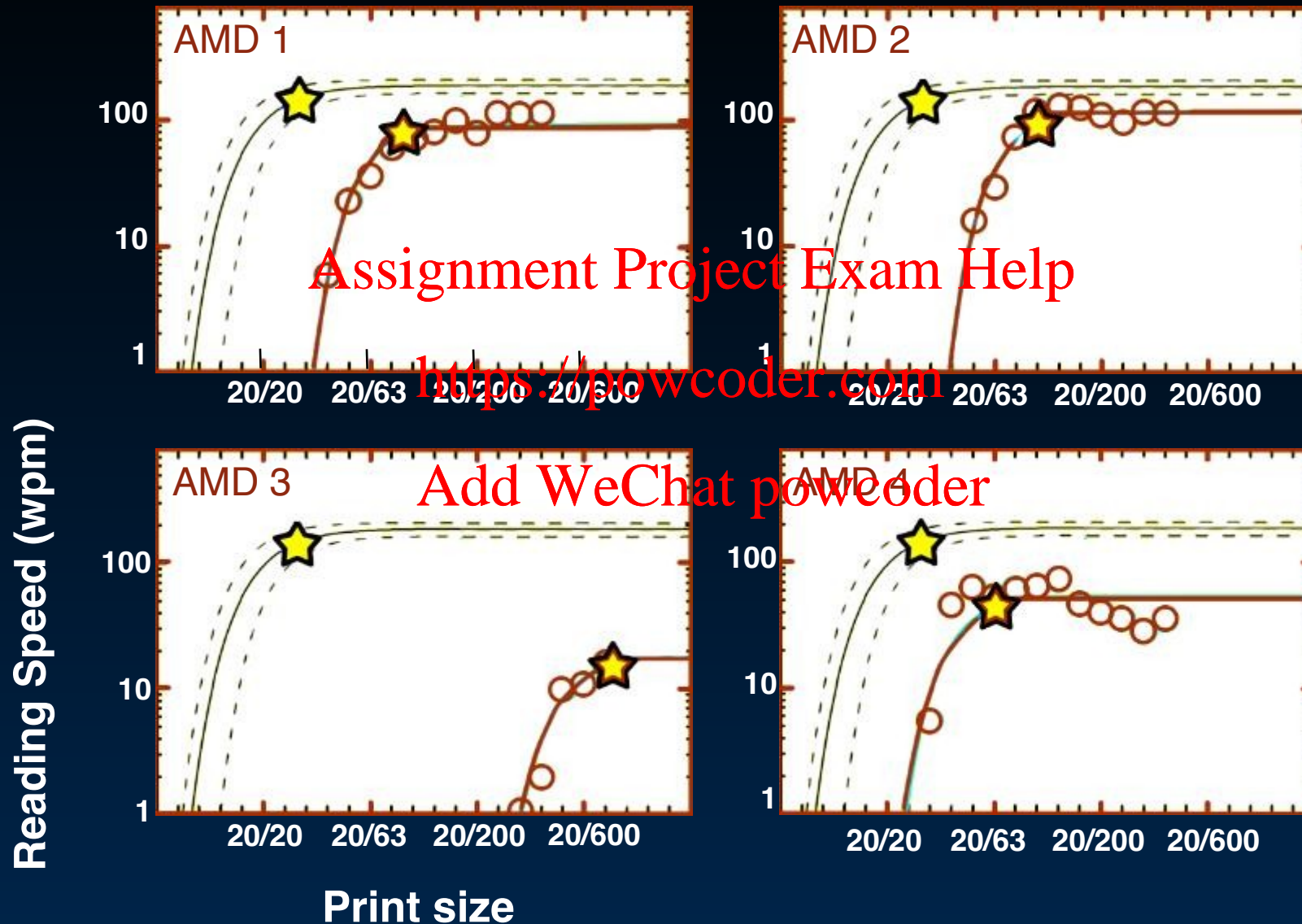
MNREAD English

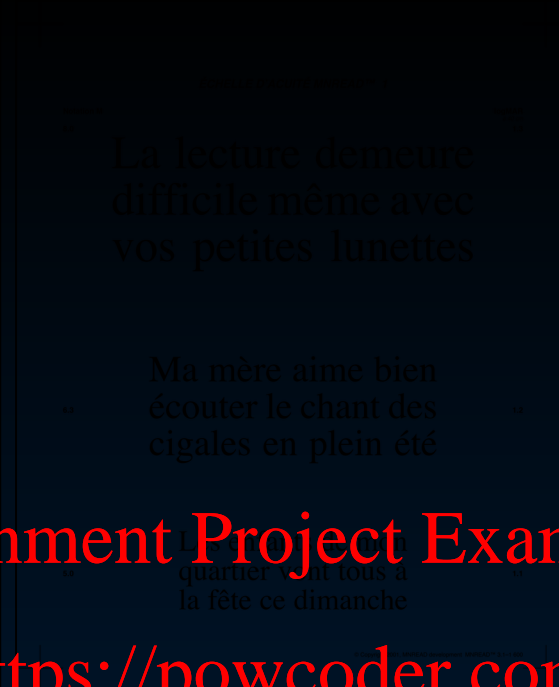
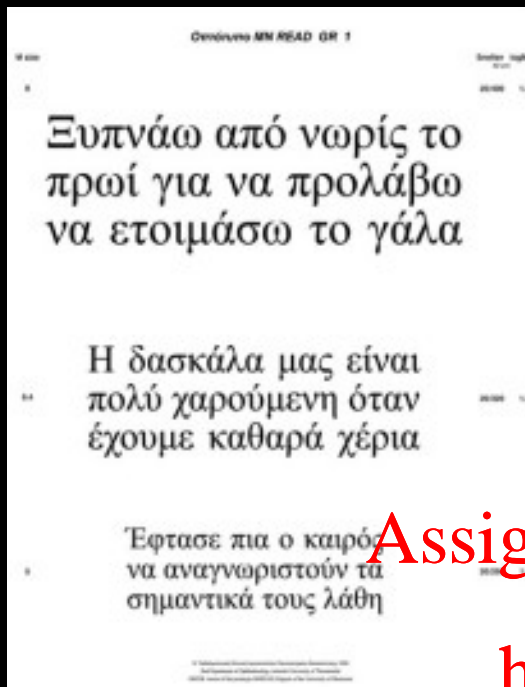


Measuring Normal Reading Vision



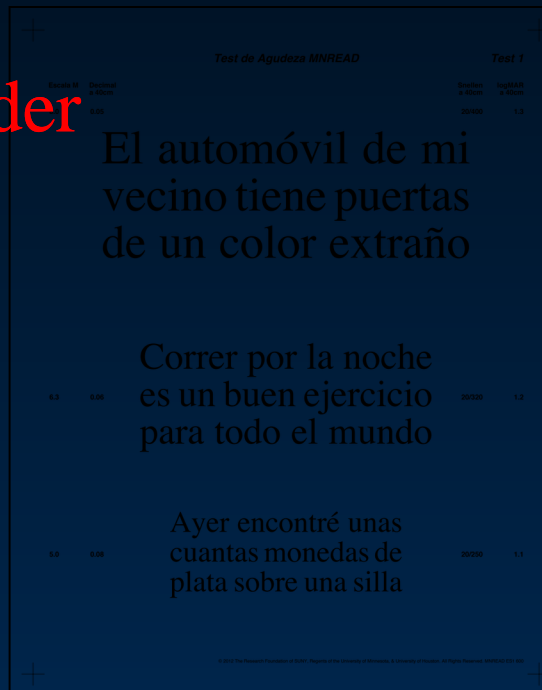
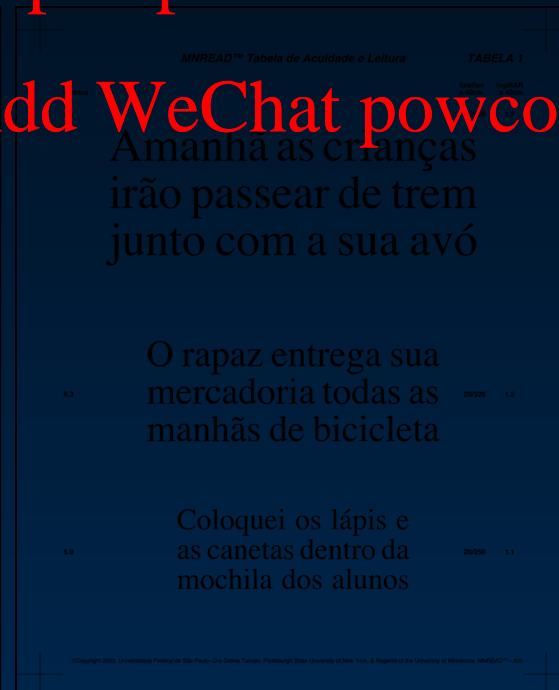
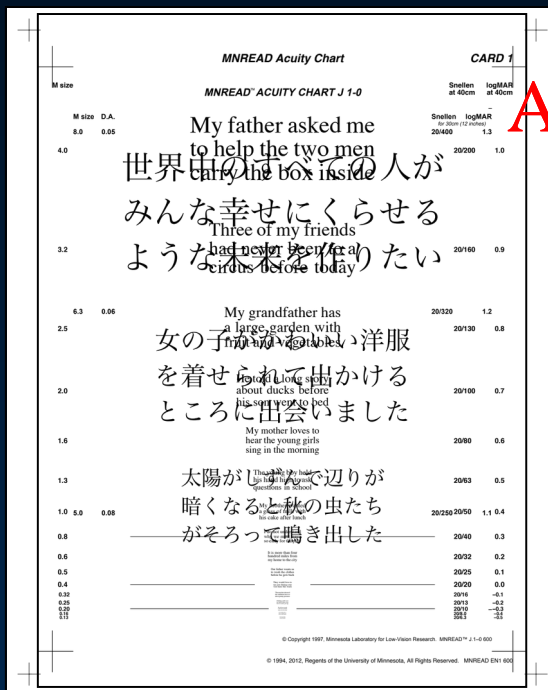
Reading with AMD





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MNREAD Maatkaart gezichtsscherpte

M size

logMAR
at 40cm

8.0

1.3

Water en brood zijn
alles wat men nodig
heeft om te bestaan

6.3

1.2

Die worst kan altijd
worden bewaard als
we dat graag willen

5.0

1.1

Je gelooft niet meer
in sprookjes van die
gouden regenbogen

MNREAD Sehtest-Tafel

M size

logMAR
Entfernung: 40 cm

8.0

1.3

An der roten Ampel
steht ein gelber Bus
und wartet auf Grün

6.3

1.2

Meine Mutter kocht
Spaghetti für Peters
sechsten Geburtstag

5.0

1.1

Gestern haben Elias
und Felix im Garten
ein Versteck gebaut

MNREAD-TR Keskinlik Çizelgesi

KART 1

M boyutu

Snellen
at 40 cm

logMAR
at 40 cm

8.0

20/400

1.3

Sağlıklı olmanın en
iyi yöntemi düzenli
uyku ve egzersizdir

6.3

20/320

1.2

Küçükler için temiz
barış dolu bir dünya
başlatmamız gerekir

5.0

20/250

1.1

Sigara kullanmanın
sağlığınıza vereceği
zararları unutmayın

한글 MNREAD 시력표 1

M size

Decimal
at 40cm

Snellen
at 40cm

logMAR
at 40cm

8.0

0.05

20/400

1.3

떨어진 가을 낙엽을
밟아 보면 사각사각
신기한 소리가 나요

6.3

0.06

20/320

1.2

친구의 웃긴 모습에
배꼽이 빠질 정도로
우리는 한참 웃었다

5.0

0.08

20/250

1.1

함박눈이 펄펄 내려
세상이 온통 하얗고
경치가 그림과 같다

iPad Version of MNREAD

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My father asked me
to help the two men
carry the box inside

Three Dimensions of Vision Measurement and Loss

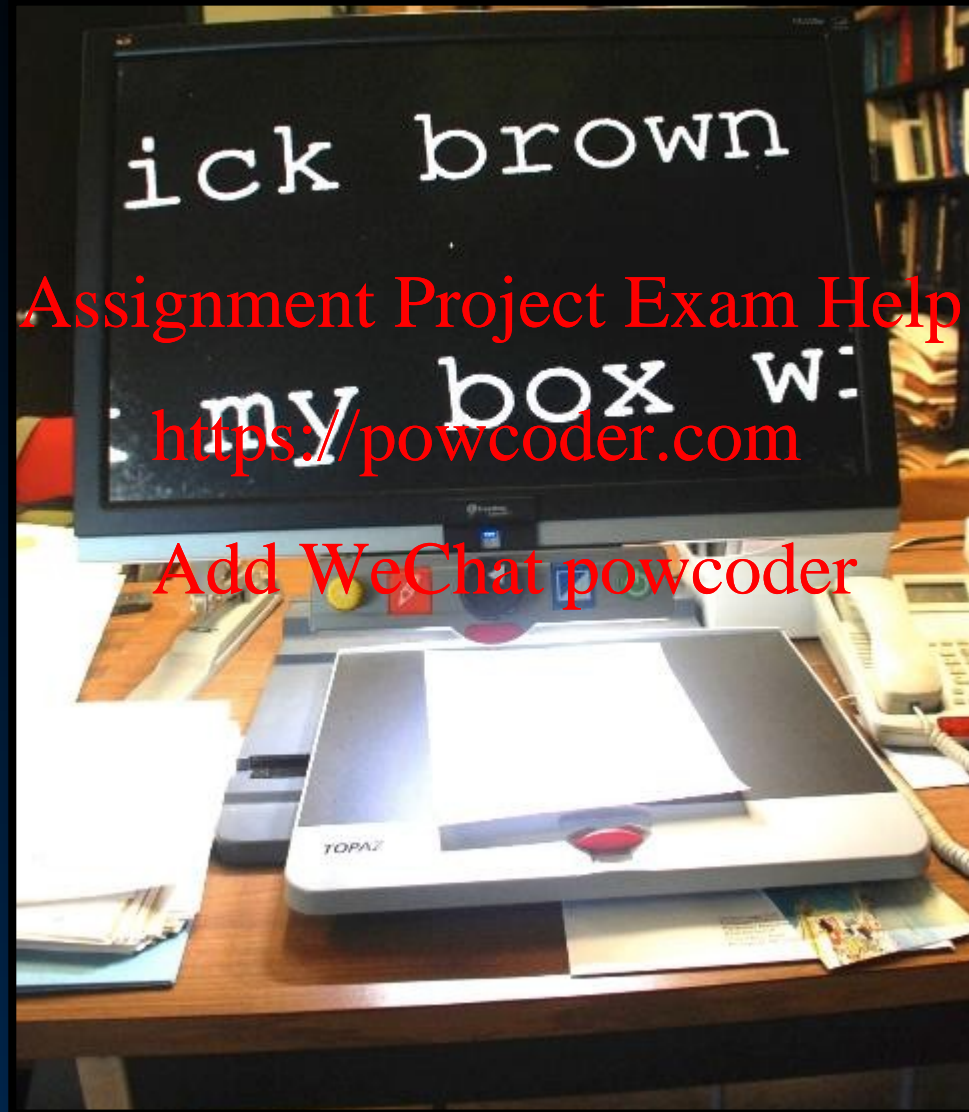
- Low vision is usually discussed in terms of:
 - Reduced acuity
 - Reduced contrast sensitivity
 - Visual-field loss.

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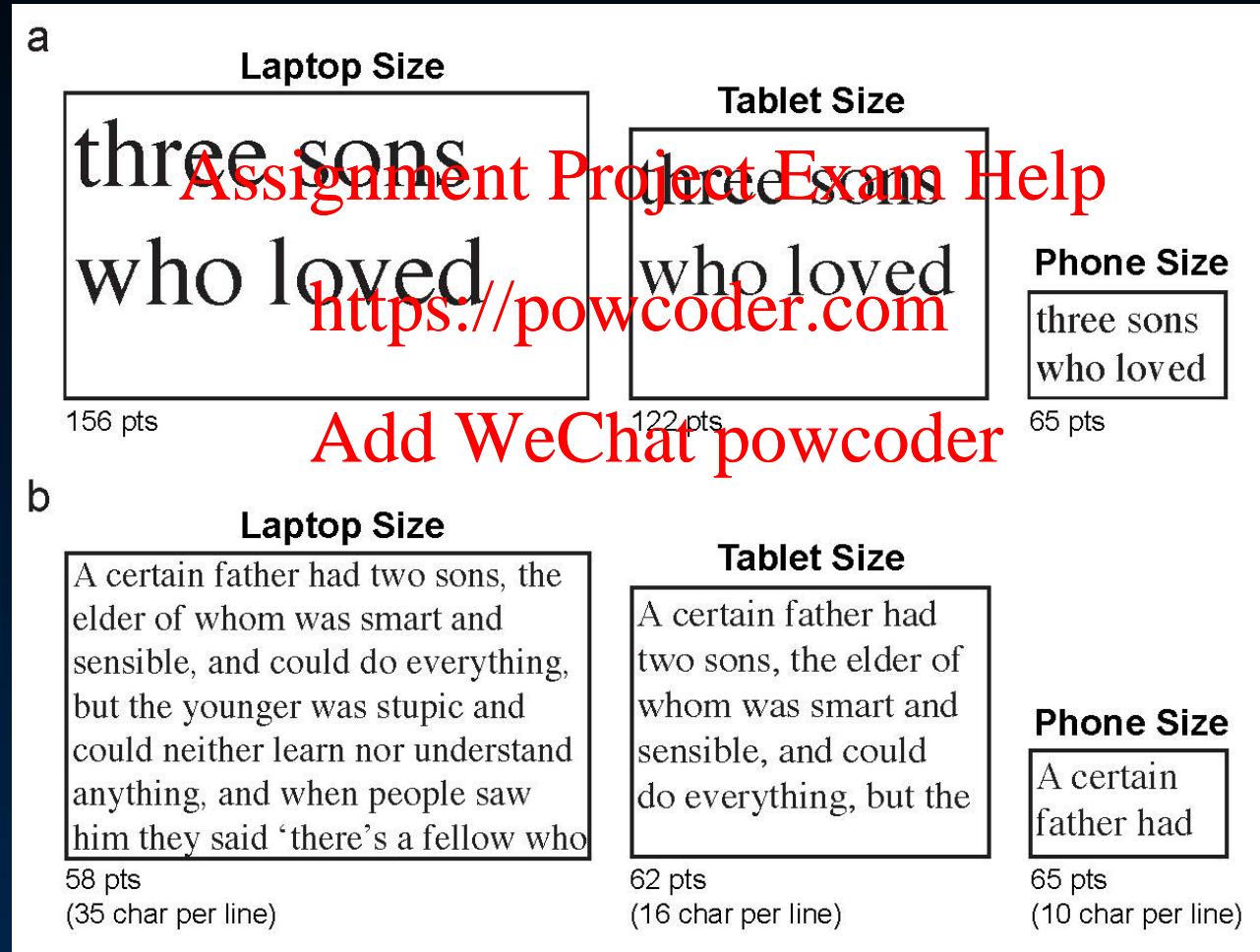
Gordon's Video Magnifier



Computer Screen Magnification Using ZoomText



Trade-off Between Print Size and Screen Size



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% Add WeChat powcoder contrast(2 sec.)

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

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3% contrast(2 sec.)
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Flashcard (2 sec, 300 wpm) contrast level 1.5%

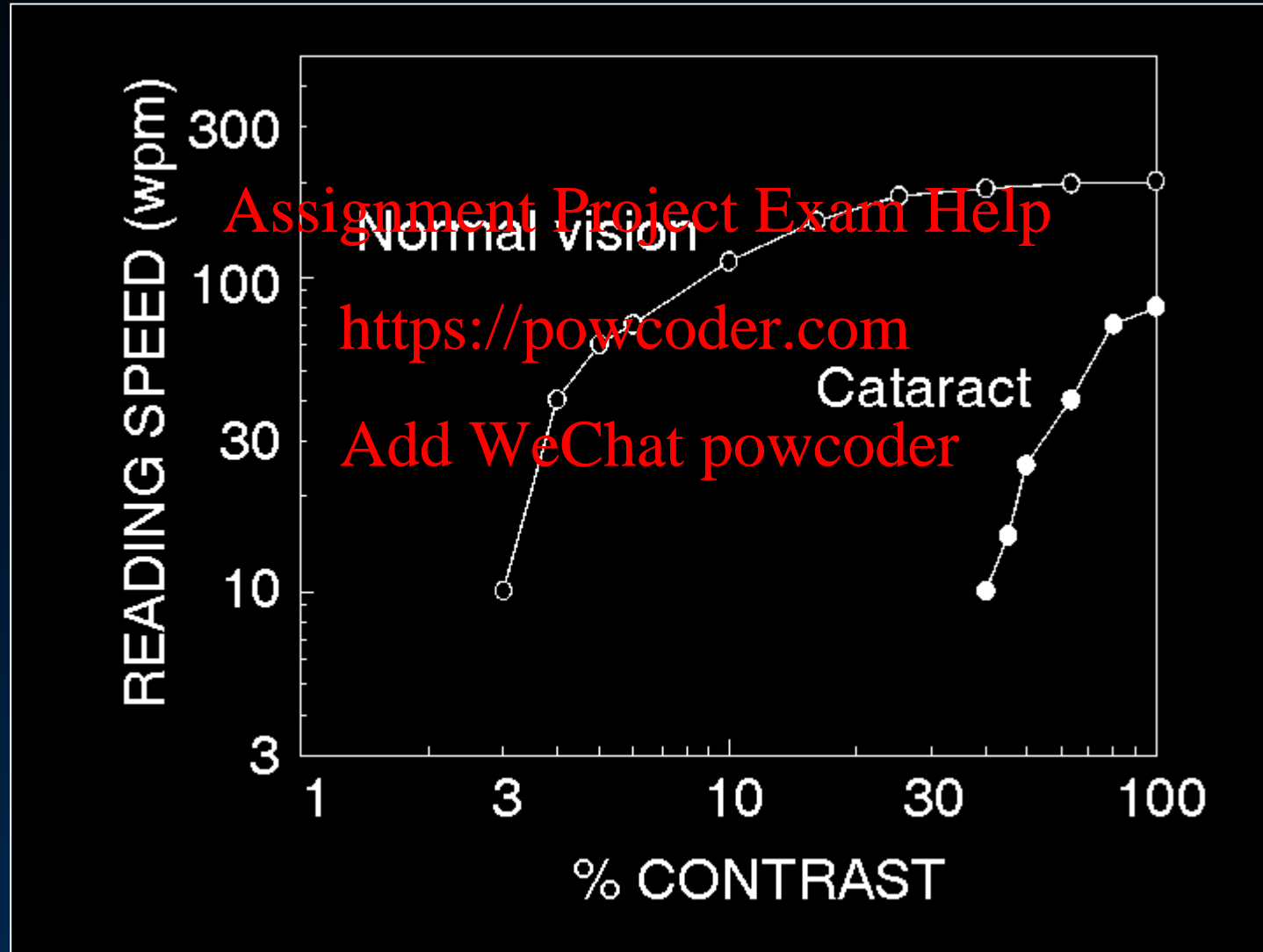
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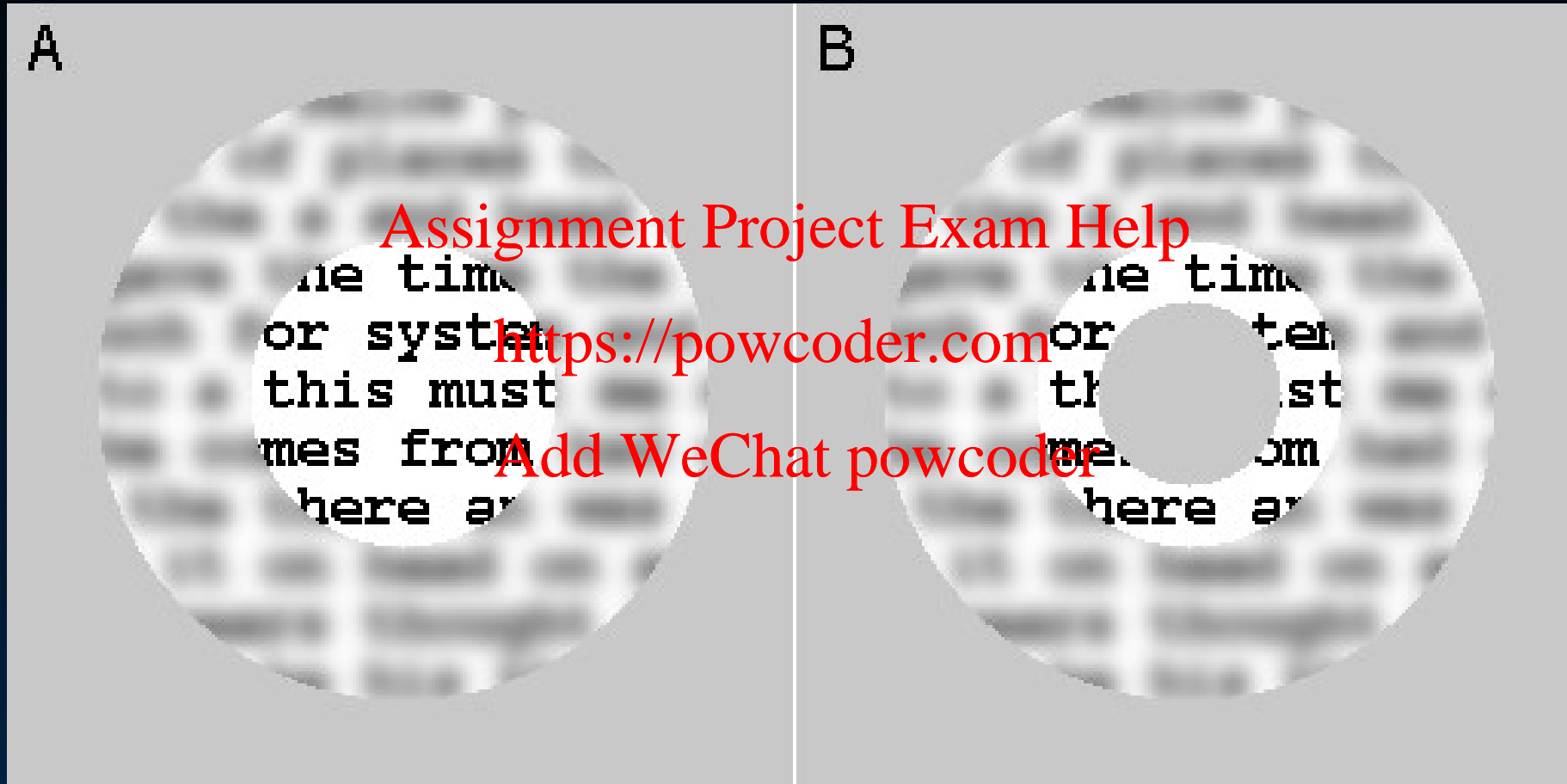
1.5% contrast(2 sec.)
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Reading speed vs. contrast

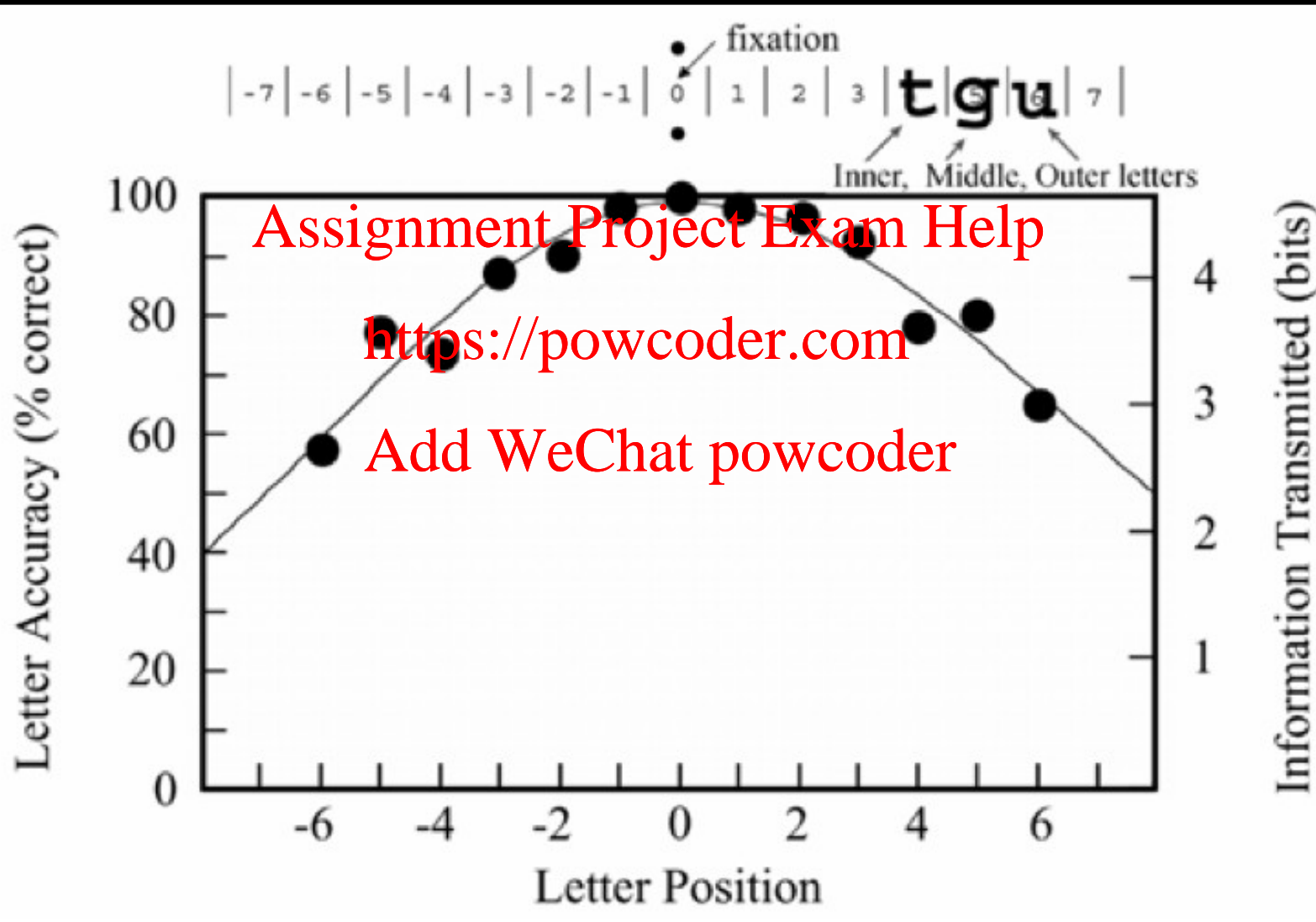
Normal and cataract



Visual span model



The Trigram Method and Visual Span Profile



Trigram (Central Vision)

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Trigram (Central Vision)

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Trigram (Central Vision)

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Trigram (peripheral vision)



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Trigram (peripheral vision)

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Personalized Remapping Schemes

★ remapping

★ rema

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★ remapping

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★ remapping

★ rema

pping

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.