MNREAD sentences

The MNREAD Acuity Chart\(^1\) uses sentences that are standardized for their vocabulary, length, and physical layout.

Vocabulary
Selected from the 3000 highest frequency words in 3rd-grade printed materials\(^2\)

Length
60 characters, including a space between each word and an implied period at the end of the sentence

Layout
\[20W - W_{\text{max}}\]

- 3 lines of left-right justified text in Times-Roman
- line length = 20W + \(W_{\text{max}}\)
- \(W\) = average character width (calculated from 11,000 60-character sentences with first letter in uppercase)
- \(W_{\text{max}}\) = width of a space character
- the between-word spaces may be narrowed by no less than 80% or widened by no more than 125% to achieve left-right justification

There is a demand for a large corpus of sentences:
- for clinical research requiring many repeated measures,
- for new vision tests that use multiple trials at each print size,
- for evaluating effects of text variables other than print size.

But it has been difficult to create sentences that meet all the MNREAD constraints. There are only 95 sentences distributed across five versions of the MNREAD Acuity Chart.

Until now!

We have created algorithmic sentence generators that write sentences that meet the MNREAD vocabulary, length, and layout constraints.

Sentence generators

1. Each generator has a phrase-structure grammar that produces simple declarative sentences using 3rd-grade-level vocabulary.

   We have 11 generators that differ in their sentence structures and vocabulary selections. These generators have spewed\(^3\) out more than a billion candidate sentences.

2. We filter these to select sentences with 60 characters ...

   Approximately 1 in 30 sentences fit the length constraint.

3. ... that fit the MNREAD layout constraints.

   Overall, this has yielded 116,000 MNREAD-compliant sentences.

   Approximately 1 in 8000 sentences fit the length and layout constraints.

   Example sentences from each of the 11 generators (A-K):

Reading performance with these sentences is comparable to that with the original MNREAD sentences.\(^4\)

MNREAD variations

Our sentence generators also allow us to test variations of the MNREAD constraints. For example:

Font — We can create sentences for any font (given the font’s width metrics.) Some sentences fit the MNREAD constraints for more than one font. This allows for comparisons of reading performance across different fonts using identical sentences.

Example sentence that fits the MNREAD format for Eido, Maxar, Courier, Helvetica, and Times:

Line length — We can create sentences with different line lengths. This allows testing for situations where text length is constrained by the reader’s device (e.g., tablet, iPhone, desktop display, etc.)

Example MNREAD sentences generated to fit 1, 2, 3, 4, and 5 times:

Reading speed for Times & Courier

Here we demonstrate the use of our generated sentences to compare reading performance with the Times and Courier fonts.

Participants
- 50 students with normal or corrected-to-normal vision

Materials
- 480 MNREAD sentences in both Times and Courier
- Printed in 8-page booklets, 60 sentences per page (print sizes 14M)
- The sentence order was the same in each booklet
- The font order (alternating pages of Times and Courier) was counterbalanced between booklets.

Procedure
- For each page, the students read as many sentences as they could in 2 mins (indicating whether each sentence ‘made sense’).

Results

Times was read 3.5% faster than Courier ([C]0.6%-6.4%, p<0.05).

This outcome is consistent with findings using earlier versions of the MNREAD chart, showing a reading speed advantage for Times over Courier in readers with normal vision.\(^5\)

Conclusions

Our sentence generator substantially expands the reading materials for clinical research on reading using the MNREAD test.

References