

Development of a “Universal Design” Font with Blur Tolerance

Tetsuya ARAI Yasushi NAKANO Ryo YAMAMOTO
Keio University, Japan

E-mail : arait@psy.flet.keio.ac.jp

An important factor that determines the ease with which textual information is conveyed is the font used, but universal design must be envisaged assuming there are a variety of readers such as the disabled and the elderly. Thus, this study sought to develop and experimentally assess a universal design (UD) font that could be easily distinguished (i.e. legible) and read (i.e. readable) by readers with varied levels of visual acuity.

Exp1 Legibility

The legibility of the new UD font and Gothic font were compared using a low visual acuity simulator.

Participants

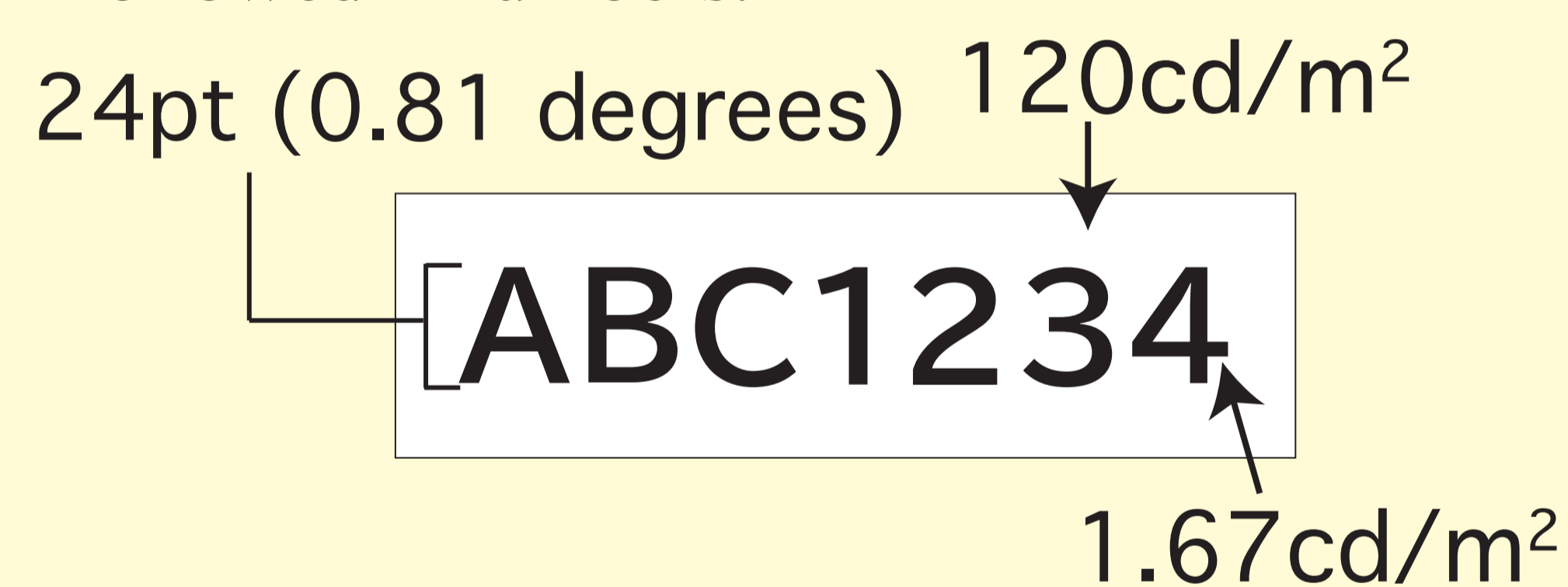
- 15 people with normal vision ages 20 to 40 (average: 27.5, SD: 4.9)
- Visual acuity was 1.0 or better.

Equipments

- Letters and numbers were presented on a CRT monitor (FlecScan T966, Eizo) with a resolution of 2048x1536 pixels.
- To simulate blurred vision, a spatial filter was used that continuously attenuate high spacial frequency components similar to those used by Legge et al. (1985) and Nakano et al. (2006).
- The viewing distance was 60cm.

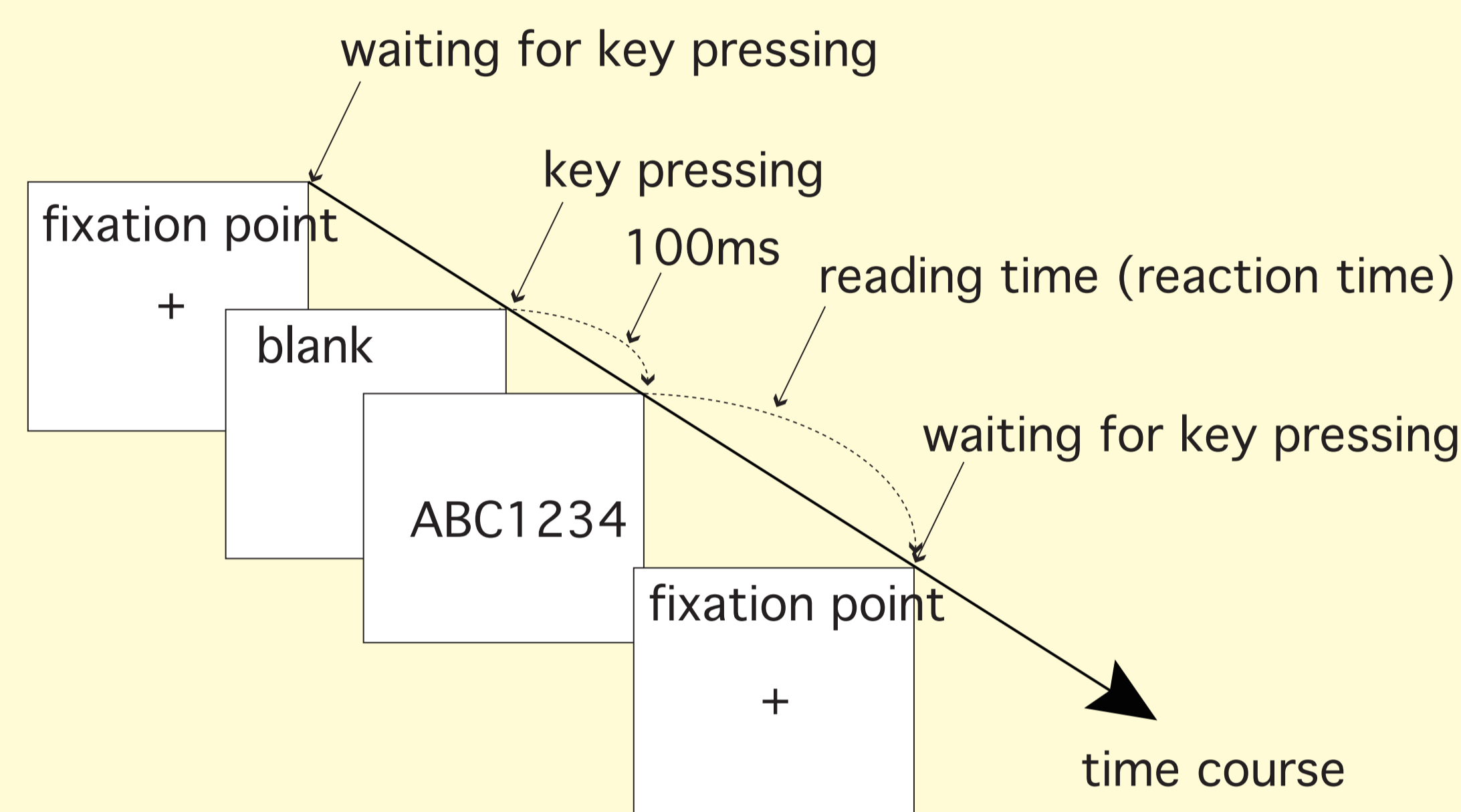
Patterns

- 7-character-long strings of letters and numbers started with randomly selected 3 letters that were followed 4 numbers.



Procedures

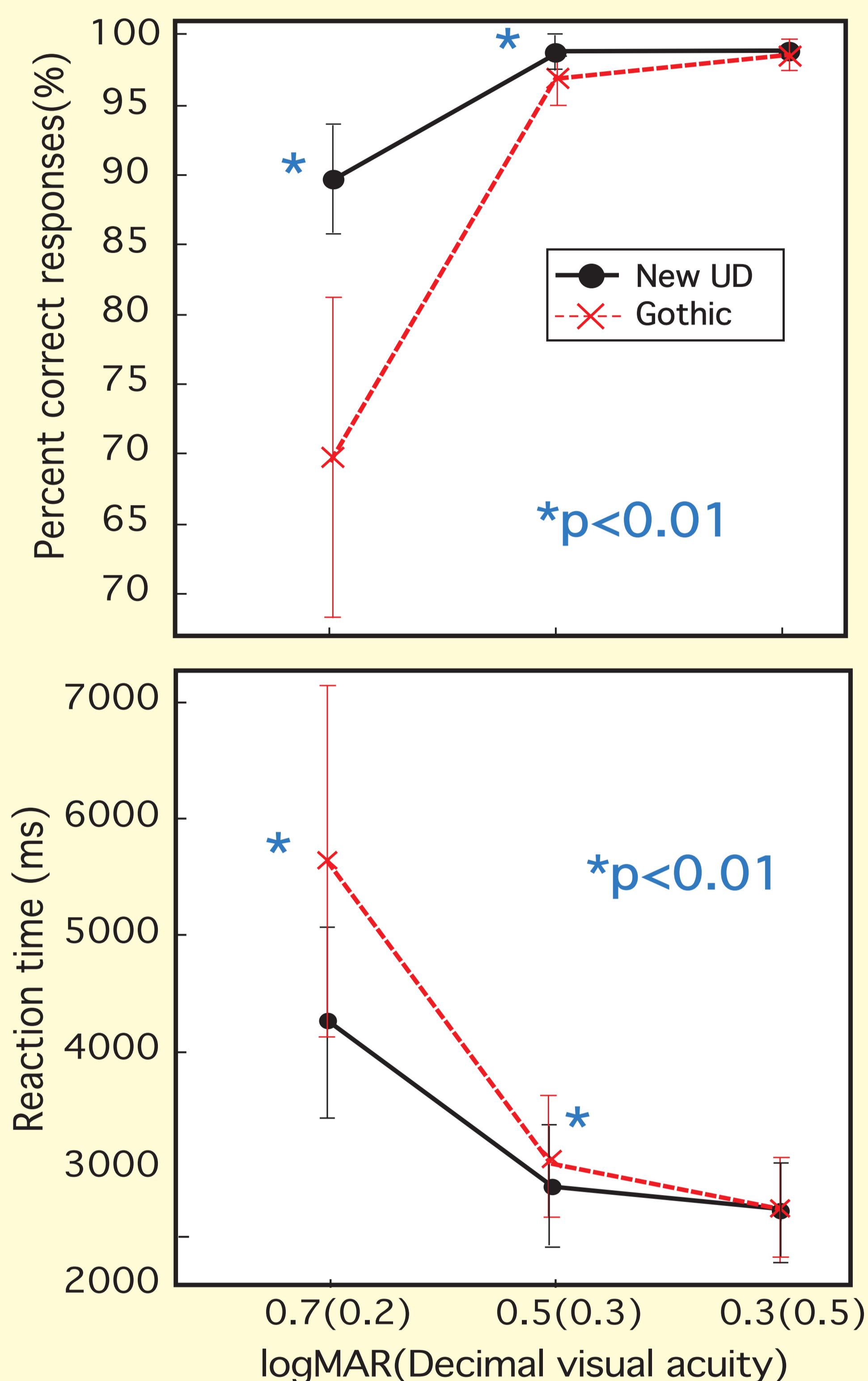
- Participants observed the strings of letters and numbers, and read aloud them in the time course shown below.



Experimental Conditions

Types of Fonts	Simulated Visual Acuity
Gothic (Morisawa New Gothic M)	0.3logMAR (0.5)
BGQ2467	0.5logMAR (0.3)
new UD	0.7logMAR (0.2)

Results



Exp2 Readability

The readability of the new UD font, Gothic font and Ming font were compared using the MNREAD-J.

Participants

- 30 people with normal vision ages 20 to 40 (average: 28.5, SD: 6.8)
- Visual acuity was 1.0 or better.
- They were divided into 3 visual acuity groups.

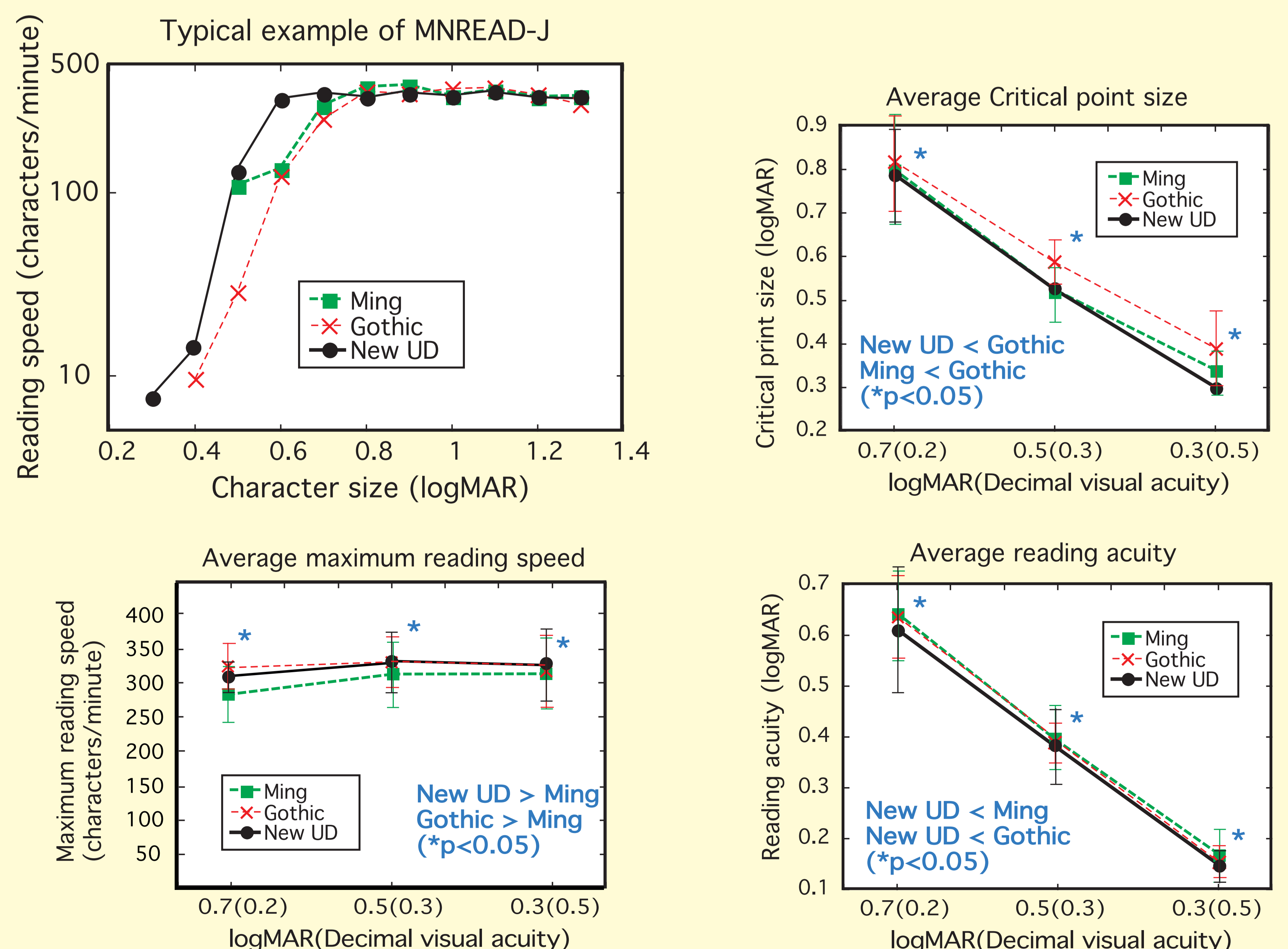
Equipments

- Low visual acuity simulator used in Exp1.
- Standard MNREAD-J (the font is Ming) and the similar charts created in Gothic font or new UD.
- Luminance on the charts was 132cd/m² and average illuminance was 528lx.

Procedures

- This experiment was performed in accordance with standard MNREAD-J testing (Oda et al., 1980).
- Participant's task was to read aloud the text shown as quickly as possible without any errors.

Results



Conclusions

- The new UD font had letters and numbers that were quickly and accurately discerned at low vision than conventional fonts did, revealing that new UD was legible and readable.