Effects of cloudiness on reading

—A comparative experiment on the contrast polarity effect using a cloudy ocular media simulation—

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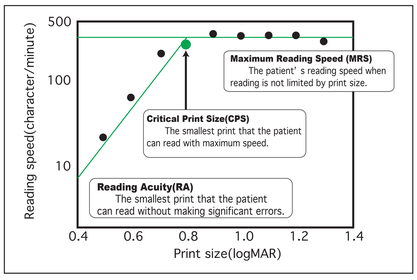
Objectives

Basic Research on Large Print for low vision students.

Legge et al. (1986) showed that reading performance is higher with white letters on a black background (white-on-black; W/B) than black letters on a white background (black-on-white; B/W) in eye disorders with cloudy ocular media. In this research, cloudy ocular media was simulated with a Bangerter filter, and an examination was conducted using MNREAD-J of which aspects that white/black inversion has an effect on (e.g., logMAR acuity, reading acuity, critical print size, maximum reading speed).



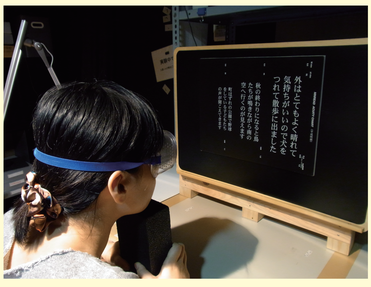
Methods

Experiments of a cloudy ocular media simulation
Simulated visual acuity was 0.5logMAR

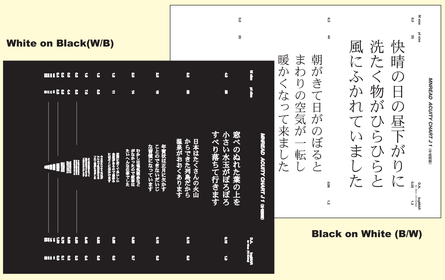
Participants : 20 adults with normal vision (Age 18 - 36, average 24.4)
Cloudy ocular media was simulated by BANGERTER filter (Simulated visual acuity was 0.5logMAR).
Tasks

1. Visual acuity was measured with the logMAR near acuity charts (B/W, W/B).
2. Reading performance was measured with the MNREAD-J charts (B/W, W/B).

BANGERTER Filter



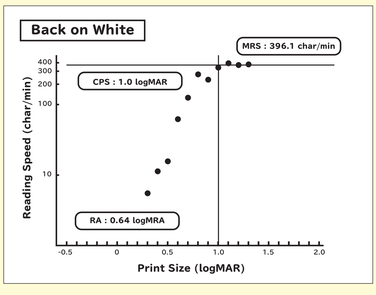
Apparatus

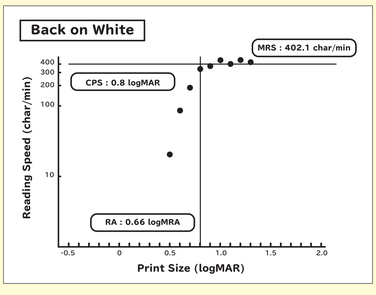


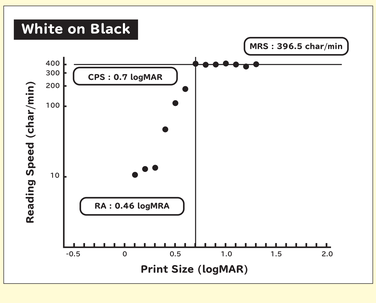
MNREAD-J (B/W, W/B)

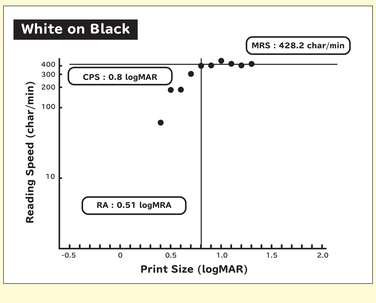
Results

Main Experiment



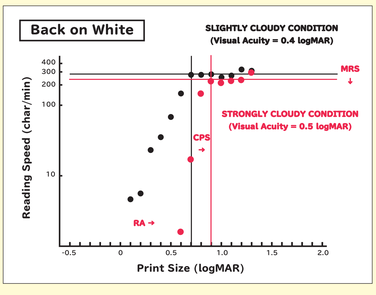


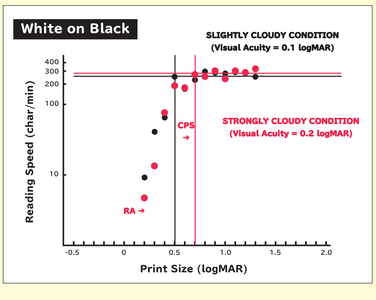




Participant 01 ***Participant 02***

Supplement Experiment





Participant 03

	Visual Acuity	Reading Acuity(RA)	Critical Print Size(CPS)	Maximum Reading Speed(MRS)
Black on White	0.5 logMAR	0.486 logMAR	0.755 logMAR	350.09 char/min
White on Black	0.25 logMAR	0.356 logMAR	0.620 logMAR	356.90 char/min

Difference between B/W and W/B : Acuity > RA > CPS
No significant difference : MRS

Conclusions

Results of a t -test showed that for logMAR visual acuity, reading acuity(RA), and critical print size(CPS), the white/black inversion condition exhibited significantly higher performance ($p<0.01$), but there was no difference in maximum reading speed(MRS). Also, the difference in performance was greatest for logMAR acuity , followed by reading acuity and critical print size.