

## SPATIAL RESOLUTION OF PEOPLE WITH LOW VISION

Nana Itoh and Ken Sagawa

*National Institute of Advanced Industrial Science and Technology  
Tsukuba, Ibaraki/Japan*

### Introduction

With increasing social attention to people with disabilities, care for people with low vision becomes important in the light and lighting field. Appropriate design of visual signs is one of the issues to be investigated for those who have fairly low visual acuity or restricted visual field due to pathological disorders in visual pathways. Data and knowledge on visual properties of people with low vision should be prepared well before any better design method is developed.

CIE published a technical report CIE 123:1997 "Lighting needs for partially sighted" to address the importance of providing better lighting for people with low vision. The report includes a number of useful information for practical lighting. Although those information are very still useful and available at present time, fundamental data for the people with low vision is still lacking.

In this paper two kinds of experimental data on the ability of spatial vision of people with low vision will be presented on the bases of large number of subjects. Contrast sensitivity function (CSF), and minimum legible font size for a single alphanumeric character are presented as useful criteria for the visibility of visual signs.

### Data: Contrast Sensitivity Function and Minimum Legible Font Size

Contrast threshold minimum contrast orientation of a presented on a threshold was number of spatial from 0.01 to 10 (cpd). A total of 72 vision were experiment, all diagnosis and tests functions before the

Figure 1 shows the functions of three people with low visual field to the retina but keeping visual field (larger restricted visual field

central part of retina (less than 10 degree), and (c) visual field only available to the peripheral part of the retina (no vision at central). Each function presented in the figure means the median value of those groups of people with low vision.

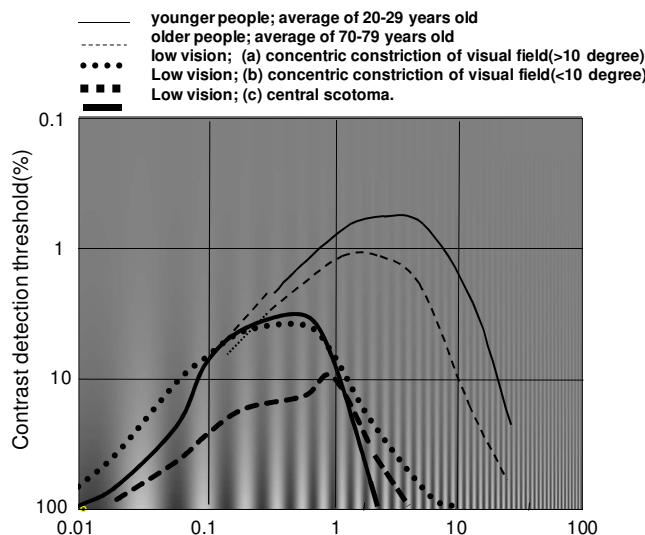


Figure 1: Contrast sensitivity functions for three types of low vision, and those for younger and old people for comparison

was defined as the required to identify grating pattern display. The measured for a frequencies ranged cycles per degrees people with low participated in the having had medical on basic visual experiment.

contrast sensitivity major types of vision; (a) restricted central part of relatively larger than 10 degree), (b) to a rather smaller

It is obvious that all of these three types of CSF of low vision have fairly low sensitivity compared to the function of older or younger people without low vision which are also shown in the figure. This means that fine details of visual signs are very hard for them to see, and therefore should be avoided in designing of visual signs, public or personal. The data give us an idea on how much fine details can be allowed in the signs for people with low vision.

To see how much font needed for people with low vision, another experiment was carried out to find minimum legible font size. Figure 2 shows the viewing conditions negative or positive the sign.

The data show also font size, for example to 700 point at a 50 cm, is needed for low vision compared younger people vision (dashed line in the figure). The large variability subjects as in the case of CSF.

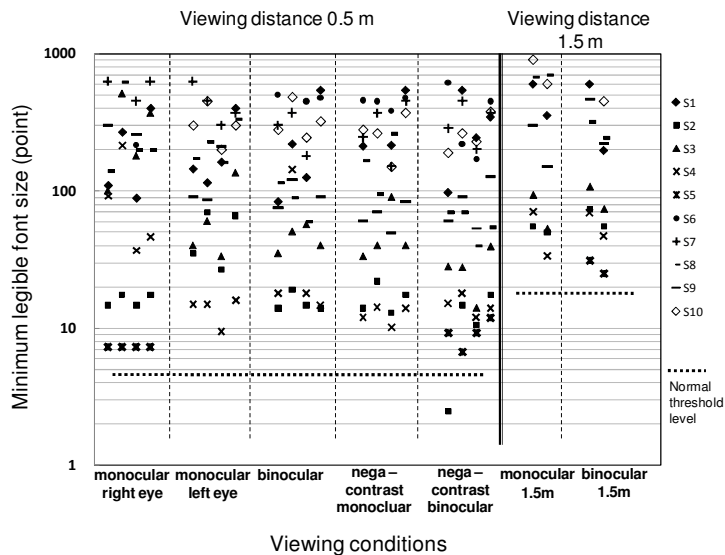


Figure 2: Minimum legible font size for people with low vision

size is with low experiment out the size for them. data in some such as polarity of

much larger a size of 100 distance of people with to the data of without low horizontal

data also show a among the

### Conclusion

Present data on contrast sensitivity function and minimum legible font size both showed fairly low ability of spatial resolution for people with low vision compared with those without low vision. The data also revealed a large variability in individual differences. These can be taken into account appropriately in the design of visual signs and lighting for people with low vision.

### Reference

[1] Itoh N, Sagawa K, Okamoto A, Mitani S, and Yoshida T, Contrast Sensitivity Function of Low Vision, Proceedings of the 9th International Conference on Low Vision, CD-ROM (2008)