Functional Impact of Task Lighting on Reading with Low Vision

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INTRODUCTION

Increased lighting is believed to benefit low vision patients in many tasks.

To date, research has evaluated patient lighting *preferences* (Rotruck, Fletcher & Walker, Poster D0279, ARVO 2015).

The LuxIQ™ (Jasper Ridge, Inc) has been promoted as a tool for prescribing task lighting.

THE QUESTIONS

Is the LuxIQ range fully utilized (i.e. necessary)?

Does reading performance improve with lighting?

Is the preferred setting optimal for patient function?

PARTICIPANTS (N=46)

Primary Diagnosis	AMD (63%), POAG (7%), Diabetic Retinopathy (7%), Optic Atrophy (7%), JMD (4%), CVA (4%), Retinitis Pigmentosa (2%), Angioid Streaks (2%), Post Craniopharyngioma (2%) Myopic Degeneration (2%)
Age	Mean: 75 years Range: 31 to 100 years
Visual Acuity (better seeing eye)	Mean: 20/155 Range: 20/20 to 20/731
Visual Acuity (worse seeing eye)	Mean: 20/401 Range: 20/160 to NLP
Contrast Sensitivity (LH)	Mean: 11/30 Range: 0/30 to 30/30

STATISTICS

Two-tailed t-tests with 45 degrees of freedom were used to compare means of reading performance measures under different lighting conditions.

METHODS

LIGHTING

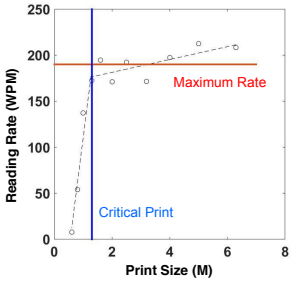
The LuxIQ™ at 4 light settings:

Ambient Room Illumination (1040 lux)
Patient Preferred Setting
Preferred + 500 lux
Preferred – 500 lux

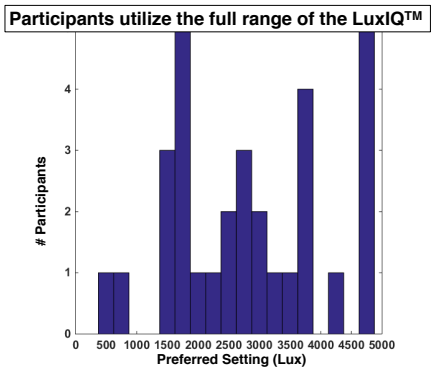
Temperature held constant at 4500°K, 575nm

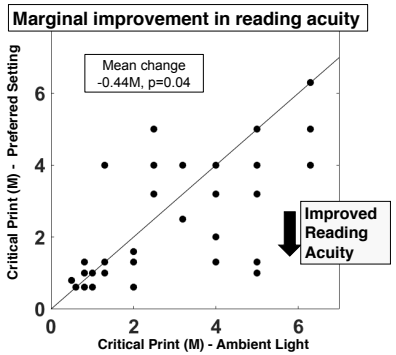
READING PERFORMANCE

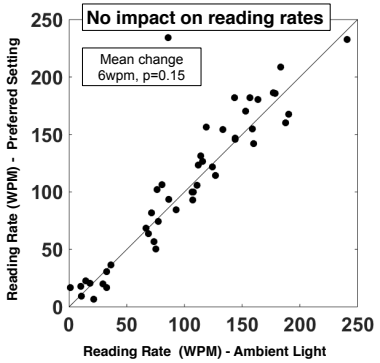
Four MNRead charts were randomized across lighting conditions. Data were fit with custom Matlab code to determine critical print and maximum reading rate.



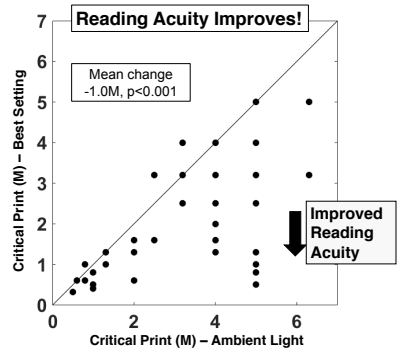
PREFFERED LIGHTING

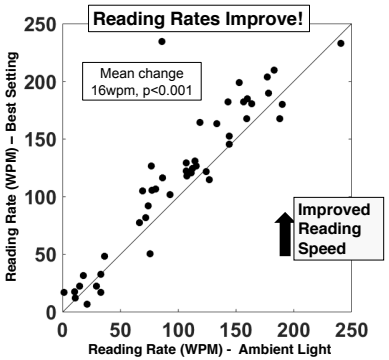






OBJECTIVE LIGHTING





CONCLUSION

Task lighting can have a significant impact on both reading acuity and reading speed.

An **objective** lighting assessment shows greater benefits for reading performance.

The LuxIQ™ is a promising tool for prescribing task lighting.

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Study Group:

ABSTRACT TITLE: Functional impact of task lighting on reading with low vision

ABSTRACT BODY:
Purpose: Individuals with low vision often complain of reading difficulties and increased lighting has been shown to enhance visual acuity (Fletcher et al. ARVO 2014 and ARVO 2015). The purpose of this study was to investigate whether: (1) lighting impacts reading function objectively; and (2) the LuxIQ is a useful or necessary tool for prescribing specific lighting needs.
Methods: Reading function of low vision and control subjects was assessed using MNRead Acuity Charts at 40cm under four light settings: ambient room illumination (280 lux), preferred setting and set points at 500 lux below and above the subjects' preferred setting. Preferred setting was measured as the participants' subjective light preference when reading their preferred size print on the MNRead chart. Temperature was kept constant at 4500 oK, 575nm. Testing began under ambient illumination and the testing order of the three remaining light settings were randomized for each subject. The LuxIQTM (Jasper Ridge, Inc) was positioned above the MNRead chart and different charts were randomly selected and alternated for each lighting condition. Charts were placed under an opaque cover revealing only the sentence which subjects were required to read. Reading rate was plotted as a function of print size to estimate critical print size and maximum reading rates.
Results: In control subjects, the different light settings had little effect on maximum reading rates, and variable effects on critical print sizes. Initial patient data suggests a more consistent impact of lighting on critical print size. Lighting preference may depend on the type of ocular pathology (e.g. Fletcher et. al, ARVO 2015), however this preference does not always confer a functional benefit to reading. The outcome measures presented here will delineate which patients are most likely to benefit from a specific lighting prescription versus simply increasing task lighting to a subjectively comfortable level.
Conclusions: Low vision practitioners commonly recommend the use of supplementary localized lighting to enhance near vision tasks. The findings from this study provide guidance as to whether practitioners can benefit low vision patients by providing an objective lighting prescription.