

INFLUENCE OF MEAN POWER DISTRIBUTION IN SUBJECTIVE PPL WEARERS SATISFACTION

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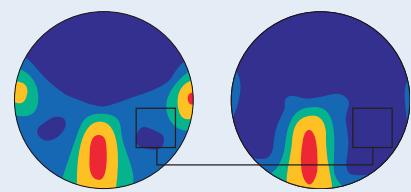
INTRODUCTION

The gradual increase of power from the top to the bottom of a progressive lens (lead to a blur in the peripheral areas of the lens. This blur is characterized by a spherocylindrical power inherent to the geometry of these kind of lenses. So the **geometrical limitation explained by Minkwitz⁽¹⁾** avoids to develop a PPL without any peripheral distortion. Therefore, the goals of most of **designers** have been to minimize them to their geometrical limits.

Personalization of lenses considering position of wear parameters has provided a significant improvement in the decrease of lateral distortions⁽²⁻³⁾. However, the main techniques used to reduce the amount of unwanted astigmatism are reducing the effective visual fields or increasing the corridor length. So, it is necessary to find a compromise between the different characteristics of a progressive lens to get lenses with wide effective visual fields, comfortable position of the main visual areas and minimum unwanted astigmatism. However, we think that **the peripheral distribution of mean sphere also plays a significant role in lens performance⁽²⁻⁴⁾** and it is not well known its influence.

MEAN SPHERE DISTRIBUTION

Differences in the mean sphere distribution should result in differences in visual performance.



PURPOSE

The objective is to assess the influence of the average value of the mean sphere in the peripheral regions of the PPLs, mainly in the nasal and temporal sides of the upper intermediate and far regions, on visual perception.

MATERIALS AND METHODS

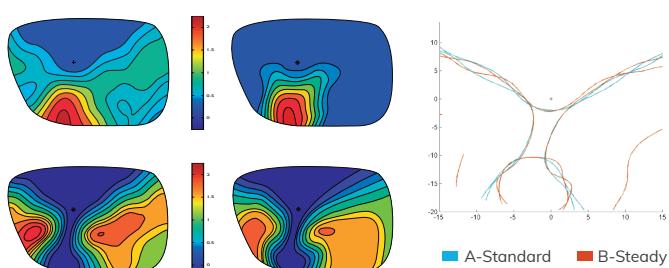
DESIGN

A prospective observational double masked study was performed on presbyopic subjects who were experienced PPLs wearers.

PROGRESSIVE LENSES

PPLs were created ad hoc for this study, manufactured with a variable front curvature (Camber™, Younger Optics), and personalized according to the use parameters (Digital Ray Path®, IOT). Each subject tested two pairs of lenses having a similar cylinder map. **One of the pairs had a design with a mean sphere map with positive values** in the peripheral areas of the lens (lens A-Standard). **The other one was designed to have a flatter mean sphere distribution** at the periphery, having an average value closer to zero in these lateral parts (lens B-Steady).

A-STANDARD B- STEADY SHEEDY CONTOURS



STAGE I: FIRST IMPRESSIONS EVALUATION

Subjects were asked to score designs in a scale from 1-5 for near, intermediate and far tasks, when they wore them for the first time.

STAGE II: ADAPTATION EVALUATION

Subjects were asked to score designs in a scale from 1-5 after using both pairs of glasses for 7 days each. They were also asked to choose the best lens for their everyday visual tasks and also when using electronic devices, and to choose the one they considered better in terms of adaptation.

STAGE III: COMPARATIVE EVALUATION

Additionally, subjects were asked to select the pair of lenses that provided them with a better visual performance when doing some specific tasks, after using both pairs of glasses for 7 days each.

STATISTICAL ANALYSIS

A design of randomized complete block test was used to determine differences in visual acuity between the 2 pairs of progressive designs. All statistical tests were performed using Statgraphics Centurion XVI.II software with a significance level of p-value <0.05.

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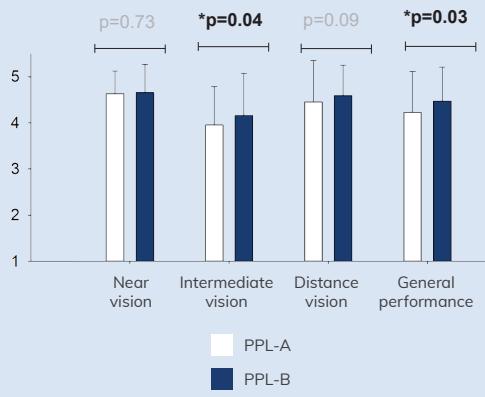
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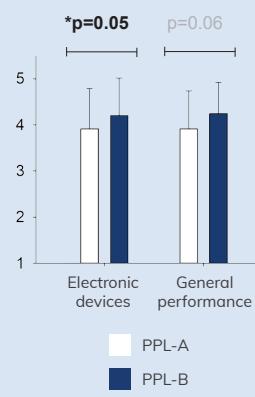
RESULTS

The sample consisted of **45 presbyopic subjects with power additions from 1.50 D to 2.75 D**. The **B-Steady lenses performed statistically and significantly better in overall** ($p=0.03$) and intermediate vision ($p=0.04$) for first impressions. After 7 days, **vision when viewing electronic devices was better for B-Steady lenses** ($p=0.05$), and B-Steady lenses were significantly preferred by 42 of wearers at far vision ($p=0.005$), 44% at intermediate vision ($p=0.01$), and 53 in overall satisfaction ($p=0.03$).

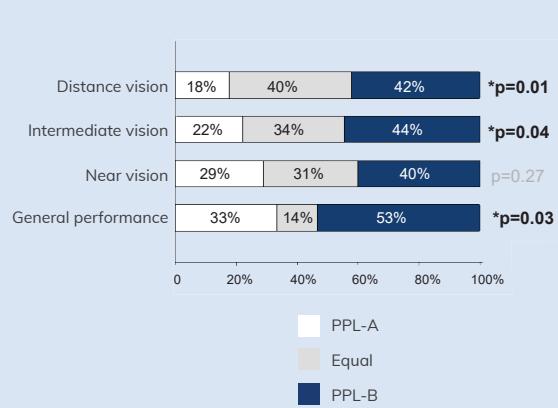
FIRST IMPRESSIONS QUESTIONNAIRE



ADAPTATION QUESTIONNAIRE



COMPARATIVE QUESTIONNAIRE



CONCLUSIONS

PPLs having peripheral distribution of mean sphere close to zero diopters seems to provide better performance in terms of overall satisfaction and at far and intermediate tasks, but they don't provide any significant improvement for near vision. As a result, mean sphere power distribution plays a key role in the visual performance of the lens and affects significantly the wearer satisfaction of the PPLs.

REFERENCES

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