

# FAR BINOCULAR VISION AND AGING.

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## INTRODUCTION

In the last decades, numerous studies on the effects of yellow filters in the visual performance have been carried out, presenting discrepancies among the different investigations. Yellow filters were developed to avoid the deterioration that takes place in the visual perception for activities like sailing, driving at night and at dusk, hunting (Clark, 1969a), skiing, aviation (Hedblom, 1961; Clark, 1969b), and target shooting (Bierman, 1952), etc. Nowadays, yellow filters are used because of the apparent improvement on brightness perception (Chung et al., 1999; Kelly, 1990) as well as on the **contrast sensitivity** under photopic illumination conditions (Yap, 1984; Rabin et al., 1996; Wolffsohn et al., 2000), and also on several ocular pathologies (Rosenblum et al., 2000; Linnik et al., 1992; Kinney et al. 1983). ). However, under mesopic conditions the existent studies are scarce and that of Yap (1984) does not find any improvements either. The purpose of this investigation was to evaluate brightness perception through a yellow filter without residual reflections, with the intention of psychophysically quantifying its influence on the visual performance under mesopic illumination conditions, where the ocular chromatic aberration is bigger. The current study investigated the influence of the yellow filter X-482 with coated treatment, on luminance thresholds in the central visual field (30°) under mesopic conditions.

Table 1. Results of heterophoria and prism vergence values from various studies

Source	Data	Phoria 6 m		Vergences 6 m			
		Mean	SD	Negative		Positive	
				Mean	SD	Mean	SD
Morgan	1944	-1	2	X/7/4	X/3/2	9/19/10	4/8/4
Borish	1970	-1	1	X/7/4	-/2/1	9/19/10	4/4/10
Amigo	1974	-2	1	X/8/4	-/2/-	9/20/10	2/3/2
Sheedy and Saladin	1983	-1	4	X/8/5	-/3/3	15/28/20	7/10/11
Daum et al.	1988	-1	2	X/8/5	-/2/2	15/29/17	9/19/13

## METHODS

We performed previous test: far monocular visual acuity, automated refraction, monocular subjective refraction and cover test. All subject that present either tropia or supression caused by refractive ambliopia, strabismus, anisometropia or unilateral cataracts were excluded.

We place the patient's best refractive correction in the phoropter and then we proceed to evaluated distance foria and distance far vergences.

Von Graefe Technique were used to evaluate distance horizontal heterophoria and Risley rotary prism were used to evaluate distance horizontal fusional vergence ranges<sup>8</sup>. Subjects viewed one vertical line of letters on a projector screen 6 m away, wich will provide a precise stimulu for fixation.

We investigated 271 subjctes with ages between 21 and more than 70 years old. Table 2

Table 2. Subjects in each group of age

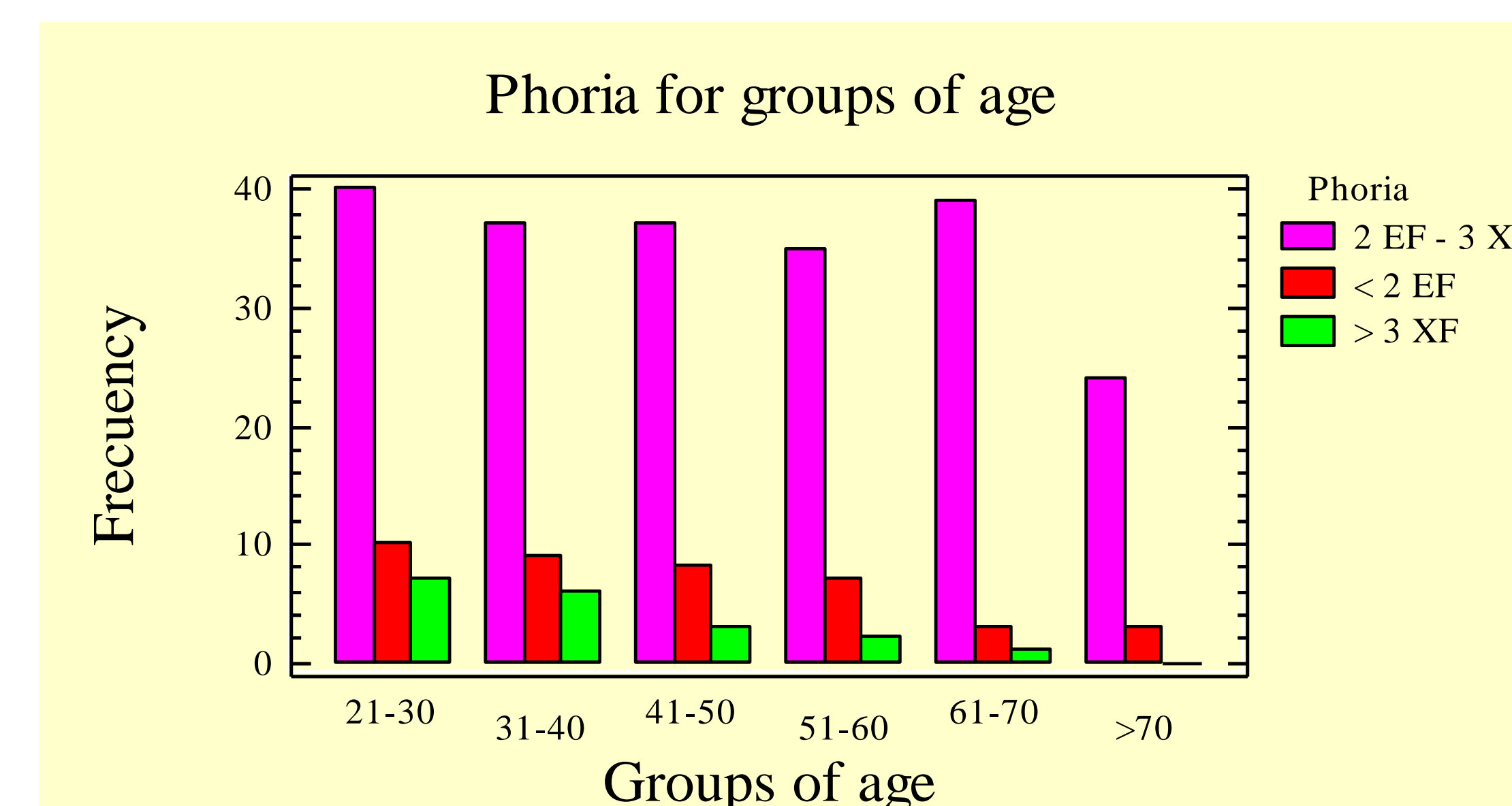
AGE	N
21-30	57
31-40	52
41-50	48
51-60	44
61-70	43
>70	27

## RESULTS

The results show that for all groups of age, the value phoria, between 2 Δ esophoria (EF) and 3 Δ exophoria (XF), is the most prevalent. Exophoric values are more frequent in more youngest subjects but are not present in older ages. However, esophoria is present in all groups of age in the same ratio. Figure 1.

Phoria values don't have statistical significance difference between groups.

Figure 1. Far Phoria Frequency for groups of age



Distance vergence amplitudes break and recovery values (means and standard deviations) were determined for each group of age, and are listed in Table 3.

Table 3. Means and standard deviations for smooth distance vergence.

AGE (years)	N	Base-out Break (Δ)	Base-out Recovery (Δ)	Base-in Break (Δ)	Base-in Recovery (Δ)
21-30	57	19 8	8 5	9 3	5 2
31-40	52	18 9	6 5	10 3	5 2
41-50	48	20 8	5 4	9 3	4 2
51-60	44	20 9	5 4	9 2	4 2
61-70	43	19 7	4 4	9 2	3 2
>70	27	17 7	5 7	9 2	3 2

Data analysis (analysis of varizance) of the differences between the mean responses were calculated, wich indicated not significant between-group differences for distance base-out break and base-in break. However, we found a significant difference between-group for base-out recovery (df = 5, p = 0,0005) and base-in recovery (df = 5, p = 0,00001). The figure 2 and 3 present these results.

We applied a multiple comparison procedure to determine wich means are significantly different from wich others. The method currently being used to discriminate among the means is Fisher's least significant difference (LSD) procedure. Table 4 and 5.

Table 4 Multiple Range Test for Recovery base-out.

CONTRAST	DIFFERENCE
21-30 - 31-40	1.9
21-30 - 41-50	3
21-30 - 51-60	2.9
21-30 - 61-70	4.3
21-30 - >70	3.2
31-40 - 61-70	2.4

Table 5. Multiple Range Test for Recovery base-in

CONTRAST	DIFFERENCE
21-30 - 41-50	1.2
21-30 - 51-60	1.6
21-30 - 61-70	2.3
21-30 - >70	2.5
31-40 - 51-60	1.2
31-40 - 61-70	2
31-40 - >70	2.2
41-50 - 61-70	1.1
41-50 - >70	1.3

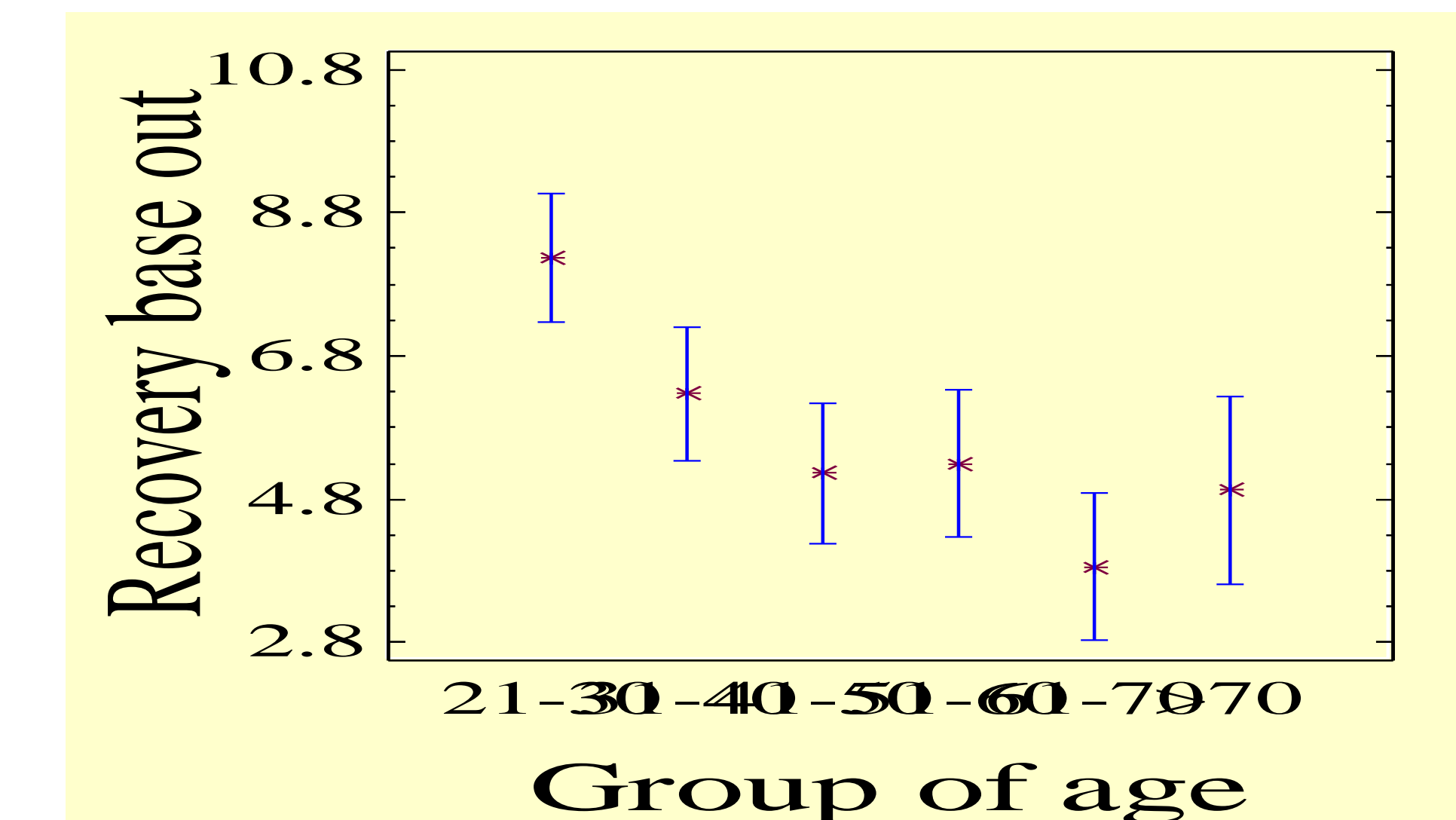


Figure 2. Means and Least Significant Difference for Recovery Base-Out

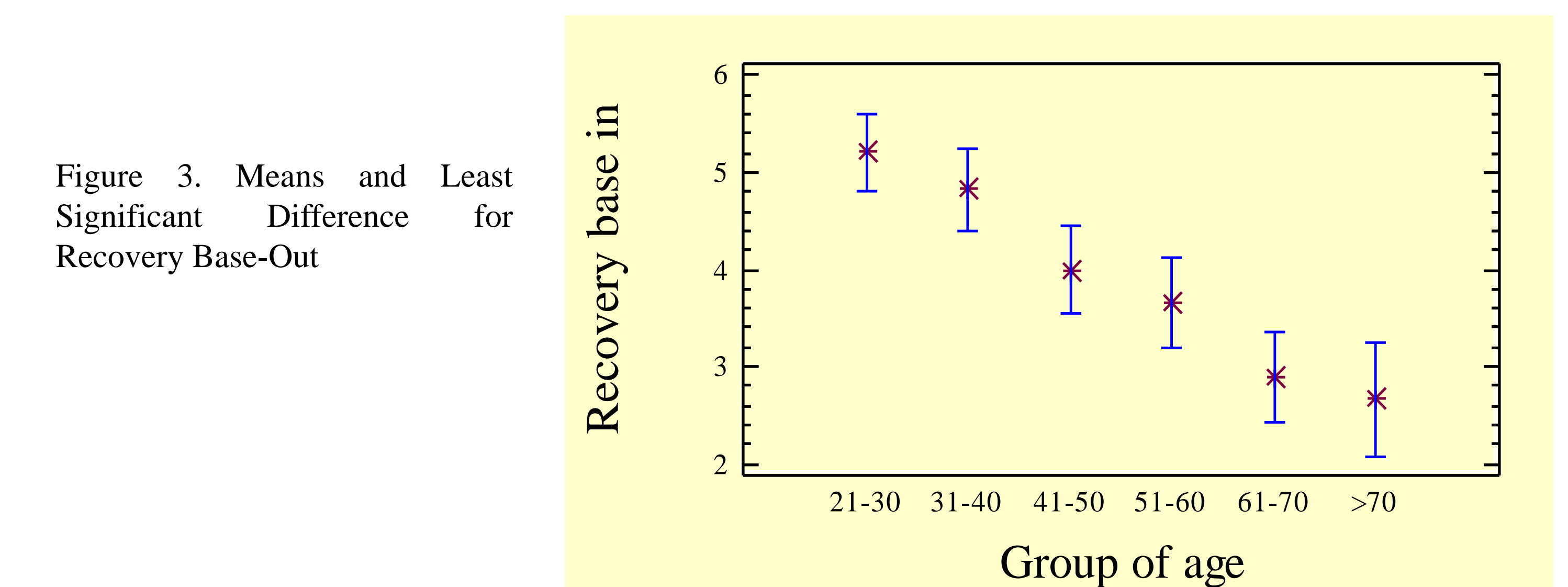


Figure 3. Means and Least Significant Difference for Recovery Base-Out

## DISCUSION y CONCLUSION

We found that distance phoria values more prevalent is orthophoria. Exophoria disappear in older group, and all group of age present the same frequency of esophoria values. This variable don't suffer significant changes with the age.

Distance smooth vergence break base-out are like values obtained by Morgan, Boris and Amigo; and smaller than values offer by Sheedy and Saladin and Daum et al. Recovery base-out values are smaller than values obtained by others research<sup>5,6</sup>

Break and recovery base-in values are slightly bigger that the results showed in table 1.

In referrence at differences between groups for age, we found significant differences in recovery base-in and base-out. Although the differences are between 1 and 4 Δ, they are not clinically significant . Also, we can appreciate that recovery values decrease with age.

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