

THE VISUAL AFTERIMAGE AND THE SPATIAL PERCEPTION

POSTIMAGEN VISUAL Y PERCEPCION ESPACIAL

M. AGUILAR and J.C. SORIANO

*Departamento Interuniversitario de Optica Valencia-Alicante.
Dr. Moliner, 50. Burjasot. Valencia. Spain.*

ABSTRACT

The apparent size of the visual afterimage mentally projected upon a screen is a function of the distance to the surface upon which it is "projected" (Emmert, 1881) (1). In complete darkness and without an actual screen, we can also observe changes in the apparent size of the afterimage. With head or arm movements we can imagine that the distance at which the afterimage is projected is changed, causing the perceived size of the afterimage to change. (Gregory et al., 1959).

We are in agreement with Gregory et al. (2) who, referring to the classic experiment by Holway & Boring (1941) suggested that the variation in the size of the afterimage with respect to its localization distance (the projection on a real or imaginary screen) may be related to the phenomenon of size constancy in the object space.

RESUMEN

Se ha probado con seis observadores que el tamaño aparente de las postimágenes visuales en la oscuridad, coincide con el tamaño de la proyección de dichas imágenes en una pantalla separada del observador, distancias próximas al metro. Esta coincidencia indica que con la sola información de la imagen visual, nosotros localizamos el objeto a un metro de distancia.

1. INTRODUCTION

Experiments carried out in our laboratory show that in with monocular viewing, in complete darkness and without movements of the observer or the presence of an actual screen upon which project the afterimage, the size of the afterimage is approximately equal to the apparent size found when the distance to the screen is about 1 m away, an, for a constant visual angle of the stimulus, is independent of the source distance which originally produced the afterimage. This result is obtained by adjusting a projection screen in distance until the apparent size of the afterimage on the screen

equals that produced by the positive afterimage previously viewed in complete darkness.

Our results show that in the absence of additional information (adaptation, binocular vision, convergence, background, depth of focus, ocular movements, previous knowledge of the objects, contrasts, size, colors, etc.) and if we have only the information given by the size of the retinal image, we locate the stimulus at a distance between 0.5 and 1.5 m.

Our finding supports justifies the theory of Otero and Aguilar (1951) used (4) to explain night myopia, based on the resting state of the eye's optics corresponding to an accommodation of between 1 to 2 diopters.

2. EXPERIMENT

The source of the afterimage was a incandescent lamp of 13 cm in diameter at a distance of 1 m with a luminance of 800 cd/m^2 . In a series of observations the diameter of the source was modified to have a constant subtended angle of 2° for the observation distances of 1, 2, 3, 5, and 10 m. Finally we work with subtended angles of 5° and 10° .

A circular positive afterimage was generated by observer's monocularly viewing an incandescence source for 55 seconds in an otherwise totally darkened room. The stimulus was then removed and the observer fixated an illuminate white screen at a distance of 10 m and reported on the equality in size of afterimages. If the size of the negative afterimage (appearing as a black shadow on the white screen) was larger than the positive afterimage one (eye closed), then the observer closed the eye and approach to the white screen advancing 1 m. He waited until the formation of the positive afterimage and then he again compared the pair in size repeating this procedure until the negative afterimage appeared to be the same size as the positive afterimage. The distance of the projection screen at which this occurred was noted.

We used 6 observers 20 to 30 years old and a total of 120 measures, in all cases, using several sizes of visual angle for the stimulus sources. The distance required to produce equality in the apparent size of the afterimages was a comprise between 0.5 and 1.5 m. The left eye of the observer was occlude during all the experiments.

3. CONCLUSION

The apparently equal size of the negative afterimage projected upon a screen at a distance of about 1 m, and the positive afterimage in darkness prove that in the absence of information other than the retinal image, we locate our visual world in a distance approximately 1 m.

SUMMARY

It was verified with 6 observers that the apparent size of the visual afterimages in darkness coincides with the size projection of the observer's of the afterimage on a screen placed at about 1 m distance. This fact signifies that with only a information as to the visual image we locate objects at around a 1 m distance.

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