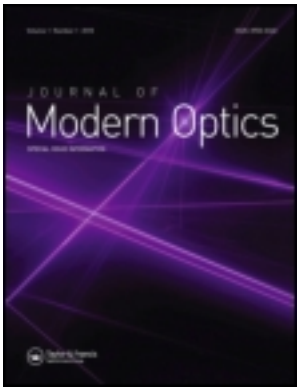

Optica Acta: International Journal of Optics

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tmop19

The Perception of Moving, Spatially Periodic, Intensity Distributions

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Available online: 11 Nov 2010

To cite this article: David H. Foster (1968): The Perception of Moving, Spatially Periodic, Intensity Distributions, Optica Acta: International Journal of Optics, 15:6, 625-626

To link to this article: http://dx.doi.org/10.1080/713818130

OPTICA ACTA, 1968, VOL. 15, NO. 6, 625–626

The perception of moving, spatially periodic, intensity distributions

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(*Received* 7 *June* 1968; *revision received* 19 *June* 1968)

Experiments have been carried out to investigate the response of the human eye when stimulated by a moving periodic distribution of intensity. The experimental arrangements consisted of a radial square-wave grating placed immediately behind an annular aperture, portions of which could be masked off; the grating was illuminated from behind, and a uniform background was provided using a beam splitter. The total angular subtense of the complete annulus at the eye was 1·5°.

The resulting pattern was viewed by the observer monocularly via an artificial pupil, whilst fixating at the centre of the annulus. The observer was able to control the speed of rotation of the radial grating. The illumination was from rectified, smoothed a.c. sources with residual ripple less than 0·3 per cent at 300 c/s.

The purpose of this letter is to report the finding of two critical speeds. It was found that there was an upper critical speed of rotation above which fusion occurred. This is analogous to critical fusion frequency for spatially stationary flashing sources. As the speed was reduced a second critical speed was reached, below which both the direction of the motion as well as he sensation of motion were apparent, and above which only the sensation of motion was apparent. It was also found that the two critical speeds of rotation are functions of the area of annulus exposed and the grating period, as well as of the background luminance and fixation.

Thus, it seems the eye is capable of distinguishing two qualities associated with moving figures: the sensation of motion, per se, and the sense of direction of the motion. Therefore, at low input rates (low angular speeds), the eye is capable of extracting all the information available; as the input rate is increased, a point is reached where ' half ' the information is lost (the directional part); and at even higher input rates all the information is lost.

Quantitative results regarding these phenomena have been obtained and will be published in due course.

When large portions of the annulus were exposed, a 'stroboscopic' stationary pattern effect was obtained. This may be similar to that observed by Rushton [1] but did not appear to be associated either with sound or with vibration from the motor. This too is being further investigated.

Reference

Rushton, W. A. H., 1967, *Nature, Lond.*, **216,** 1173.