

Article Reach
InterLibrary Services
Main Library

ARLIR Article Request Wed Oct 10 08:23:52 EDT 2007

REQUESTING LIBRARY RECEIVING METHODS:

>>Ariel IP Address: 205.227.91.137<<

CENTRAL ARIEL PATRON NAME:

Odyssey IP Address:

MAIL: Knight Library, ILL Unit, 1299 University of Oregon, Eugene, OR 97403

FAX: 541-346-3094

EMAIL: libill@uoregon.edu

REQUEST ID: 27956

Mail Electronic Fax Local Pass: _____

Patron #: p112308009ore0

PATRON DELIVERY PREFERENCE: Not Specified

Patron Note:

JOURNAL: Psychopharmacology

ARTICLE: Modification of visual orientation illusions by drugs which influence

AUTHOR: Gelbtuch, M H

YEAR: 1986

MONTH:

DAY:

QUARTER:

SEASON:

VOLUME: 90

ISSUE: 3

NUMBER:

PAGES: 379-83

PAGED LOCATIONS: >>za006<<, 9cubp

Staff Note:

LOCATION: MSU MAIN LIBRARY

CALL NUMBER: RC321 .P73

HOLDINGS: v.47 1976-v.184 2005

Modification of visual orientation illusions by drugs which influence dopamine and GABA neurones: Differential effects on simultaneous and successive illusions

M.H. Gelbtuch, J.E. Calvert, J.P. Harris, and O.T. Phillipson

Brain and Perception Laboratory, Anatomy Department, Medical School, University Walk, Bristol BS8 1TD, UK

Abstract. The effects of haloperidol, nomifensine and lorazepam on the visual tilt illusion were studied in normal volunteers. Haloperidol and nomifensine produced no significant changes in the illusion, although in previous work they had been found to reduce and enhance, respectively, a closely related illusion, the tilt aftereffect. By contrast, lorazepam produced a dose-related increment in the size of the tilt illusion, but had no effect on the tilt aftereffect. The results are discussed in relation to proposed mechanisms which may underlie the two kinds of illusion. The differential effects of individual drugs on the two illusions may reflect their differing actions on two processes: lateral inhibition and adaptation in visual channels.

Key words: Haloperidol – Nomifensine – Lorazepam – Visual tilt illusion – GABA – Dopamine

There is ample evidence that in acute schizophrenia, an illness in which a malfunction of brain dopaminergic mechanisms has been heavily implicated (see Crow et al. 1976 for review) various relatively simple aspects of perception are abnormal. Such evidence comes from the reports of patients themselves (e.g. Chapman 1966; Phillipson and Harris 1985) as well as more objective studies (see, e.g. McGhie 1977 for review). To complement such studies of patients, we have begun to examine the effects of drugs which are known to affect dopaminergic transmission on visual perception in healthy volunteers. Two commonly studied visual effects – the movement and tilt aftereffect (Anstis 1975; Braddick et al. 1978; Frisby 1979) – are perceptual distortions of motion and orientation. The tilt aftereffect (TAE) is the apparent tilt of a line or grating which follows prolonged inspection of a line or grating in a slightly different orientation. The movement aftereffect (MAE) is the apparent motion of a stationary field which follows inspection of a moving field. It has been reported that the MAE is abnormally long in schizophrenia (Abraham and McCallum 1973; Claridge 1967). We have found that the neuroleptic drugs chlorpromazine and haloperidol reduce both the movement and the tilt aftereffects, while the antidepressant nomifensine, which potentiates dopaminergic transmission by preventing the re-uptake of dopamine, enhances the tilt aftereffect (Harris et al. 1983, 1986).

How might the drugs produce these changes? One ex-

planation for the TAE is that it results from the effects of prolonged lateral inhibition in the visual cortex (Tolhurst and Thompson 1975). Thus, during inspection of the adapting stripes, inhibition from the most excited orientation detector is supposed to produce a short-lived reduction in the output of detectors which prefer neighbouring orientations. When the subject subsequently inspects the test stripes, the detectors giving the greatest output may not be those whose preferred orientation corresponds to the physical orientation of the test grating, and so a shift in apparent tilt occurs. So, we speculated, one possible effect of the drugs might be to change the strength of lateral inhibition in the visual cortex. If this speculation is correct, then the simultaneous tilt illusion (TI) should also be affected by appropriate drug treatment. In this illusion (Blakemore et al. 1970), the apparent tilts of lines whose orientation and position are similar are distorted. Figure 1 gives an example, in which the central circular patches of grating are vertical and parallel to each other, but have opposite apparent tilts induced by their surrounding stripes. The distortion is a perceptual expansion of small acute angles. It has been suggested that both this effect and the tilt aftereffect result from lateral inhibition between orientation selective channels in the visual cortex (Tolhurst and Thompson 1975).

It is likely that lateral inhibitory tuning in the visual cortex, where orientation-selective neurons are first encountered in the visual system, is mediated by GABA. This neurotransmitter has a putative inhibitory role in visual cortex (Iversen et al. 1971), and bicuculline, a GABA antagonist, has been shown to reduce or even remove the orientation selectivity of cortical neurones (Sillito 1979). It is plausible to assume that this occurs because bicuculline reduces the inhibitory input to the cell from other orientation-sensitive neurons whose preferred orientation is slightly different.

With these considerations in mind, we have measured the effects of drugs which affect dopaminergic transmission on the TI, and of lorazepam, a benzodiazepine which potentiates the activity of GABA (see Tallman and Gallager 1985 for review), on both the TI and two aftereffects, the TAE and the MAE.

Method

Apparatus and procedure

The tilt illusion. The illusion was measured on a circular area of grating 2.7° in diameter. Immediately surrounding

