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DISINHIBITION IN HUMAN VISION

Joanna Gemma Maria Scheirlinck

Being a thesis submitted as a partial  
requirement for the degree of Master  
of Science with Massey University,  
Department of Psychology.

1981

ABSTRACT

Recent electrophysiological and psychophysical data have suggested that within the human visual system there exists specialised neural units which respond maximally to specific orientations. This suggestion is based upon electrophysiological data recorded from orientation specific neurons in the cortex of the cat and monkey, and psychophysical studies of normal observers.

Following a review of this literature three psychophysical paradigms (masking, aftereffect, and dichoptic aftereffect) were utilized to investigate disinhibition of orientation analyzers in humans.

Chapter two examined the spatial selectivity of the disinhibition function with successive presentation of two masking gratings. The results indicated that, for a vertical test stimulus, disinhibition was maximal when the orientations of M1 and M2 were similar and was minimal when the orientational difference was greater than 15 deg.

Chapter three investigated disinhibition in the orientation aftereffect, following both successive and simultaneous presentation of two adaptation gratings. The results showed that regardless of the temporal sequencing the addition of a second grating could either disinhibit or summate the magnitude of the aftereffect. Generally, interaction was maximal when when the orientation difference between the gratings was 15 deg.

Dichoptic presentation of stimuli (chapter four) demonstrated that orientation disinhibition may be a high

level effect at least parallel to that of binocular rivalry. The results indicated firstly that disinhibition and summation were maximal when the orientation difference between the gratings was 15 deg and secondly that these functions could not be disrupted by binocular rivalry.

The results of this thesis are in keeping with a lateral inhibition explanation of orientation disinhibition. This lateral inhibition system is consistent with a general feature detection model of visual perception which is known to exist in humans.

ACKNOWLEDGEMENTS

I am especially grateful to Nigel Long for his expert advice, indefatigable enthusiasm, encouragement, and patience.

Warren without your support and assertion it would not have been possible.

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