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**COGNITION AND THE STEADY STATE  
VISUALLY EVOKED POTENTIAL**

PER LINE

M.App.Sc

1993

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## ABSTRACT

This masters thesis examines the hemispheric activation pattern of the cognitive processes involved in a complex mental rotations test (MRT) (Vandenberg and Kuse, 1978) using Steady-State Probe Topography (SSPT) (Silberstein et al, 1990) as a method to index brain activity. The Steady State Visually Evoked Potential (SSVEP) was recorded from 64 electrode sites using a multichannel electrode helmet, and elicited by a 13 Hz sinusoidal visual flicker, whilst the subjects were performing a visual vigilance Baseline task and the MRT. Forty-one right handed subjects (twenty male and twenty-one female) were used. In the MRT the subjects were required to choose the two figures which correctly matched the criterion figure in the centre. The figures were three-dimensional objects represented in two-dimensions on a computer screen. A significant finding of this study was that when all the subjects were considered as one group, no noticeable lateralization in cerebral activation associated with mental rotation was evident. When analyzing the results for the subjects, partitioned into two groups according to gender, evidence was found suggesting that the cortical processing associated with mental rotation may be more localized bilaterally in the males than the females. However, no noticeable lateralization effects for mental rotation were found in the males or females, and hence no gender differences in hemispheric lateralization was evident. An important finding was the emergence of gender differences in hemispheric lateralization in subsets of subjects performing with higher spatial ability. A left hemisphere lateralization for mental rotation was associated with the Best Performance Male group. The Best Performance Female group showed the opposite effect, where a right hemisphere lateralization was associated with better performance on the task. The lateralization effect appeared to be stronger in the Best Performance Males than the Best Performance Females. An important conclusion from this study is that when examining for hemispheric lateralization effects in mental rotation, and possibly other visual-spatial tasks, not only gender effects need to be considered, but the level of spatial ability in the comparison groups needs also to be taken into account.