

Abstract

Perception is the process of giving meaning to the environmental stimulus. The ambiguous image lacks critical information, thus making the perceptual process complicated. An individual can reveal different interpretations of an ambiguous image during the visual scanning task. An ambiguous image can have various highly focused regions. The initial part of the literature review shows that visual cues (highly attended regions) influence perception. The mean duration of perceptual reversal time is 6.06 seconds, and the standard deviation of 2.61 seconds was deduced. The other part of the review concludes that ET parameters (fixations, saccades, and pupil dilation) on Rorschach Inkblot Test (RIBT) helps in detecting Schizophrenic disorder.

In the first part of the study, two bistable images (Young Girl-Old Woman(YGOW), and Duck-Rabbit) have been used on 24 university students. A bistable image has two valid interpretations where only one can be perceived at a time. The other interpretation may or may not be perceived by the individual. If perceptual switching occurs, the focus is primarily on the overlapped region. These regions can be identified using heat-map plots. Certain eye parameters associated with visual scanning (scan-path), attention (densely fixated regions) and pupil diameter are key in developing cognitive models for the detection of abstract images. Automated models (Machine learning-based and Probability-based) for detection of the perceived objects were developed. Results indicated that the Density-based spatial clustering of applications with noise (DBSCAN) based clustering of fixation points is key in the detection of highly attended regions (region of interest). These regions significantly influence perception.

In the later part of the study, abstract images (RIBT cards) with multiple interpretations

were shown to 34 university students. The purpose of the study was to develop objective measures for analyzing Rorschach responses of different individuals. It was found that the initial fixations were centrally located. Eye-tracking features, namely, Initial fixation region, SF ratio, Fixation duration, and Mean return were used to identify different regions with high attentional values. The data was further analyzed in terms of number and type of responses (Original or Popular). It was done to explore significant eye-tracking parameters associated with these types of responses while attending similar card regions. The findings indicated high variations in pupil diameter during the processing of Original responses. Eye parameters are useful markers in understanding visual perception of ambiguous images. The immense contributions of eye tracking technology in visual perception of human subjects has been verified in this study.

Keywords: Visual Perception, Eye-tracking, Ambiguous image, Fixation, Saccades, Cognitive model, Rorschach Inkblot Test.