

Differential effects of ascending and descending BAC limbs on drivers' visual scanning

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Alcohol intoxication has known biphasic effects on behaviour. The ascending limb of the blood alcohol content (BAC) curve is associated with stimulative effects, while the descending limb is generally linked with sedation. Although the impact of alcohol on driving performance has been widely investigated, the differential effect of ascending and descending limbs on such performance is less understood. Given that driving performance is reliant on visuospatial awareness, exploring how visual scanning behaviour changes across the BAC curve during a driving task may further elucidate ways in which ascending and descending limbs differentially affect performance. In a placebo controlled repeated measures design ($N = 14$), the present study investigated the biphasic effects of alcohol (target peak BAC = 0.05) on performance in a simulated driving, and visual scanning behaviour as measured by gaze entropy. Standard deviation of lateral position (SDLP) increased in both the ascending and descending limbs suggesting impairment of driving performance. The number of fixations increased in the ascending limb and decreased in the descending limb. General gaze entropy showed greater increases in the ascending limb, whereas the ratio of entropy relative to the number of fixations was greater in the descending limb. An overall significant interactive effect between condition and limbs was observed for both SDLP and relative gaze entropy, as both were higher in the descending limb. These results suggest that alcohol has differential effects on drivers' visual scanning whereby gaze movements become more frequent and spatially dispersed in the ascending limb, while in the descending limb, gaze movements become less frequent and more disordered. This observation is consistent with extant evidence for the stimulative and sedative properties of the ascending and descending limbs of the BAC.