INTRODUCTION

Cues or optic flow? Local or global structures?

Traditionally, the visual control of driving has been explained in terms of the perception of local structures of the environment such as visual cues to road geometry (see Figure 1) and the driver's eye movement has been assumed to indicate the use of these cues (Shinar, 1978).

METHOD

Six participants (age range 21-26) were tested in driving a remote-controlled toy car through a triple bend. Each one drove through the track 30 times (Figure 3). Gaze patterns were measured and successful trials from trials 7-15 (Session 1) and 22-30 (Session 2) were selected for analyses. Visual control was based on a monitor displaying the driver's view (see Figure 4).

RESULTS

Gaze data were analyzed using a car-centered coordinate system, and then measuring gaze duration on 3 areas of the barriers (2 tangent points and 3 barriers on the opposite side of the tangent points) and the road surface. Figure 5 demonstrates changes in horizontal gaze directions in four sample trials.

Figure 5. Sample trials with horizontal gaze directions as participants drove through the track (participants 1-4). The vertical axis (y) displays the visual angle and the horizontal axis is scaled to the track as depicted in the bottom figures.

Average trial duration of the successful trials shows that performance was improved in Session 2. Trial duration was shorter (speed increased) in the second session as a result of learning (see Figure 6).

Average values of the absolute horizontal gaze co-ordinates (x,y) show that drivers' gaze became more constrained as evidenced by reduced horizontal eye-movements (see Figure 7).

Average values of the vertical gaze co-ordinates (y) indicate that drivers tended to look further ahead of the car as a result of learning (see Figure 8).

Figure 6. Average trial duration of the successful trials for each participant in the two sessions of learning.

Figure 7. Average gaze (y) co-ordinates for each participant in the two sessions.

REFERENCES