IMPACT OF COUNTDOWN GROUND LED LIGHTS ON TRAFFIC FLOW EFFICIENCY AT SIGNALIZED INTERSECTIONS: A DRIVING SIMULATOR STUDY

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Introduction
- Unnecessary stopping at signalized intersections during yellow interval reduces traffic flow efficiency
- Difficult to make appropriate decisions at the onset of yellow interval

Objectives
- To investigate the impact of countdown ground LED dynamic lights on traffic flow efficiency during inter-green period at signalized intersections
- The countdown system is aimed at visualizing the inter-green period by means of a countdown system

Apparatus
Driving simulator at QTTSC was used
- 135° horizontal view
- 5760 x 1080 pixels resolution

Participants
67 participants with a valid Qatari driving license

Regression analysis
<table>
<thead>
<tr>
<th>Variables</th>
<th>β exp</th>
<th>β Standard error</th>
<th>Wald df</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-9.230</td>
<td>.000</td>
<td>2.461</td>
<td>14.062</td>
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<tr>
<td>Condition (base = Control)</td>
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<tr>
<td>Age</td>
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<td>1.049</td>
<td>.057</td>
<td>.726</td>
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<td>Experience</td>
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<td>.979</td>
<td>.061</td>
<td>.119</td>
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<td>Speed</td>
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<td>1.111</td>
<td>.025</td>
<td>17.162</td>
</tr>
</tbody>
</table>

STUDY DESIGN

Situation
- Option zone
  - At the onset of yellow interval: 65 m from the stop line
  - At the onset of flashing green: 125 m from the stop line
- Other scenarios

3 Scenarios
1. Control
2. Flashing green
3. Green LED lights

Results

- LED lights were turning off one by one in a sequential order with a speed of 56 kph
- LED lights stretch = 100 m
- Spacing between lights = 5 m

Mean speed

- Average speed is 76.8 km/h
- Standard deviation is 9.9

Minimum speed observed = 48.7 km/h

Main findings

- Most of the drivers crossed the intersection compared to the Control scenario
- 11.5 times higher probability of stopping comparing to the Control scenario
- 2.5 times higher probability that a driver will cross the 7-intersection compared to the Control scenario

Traffic direction
- Highest probability of crossing for Green LED lights at different speed regimes

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