Can light engineering measures make a difference?

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Introduction

Road environments are already heavily developed

• Building new infrastructure is not a solution!
• Solutions should be less obstructive
• Do not interfere with existing infrastructure elements
• Instead: Seek management and additions in the road environment
Aims and Objectives

- The examination of several “light engineering” measures
- Assessment of their impact on road safety of 5 specific measures:
  - signage installation/improvement for workzones
  - road markings implementation
  - installation of chevron signs
  - edgeline rumble strips
  - traffic sign installation/traffic sign maintenance
Methodology

• A clearly defined methodology was developed
• Carried out within the SafetyCube project
  – rigorous literature search
  – analysis of studies in terms of design
  – methods and limitations and synthesis of findings and meta-analyses
• Studies were selected and analyzed in a set taxonomy consisting of light engineering measures
• Analysis options: meta-analysis, vote-count, qualitative review
Delineation and Road Markings

- Qualitative review-type analysis
  - Mostly positive effects on road safety

- A meta-analysis showed significant correlations with mean speeds

- Positive effects of repainting the barrier lanes on vehicle encroachments

- A few unclear effects for the effect of line and number markings on median speeds

- Some speed increases due to a sense of security to drivers
Signage installation and improvement for workzones

- Qualitative review-type analysis
- Most studies reported speed reductions
- Mixed results also present for speed limit compliance rate
- Lack of statistical tests in a number of studies
- Positive effects on lane distribution
- Positive impacts on road safety overall
Chevron signs

- Vote-count analysis
- Significant reductions in
  - crash numbers
  - speed due to chevrons and full-post chevrons
  - vehicle lateral lane position
- Beneficial effects on speed both for Flashing Yellow (FY) chevrons and Flashing Yellow (FY) signposts
- The combination of FY chevrons and FY curve signs was found to have a small and inconsistent effect

<table>
<thead>
<tr>
<th>Outcome definition</th>
<th>Tested in number of studies</th>
<th>Result (number of studies)</th>
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</thead>
<tbody>
<tr>
<td>Crash Reduction</td>
<td>2</td>
<td>↑ - - 1</td>
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<tr>
<td>Mean Speed</td>
<td>4</td>
<td>- - 4</td>
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<tr>
<td>Mean Lateral position</td>
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<td>- - 2</td>
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<tr>
<td>Exceeding speed limit vehicles</td>
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<td>- 1 -</td>
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<tr>
<td>Behavioural Safety Indicators [Simulation]</td>
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</tbody>
</table>

Total Studies = 7
Edgeline rumble strips

- Vote-count analysis

- An improvement in road safety both for:
  - single treatments (edgeline rumble strips only)
  - combined treatments (edgeline rumble strips and widening of shoulder width)

- Reduction in all single-vehicle run-off road crashes

- The presence of edgeline rumble strips does not affect severe crash occurrence

### Outcome definition

<table>
<thead>
<tr>
<th>Outcome definition</th>
<th>Tested in number of studies</th>
<th>↑</th>
<th>↓</th>
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</thead>
<tbody>
<tr>
<td>Total Crashes</td>
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<tr>
<td>Severe crashes</td>
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<td>2</td>
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<td>Crash severity probability</td>
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<td>Lateral position Indicators</td>
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<tr>
<td>Encroaching onto or across edgeline</td>
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<tr>
<td>Passing manoeuvre indicators</td>
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<td>1</td>
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</tbody>
</table>

Total Studies = 5
Traffic sign measures

- Qualitative review-type analysis

- Reduction of the displayed speed limit has a limited impact on crashes (including injury and fatal crashes).

- Significant decrease in mean speed and for all the different speed exceedance intervals.

- Sign treatment shifts motor vehicles away from the rightmost lane positions.

- Fluorescent SYG (Strong Yellow Green) warning signs → marginal improvements in perceived safety at crossing sites.
Conclusions

- Assessment of several light engineering measures
  - evaluating their impact on road safety
  - based on its documented impacts in synopses
  - various outcome indicators (e.g. crash counts, mean speed, more indirect behavioural effects)

- Light engineering measures are beneficial for road safety.

- Findings are particularly useful for developing road safety policy measures.

- All results available at: https://www.roadsafety-dss.eu.
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