Analysis of the effect of dual purpose safety cameras at signalised intersections in Adelaide
Safety cameras considered

• Only considering safety cameras at signalised intersections

• This does not include:
  – Safety cameras located at midblocks
  – Safety cameras located at pedestrian crossings
  – Mobile speed cameras
  – Hand-held laser gun speed detection
Types of safety camera

Technology type

• Wet film
  – Removable internal camera
  – Removed for processing

• Digital
  – Permanent internal camera
  – Downloaded for processing

Infringement type

• Red light
  – Red signal infringements
  – No speed detection

• Dual purpose
  – Red signal infringements
  – Speeding infringements
Safety camera layout and function
History of safety camera installation

• 102 safety camera installations were identified between July 1988 and June 2009
  – 15 wet film, red light cameras in 1988
    • Later decommissioned
  – 4 wet film, red light cameras in 1997
    • Later decommissioned
  – 26 wet film, red light cameras in 2001
    • Most were upgraded to dual purpose cameras from 2003 to 2005
    – 57 digital, dual purpose cameras from 2006 to June 2009

• Beyond June 2009, further safety cameras have been installed but were not part of this study
Infringement data

• De-identified infringement records for all safety cameras installed from 2001 onwards was supplied by South Australia Police

• The following information was supplied for each recorded infringement:
  – Site location
  – Date
  – Time
  – Type (red signal or speeding)
  – Speed of infringing vehicle (if speeding)
Analysis details

• The aim of the analysis was to investigate the change in the number of infringements over the first year of operation
  – This provided consistency across sites and controlled for seasonal effects

• The number of infringements per week was used as the unit of measure
  – The number of daily infringements at each site was low
Selecting sites for analysis

• The following sites were removed from the analysis:
  – Red light only sites
  – Country sites
  – Sites without a full year of data
  – Sites with significant gaps in recorded infringements
• This left a total of 21 sites for analysis
## Sites used in the analysis

<table>
<thead>
<tr>
<th>Site</th>
<th>Speed limit</th>
<th>Lanes</th>
<th>Average daily traffic</th>
<th>Commissioning date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>3</td>
<td>16,750</td>
<td>16/02/2006</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>3</td>
<td>14,775</td>
<td>17/02/2006</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>3</td>
<td>12,800</td>
<td>17/02/2006</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>3</td>
<td>-</td>
<td>07/03/2006</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>3</td>
<td>-</td>
<td>21/03/2006</td>
</tr>
<tr>
<td>6</td>
<td>80</td>
<td>3</td>
<td>10,750</td>
<td>02/05/2006</td>
</tr>
<tr>
<td>7</td>
<td>60</td>
<td>3</td>
<td>-</td>
<td>05/05/2006</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
<td>3</td>
<td>15,625</td>
<td>09/05/2006</td>
</tr>
<tr>
<td>9</td>
<td>60</td>
<td>3</td>
<td>10,225</td>
<td>05/10/2006</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>2</td>
<td>15,375</td>
<td>09/10/2006</td>
</tr>
<tr>
<td>11</td>
<td>60</td>
<td>2</td>
<td>14,650</td>
<td>12/10/2006</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>2</td>
<td>16,800</td>
<td>06/12/2006</td>
</tr>
<tr>
<td>13</td>
<td>50</td>
<td>3</td>
<td>-</td>
<td>26/03/2007</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
<td>3</td>
<td>-</td>
<td>26/03/2007</td>
</tr>
<tr>
<td>15</td>
<td>60</td>
<td>4</td>
<td>15,400</td>
<td>27/03/2007</td>
</tr>
<tr>
<td>16</td>
<td>60</td>
<td>4</td>
<td>12,250</td>
<td>27/03/2007</td>
</tr>
<tr>
<td>17</td>
<td>70</td>
<td>3</td>
<td>17,675</td>
<td>30/03/2007</td>
</tr>
<tr>
<td>18</td>
<td>60</td>
<td>3</td>
<td>11,550</td>
<td>03/04/2007</td>
</tr>
<tr>
<td>19</td>
<td>60</td>
<td>3</td>
<td>20,325</td>
<td>09/04/2007</td>
</tr>
<tr>
<td>20</td>
<td>60</td>
<td>3</td>
<td>16,550</td>
<td>09/04/2007</td>
</tr>
<tr>
<td>21</td>
<td>60</td>
<td>3</td>
<td>16,200</td>
<td>12/04/2007</td>
</tr>
</tbody>
</table>
Results – Red signal infringements
Results – Speeding 10+ km/h

100%
Results – Speeding 15+ km/h

20%
Results – Speeding 20+ km/h

Number of infringements over weeks.
Results – Speeding 25+ km/h

Number of infringements vs. Week
Results – Speeding 30+ km/h

![Graph showing the number of infringements over weeks.](chart)

1%
Results – Speeding stratified
Results – Summary

• Gradual decline in red signal infringements
• Faster decline in speeding infringements
  – Greater levels of speeding declined faster during the first few weeks
Discussion – Methodology

- No controls
- No before data
- No detailed knowledge of other changes at intersections

- Natural change in vehicle speeds on 60 km/h arterial roads between 2007 and 2008
  - 25 per cent drop in vehicles travelling 10+ km/h over the speed limit
  - 20 per cent drop in vehicles travelling 15+ km/h over the speed limit

- This natural change should be acknowledged but we don’t think it is responsible for the total effect because:
  - The measured change is larger
  - The rapid decline in high level speeding is not consistent with such a change
Discussion – Behaviour change theory

• What is causing the change in driver behaviour?
  – (What causes drivers to violate in the first place?)
  – Seeing warning signs and camera unit
  – Receiving infringement notice with demerit points and fine
  – Information from radio, newspaper, internet, GPS navigator

• Why do higher levels of speeding decline faster?
  – Small group of drivers who habitually travel at high speed
  – Learn location of safety cameras and change behaviour quickly
  – Higher penalties for high speed infringements
## Demerit points, fines, and disqualification

<table>
<thead>
<tr>
<th>Infringement</th>
<th>Demerit points</th>
<th>Fine</th>
<th>Automatic driving disqualification period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speeding (&lt; 15 km/h)</td>
<td>1</td>
<td>$182</td>
<td>-</td>
</tr>
<tr>
<td>Speeding (15 – 29 km/h)</td>
<td>3</td>
<td>$290</td>
<td>-</td>
</tr>
<tr>
<td>Speeding (30 – 44 km/h)</td>
<td>4</td>
<td>$435</td>
<td>-</td>
</tr>
<tr>
<td>Speeding (45 + km/h)</td>
<td>6</td>
<td>$600 - $1000</td>
<td>6 months</td>
</tr>
<tr>
<td>Red signal</td>
<td>3</td>
<td>$390</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total demerit points over a 3 year period</th>
<th>Automatic driving disqualification period</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 – 15</td>
<td>3 months</td>
</tr>
<tr>
<td>16 – 20</td>
<td>4 months</td>
</tr>
<tr>
<td>20 +</td>
<td>5 months</td>
</tr>
</tbody>
</table>
Discussion – Infringement interaction

- Drivers who are travelling at the speed limit will have more time to recognise an amber or red signal and stop their vehicle.

- Drivers who respect an amber or red signal will stop their vehicle instead of attempting to ‘beat the red’ by speeding up.
Conclusions

• There are still unknowns
  – The reasons for red signal and speeding violations
  – The reasons for the decline in infringements
  – The level of interaction between infringement types

• The reduction in infringements after the installation of a safety camera at a signalised intersection is considered a worthwhile improvement in driver behaviour
  – Would be expected to lead to a reduction in crashes and crash severity
Acknowledgements

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Questions?