Title: Effects of automated motorway speed enforcement: average versus instantaneous speed control

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Background
Speed enforcement cameras are widely applied nowadays, also on motorways. More recently average speed enforcement is introduced, involving cameras installed over a stretch of road. In this system, data on speed and time are recorded for each vehicle as it enters and leaves two points in the system, a road section. The data are then used to calculate the average speed of the vehicle.

Aim
The presentation discusses effects of both instantaneous speed cameras and average speed enforcement. Effects on speed behaviour as well as effects on crashes are discussed based on recent empirical evidence.

Method
The effects on speed behaviour were examined at two locations with speed cameras and at two road sections with average speed enforcement, all located on motorways in Flanders, Belgium. The effect is analysed through a before- and after and a cross-section comparison of travel speeds.

In the second part of the study, the traffic safety effects at 26 locations with fixed speed cameras on motorways in Flanders-Belgium were evaluated by means of a before- and after comparison of the number of crashes.

Results
The results show a V-profile in the speed distribution for both locations with instantaneous speed cameras, with speed decreases at the speed camera location. Both the proportion of drivers exceeding the speed limit and the proportion of drivers exceeding the speed limit more than 10% decreased considerably. However, before and beyond the cameras the speeds hardly, if at all, reduced. Moreover the analyses of the speed profiles before and beyond the cameras show that drivers do slow down quite abruptly before the camera and speed up again after passing the camera. It is concluded that a V-profile is found in the spatial speed distribution for both locations. The installation of average speed enforcement systems led to decreases of the average speed, of the odds of drivers exceeding the speed limit and decreases of the odds of drivers exceeding the speed limit with more than 10%.

Within an average speed enforced section, speeds turn out to be relatively homogenous. Upstream from and at the camera location (-1200 m up to +200 m) increases were found in the number of crashes. Downstream from the camera decreases were found in the number of injury crashes. A separate analysis according to the crash type generally showed unfavourable effects in the number of side and rear-end crashes, however favourable results were found for the number of crashes against an obstacle outside the roadway. A comparison of the study results shows that the unfavourable results at the camera locations can probably be attributed to the sudden braking behaviour before the speed camera.

Conclusions
The results show that automated speed enforcement on motorways has an important, but sometimes possibly adverse impact on road user behaviour. Fixed speed cameras at motorways tend to lead to a V-profile of speeds (“kangaroo jumps”) and ambiguous effects on crashes. Section control tends to produce more homogenous speed reductions, with some indications for spillover effects.