

# IMPACT OF WAITING TIMES ON PEDESTRIANS' AND CAR DRIVERS' BEHAVIOUR ON SIGNALISED TRAMWAY CROSSINGS

ITS WORLD – 19.09.2018 – TS31 Improving intersection management  
Nicolas SPEISSER, Cerema

# INTRODUCTION

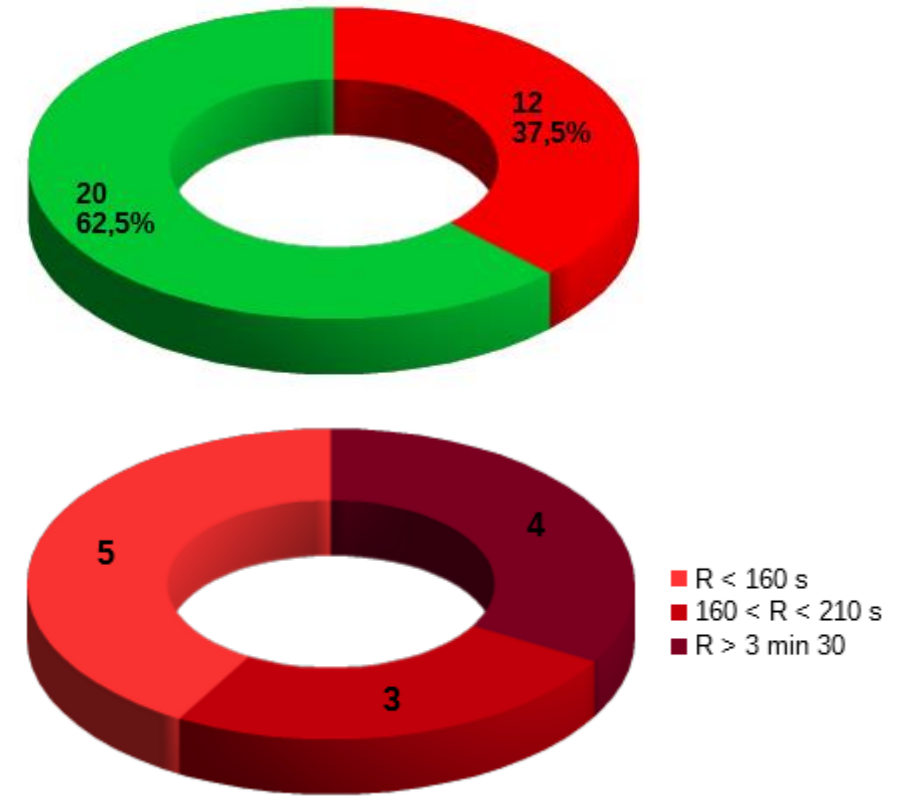
French legislation on road signalisation:

"the waiting time imposed on road-users should never exceed two minutes under normal circumstances."

Cities have questioned this rule because they cannot comply with this requirement, especially on tramway crossings.

The transport ministry has opened discussions about modifying this rule.

Before changing the maximum waiting time of 120 seconds, we had to make sure that increasing the waiting times would not lower levels of safety for all concerned.



# METHOD

Nine junctions studied in five cities

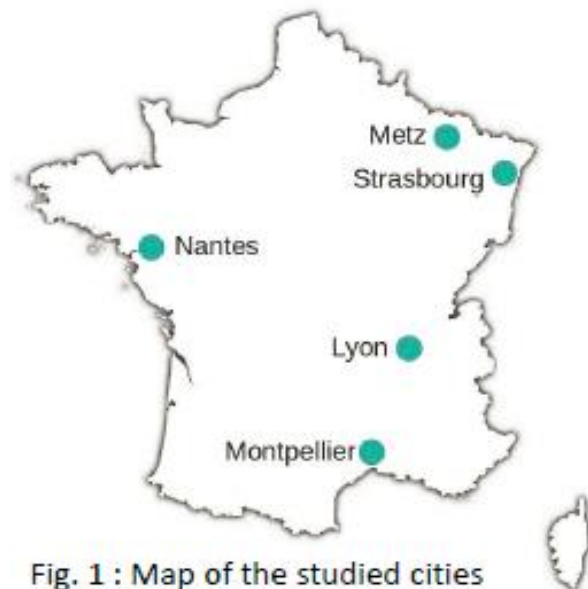
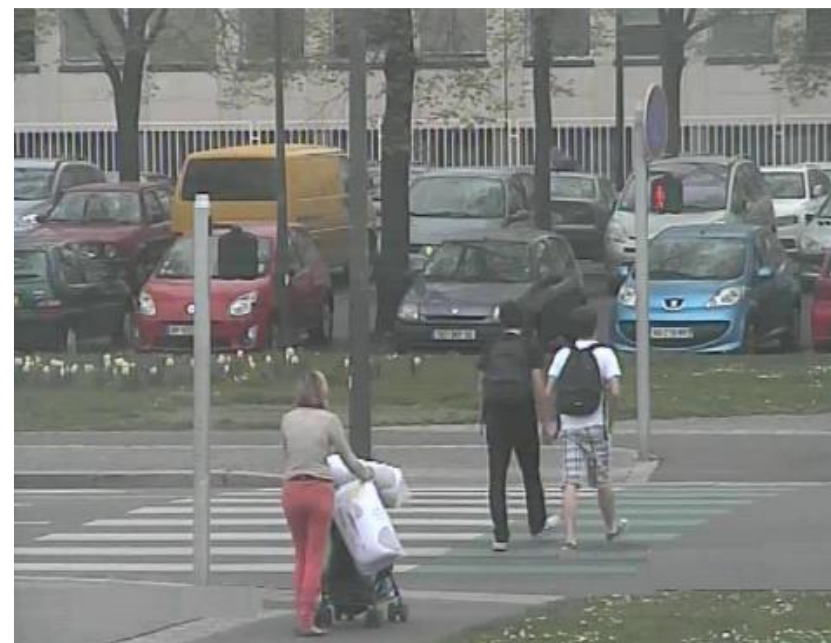


Fig. 1 : Map of the studied cities

Four pedestrian behaviours :

- « Red »
- « Red after waiting »
- « Decide to wait for green »
- « Have to wait for green »



The behaviour of 44,000 car drivers was studied on six signalised crossings.

Every colour change of the lights was systematically noted.

We counted every car crossing both during green and red periods.

# RESULTS FOR PEDESTRIANS

Accidents: very few accidents from 2010 to 2015

Pedestrians:

Table 1. Behaviour of pedestrians on crossings P1, P2 and P3

Name of the crossing	Average red time (seconds)	Maximum red time (seconds)	Behaviour "Red"	Behaviour "Red after waiting"	Behaviour "Decide to wait for green"	Behaviour "Have to wait for green"	Total
Crossing P1	42	99	58 %	6 %	27 %	9 %	36 %
Crossing P2	88	112	78 %	2 %	11 %	9 %	20 %
Crossing P3	113	302	74 %	6 %	15 %	5 %	20 %

Even if the waiting time is short, up to 64% of the pedestrians do not respect the red light. When it is longer (between 90 and 300 seconds), about 80% of pedestrians cross during red time.

# RESULTS FOR CYCLISTS

Table 2. Behaviour of cyclists on crossings P1, P2 and P3

Name of the crossing	Average red time (seconds)	Maximum red time (seconds)	Behaviour "Red"	Behaviour "Red after waiting"	Behaviour "Decide to wait for green"	Behaviour "Have to wait for green"	Total
Crossing P1	42	99	54 %	6 %	20 %	20 %	40 %
Crossing P2	88	112	87 %	2 %	7 %	4 %	11 %
Crossing P3	113	302	81 %	5 %	10 %	4 %	14 %

When the waiting time is short, about 60 % of cyclists run the red light.

When it is long, from 90 to 300 seconds, more than 85 % of cyclists run the red light.

# RESULTS FOR DRIVERS – LONG RED TIME

Table 3. Behaviour of car drivers on 6 crossings

Name of the crossing	Average red time (seconds)	Maximum red time (seconds)	Number of observed cars	Number of red-light runners	Percentage
Crossing D1	24	87	16,755	134	0.80 %
Crossing D2	21	58	1,036	11	1.06 %
Crossing D3	41	105	9,590	28	0.29 %
Crossing D4	87	143	11,280	145	1.29 %
Crossing D5	82	298	4,923	58	1.18 %
Crossing D6	162	758	687	176	25.6 %

On crossing D6, the acceptability threshold is exceeded. 25% of car drivers run the red light.

# RESULTS FOR DRIVERS – SHORT GREEN TIME

Table 4. Behaviour of car drivers on crossing D1 depending on the green period length

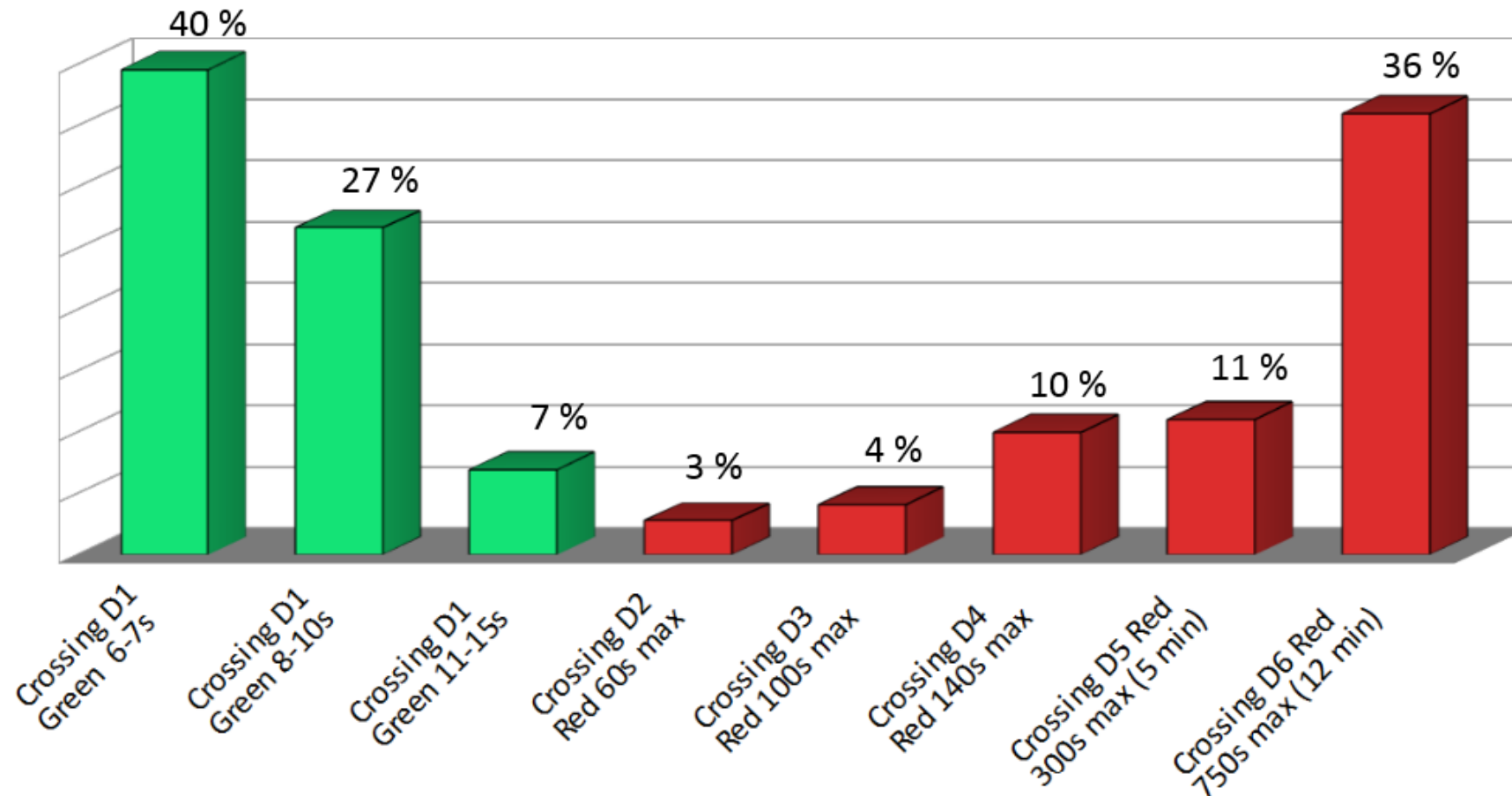
Green light period length	Number of studied periods	Traffic (vehicles)	Number of red-light runners	Percentage
6 - 7 seconds	24	60	19	32 %
8 - 10 seconds	15	63	8	13 %
11 - 15 seconds	36	154	5	3 %

When those periods last 6 or 7 seconds, 32 % of drivers crossed during red times.

# COMPARISON OF FIGURES

If we want to compare the figures precisely, we have to compare the rate of signalling cycles during which a driver ran the red light.

Fig.1 : Rate of signalling cycles with infringements, in relation to green and red times





# CONCLUSION



It is inadvisable to extend the maximum waiting time of 120 seconds for pedestrian crossings. According to the evidence, the waiting times should last less than 90 seconds for pedestrians and cyclists.

A waiting time from three to five minutes is accepted and respected by car drivers.

A waiting time over six minutes exceeds the acceptability threshold and must be avoided. On tramway crossings, the waiting time limit could be extended to a maximum of three to five minutes without lowering levels of safety.

The green periods of 6 or 7 seconds for car drivers should be avoided to keep the lights' credibility and maintain the users' safety.

The research contributed to quantify the rates of red light running in accordance to the length of waiting time. We also estimated the duration of an acceptability threshold for pedestrians, cyclists and car drivers.

# THANK YOU FOR YOUR ATTENTION

Nicolas SPEISSER  
Road traffic engineer  
+33 3 87 20 45 23  
[nicolas.speisser@cerema.fr](mailto:nicolas.speisser@cerema.fr)