

EVALUATION OF THE SAFETY BENEFITS OF THE EXCLUSIVE AND CONCURRENT GREEN MAN PHASINGS FOR PEDESTRIANS IN CAPE TOWN

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ABSTRACT

International research has shown that the crossing behaviour of pedestrians at intersections can significantly affect the likelihood of crashes. Within the South African context, pedestrian traffic fatalities are a major concern, and city authorities are anxious to find effective means of managing pedestrian crossings as safely and efficiently as possible. This study compares crossing behaviour of pedestrians at two different types of signals in the city of Cape Town; first the conventional 'concurrent' signals where pedestrians cross at the same time as vehicles, i.e. where the green pedestrian signal and the green vehicle's signal are aligned with each other; and the second 'exclusive' phasing, where pedestrians have a dedicated green light phase where all other vehicular traffic is stationary (also known as a scramble phase). The study found that whilst the exclusive pedestrian phases had the most promise of safety on paper, in reality there was no discernible difference in safety overall, as the longer waiting periods meant that pedestrians were inclined to cross illegally, when the pedestrian signal was red. The study also found a high level of ignorance and confusion among members of the public about the signals – only 17% of pedestrians surveyed understood what the green, red flashing and red phases permitted them to do.

1. BACKGROUND

In South Africa, pedestrian related fatalities account for 39.5% of all road-related deaths. The mortality rates recorded in low to middle income countries confirm routinely that pedestrians are at particular risk. Low to middle income cities like Mumbai and Mexico City have recorded fatality rates of 2-3 deaths per 100 000, and Sao Paulo reports 10 fatalities per 100 000 (Mohan 2002). A study carried out in 2004 showed that South Africa has the one of the highest mortality rates in its major cities. The fatality ranged from 19.3 per 100 000 in Cape Town to 12.4 in Pretoria (Mabunda, Swart et al. 2008a). In contrast, the mortality rates recorded for high-income cities like London and Tokyo were at 1 per 100 000. These numbers are an indication of the relative safety of the pedestrians in low- to middle-income countries like South Africa compared with high-income countries.

Research has also confirmed that pedestrians crossing illegally at signalized intersections occur frequently and that this is one of the most common reasons for vehicle-pedestrian collisions (Wang, Yang et al. 2011). This suggests that preventative measures should be taken to reduce the number of pedestrians who practice unsafe and illegal crossing movements. A study by King et al. (2009) reported that illegal crossing behaviour at

have an effect on the likelihood of crashes but do not appear to have prevented them altogether.

The signal types (exclusive or concurrent) affect exposure to risk of conflicts in that the concurrent phasing exposes pedestrians to conflicts from turning vehicles, while they are protected from these in the exclusive phase. However there was a higher average incidence of illegal crossings at exclusive phase crossing points than at concurrent phase crossings, as well as an elevated number of crossings away from the formal crossing, at exclusive phase crossing points. Crossing during the phase of vehicles movement exposes pedestrians to significant risk, especially if vehicles are moving in free flow at the time.

Responsibility for the conflict at concurrent phase crossings was shared between pedestrians and vehicles. At exclusive phase crossings all conflicts recorded were exclusively the result of pedestrians crossing illegally.

5.3 Pedestrian survey results

Surveys were conducted to find out how pedestrians experienced crossing at both signal types, and to gain a better understanding of the pedestrian crossing experience in the City.

Among other questions, pedestrians were asked about the perceived waiting time at the specific signal type they were crossing at, at the time of survey. The responses (see Table 4) indicate some differences in attitude towards the waiting time at each:

Table 4: Survey responses to waiting time

	Percentage of pedestrian responses at concurrent signals (n = 46)	Percentage of pedestrian responses at exclusive signals (n/=46)	Total Percentage of pedestrian responses (n=92)
Only experienced a minimal. wait	0%	1%	1%
Wait was considered not long	68%	55%	61%
Wait was considered long	28%	26%	27%
Wait was considered excessively long	4%	18%	11%

There were clearly some differences regarding the waiting periods in the exclusive phasing signals, where more pedestrians reported that waits were excessively long, than in the concurrent phases. This was borne out by the observations which showed slightly higher numbers of pedestrians crossing illegally during the red phase at exclusive phase intersections

In the observations of pedestrian crossing, it was seen that around 60% of all crossings were initiated when the pedestrian signal was on the steady red man. One explanation for this could be intentional lawlessness – i.e. that pedestrians knowingly - out of frustration or impatience – cross, irrespective of the signals, whenever they can see a clear break in the traffic. Certainly, in the surveys, the majority of respondents felt that, regardless of signal type, the actual crossing time provided to them was too short. Sixty-three percent of the respondents felt this to be the case; with only 19% indicating that the time provided was sufficient. So there does appear to be a sense that the legal crossing time is at odds with pedestrian needs. That said, it is also possible that this crossing behaviour may also have to do with pedestrians failing to understand that the legal crossing periods comprises the green man phase as well as the flashing red man phase, not simply the green man phase alone. During the observations some pedestrians had been observed starting to run when the signal changed from the green-man to the flashing red-man – possibly indicating that they did not fully understand that they still had sufficient time to cross safely.

Quite shockingly, the survey results confirm fairly conclusively that few pedestrians do in fact understand the rules of the red light man. Of the 92 pedestrians surveyed, only 9 respondents were able to accurately explain the signals rules. 43 explained them inaccurately, and a further 40 said they were unsure of the rules.

6. CONCLUSION

In closing, in the South African context the safety benefits of the exclusive phase of the green man are questionable. There was almost no indication that the safety of the pedestrians at the exclusive intersections was improved. This was not because of a design flaw in the signals themselves, but because of the behaviour of the pedestrian during the non-green phase of the signals. Higher percentages of pedestrians were observed crossing illegally at exclusive phases than at concurrent phases, probably because of waiting time frustrations. More pedestrians were also observed crossing away from the formal crossings at these locations, placing them at higher risk of serious conflict with vehicles. It would appear that unsafe crossing behaviour of pedestrians is common at all intersections types but there is greater opportunity for it at the exclusive phase because of the longer waiting time.

The most significant finding from the study is arguably the fact that pedestrians do not appear to understand the rules of the crossing phases. They appear to see the different light contexts as rough guidance, and in fact the flashing light induces a fair amount of panic. Many pedestrians began crossing on the flashing phases, without apparently understanding that this is 'illegal', and even more started crossing when the solid red man was showing.

Unsafe pedestrian behaviour is a complex and difficult problem to solve, but introducing phases which ostensibly protects pedestrians better does not appear to work when there is a culture of poor pedestrian behaviour; when waiting times are considered high; and in the context of pedestrians not fully understanding crossing rules.

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