

RED-LIGHT VIOLATIONS AT LEVEL CROSSINGS

Results of road-side interviews

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R.D. Wittink

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SWOV Institute for Road Safety Research, The Netherlands

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### SUMMARY

In the Netherlands 114 collisions between train and road users took place annually during the last five years, resulting in an average of 51 deaths and 38 injuries. Sometimes the collisions are regarded simply as a consequence of red-light violations.

In road-side interviews on level crossings protected by flashing lights only, 12% of users of these crossings admitted ignoring the red lights "once". Half of them said it was too late to stop (an "amber" phase is lacking). Red-light discipline at level crossings seems to be better than on road crossings.

Two categories road users admitted ignoring the red lights significantly more: regularly users and (young) cyclists and moped riders. One reason might be that they themselves want to decide if there is enough time to precede the train. Another might be that regularly users suffer inattention: this supposition gets affirmation by the fact that a significantly higher proportion of them also overlooked the lights (for example in case of a black-out).

A special problem concerns the possibility that more than one train passes during the same warning cycle. The survey shows 3% of the users don't wait before the red lights stop flashing after one train did pass.

Different solutions for the safety of level crossings are worthy of consideration.

Educating the public is only one of them, because:

- accidents on level crossings are only partially a matter of reckless behaviour
- other measures might be more appropriate to influence behaviour.

## INTRODUCTION

In the Netherlands level crossings protected by automatic flashing lights only (AFL) imply the greatest safety problems compared with other level crossings. In the years 1983-1987 approx. 65% of the collisions between trains and road users took place on AFL-crossings. The proportion of fatalities was 66%. There are over 1850 public level crossings on passenger-carrying railway lines in the Netherlands. Of these, 830 (45%) were protected by automatic flashing lights only. Annually 114 collisions between trains and road users took place, resulting in an average of 51 deaths and 38 injuries.

Per AFL-crossing the risk of a collision is 2.2 as high as at crossings fitted with automatic half barriers as well (AHB). The risk of a collision per encounter between a train and a road user on an AFL-crossing will be still higher compared with AHB-crossings, since barriers are installed on crossings with the highest intensities of road and rail traffic.

That's why the Steering Group on Safety at Level Crossings, set up by the Dutch Minister of Transport and Public Works in 1985, decided to give priority to AFL-crossings.

Besides, the Netherlands Railways Ltd. estimated the amount of red light offences on level crossings at 15 millions per year (Hasselman, 1984). Since it is less easy to ignore red lights at AHB-crossings - you've got less time unless you slalom besides the barriers - it is likely that most offences take place on AFL-crossings. One can doubt the figures of the Netherlands Railways, but they succeed in creating the opinion that irresponsible behaviour is the basis for the problems with safety. The Steering Group deliberated various policy problems, it brought together views of rail and road experts, and considered that research was needed into the problems road users have on AFL-crossings (Ministry of Transport, 1987). Mr. E. Tenkink presents here the research on observations of the behaviour (Tenkink et al., 1987). I was involved in a survey of crossing users and will present the results of this research. These studies took place independently and at different crossings.

## METHOD

The survey was carried out by the Traffic and Transportation Engineering

Division of the Public Works Department. The data were processed by the consultants Goudappel and Coffeng. The report has not yet been published, but the Steering Group took her conclusions, I can propagate here.

The road users were stopped at five level crossings. These locations were not visible from the crossing. After sifting, 815 usable responses remained, 705 from motorists and 110 from cyclists and moped riders. Over three-quarters were men; one third of the respondents were under 30 years. Almost half of the respondents used the crossing where they were interviewed daily (more or less), over a quarter more than once a week.

The questions concerned perception of the crossing and the warning system, understanding of the warning system and behaviour. The questions about understanding and behaviour were distinguished to three situations:

(1) before a warning cycle, (2) the phase of the warning cycle preceding the arrival of a train, (3) the warning cycle following passage of a train.

#### REASONS FOR OFFENCES

Asked whether they ever ignored the red lights at level crossings, 12% of the people answered in the affirmative.

The survey indicated that the people know well the meaning of the red flashing lights. The reasons for the offences must be found elsewhere. Nearly half the people who ever ignored the red lights, gave the reason that they were in the clearance phase. The others said they had not been attentive (had a black out) or were in a hurry or that there wasn't a train coming.

A significantly higher proportion of those who regularly used the crossing said that they sometimes jumped the lights. This was also true of the people under 18 years and cyclists and moped riders - who were identical in many cases.

The observations (see Tenkink et al., 1987) in fact showed the same percentage offences, so the pronouncements of the people in the survey may be a fair representation of what they really do. In that case it strikes that only a minority of the offences have been made consciously, if we can take the explanations also for true. The observations of Tenkink c.s. indicate that this holds at least for the period of the warning cycle in which the offences were made: at the beginning. That means that one part of the

offenders couldn't make a fair stop before the crossing from the moment they saw the red lights starting flashing (a clearance phase is missing), another part was able to stop but knew that the red lights just started flashing or judged that the train was still far away, a third part was unattentive.

#### TWO PROBLEM CATEGORIES

Safety problems may arise with people who make false judgments and with the people who had a black out.

Although these problems only arise with a very small proportion of all users, we could distinguish two categories who may suffer an increased risk: young people riding a bicycle or moped and regularly users.

One may suggest that especially regularly users may suffer unattentiveness. We analysed that indeed a higher proportion of them overlooked the lights. Perhaps they experience too often that there isn't a train coming. In any case, here lies a problem that isn't easy to be relieved.

Thornson & Lundstrom (1986) even stated that unattention causes 66% of the accidents at level crossings. Unconscious offences will be more dangerous than conscious offences.

In two cases, wrong judgments of the neighbourhood of a train can become a problem.

Firstly, when one decides to pass just before a train. The observations of Tenkink et al. (1987) indicate that this is hardly the case at AFL-crossings. Perhaps this happens more often at unprotected crossings, where a passerby must judge by himselfes what to do. Train drivers often complain about near-misses, their fear of a crash is fully understandable because they can't do anything to prevent it and the consequences are often fatal. But at AFL-crossings, neither our survey, nor the observation study could confirm regularly risky behaviour.

Secondly, wrong judgments may take place when more than one train uses the same warning cycle. In the Netherlands one doesn't get an extra warning in that case. One has to know in general that it is always possible that still another train is coming. But when one almost always experience that this doesn't happen, the attention may fade away. Two situations are possible. One may judge the distance of one train without being aware that

from the other side another train is already closer at hand. Or one starts to pass the crossing immediately after one train did pass, without waiting for the red lights to stop flashing and without making a good judgment of the possibility that another train is near.

Asked about their behaviour once a train has passed, 3% of the people in the survey gave answers that may imply increased risk, such as "immediately", "immediately following another vehicle across", or "looking to see whether it was safe to cross". Answers of this kind were significantly more common among the people who admitted sometimes jumping the lights and among cyclists and moped riders.

A previous accident study on level crossings by SWOV (Wittink & Ederveen, 1985) has shown that 10 percent of those who died on a level crossing, collided with a second train approaching.

#### CONCLUSIONS AND RECOMMENDATIONS

One can't sustain that the people behave irresponsible at level crossings. Asked about their behaviour outside the warning cycle, most people in the survey indicated that they take more care than necessary. In that situation the protection system shows a white flashing light. Still, people delay and look if a train is coming. Tenkink et al. also analysed that the red-light discipline at level crossings is better than at road crossings.

From our survey one may conclude two problem categories: regularly users who suffer unattentiveness and young people - mostly cyclists and moped riders - who make more offences and seem to be not always enough careful especially when more than one train is passing by in the same warning cycle.

It is unknown how much these problems contribute to the safety figures. For example dazzle is also said to contribute to collisions at level crossings.

Seeking solutions for the in the survey established problems, one can look at technical ways and at information or education. The problem of unattentiveness should be handled in a technical way by making the danger signal more obtrusive. The problem of wrong judgments should be handled both in a technical way and by information or education. A seperated warning light in case of "a second train" is recommended, supported by an information campaign.

Besides that, an "amber" phase can prevent road users from deciding for themselves how long the clearance phase should be. It can also make reactions at the start of the warning cycle more controlled, reducing the risk of nose-to-tail collisions.

More expensive but demonstrably effective is the substitution of AFL-equipment by AHB-equipment.

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