3.8 VARIATION IN VEHICLE CONFLICTS AT A T-JUNCTION AND COMPARISON WITH RECORDED COLLISIONS (Summary)

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A six-month long study has been made of vehicle conflicts occurring at a semi-urban T-junction where two main roads meet. At this junction, between A404 (Stanley Hill) and A413 at Amersham in Buckinghamshire, repeated daily and hourly conflict counts were made on weekdays during this period, from 0800 to 1800 hours each day.

In all, conflict data for 27 days including 15 successive Tuesdays and three complete five-day weeks were collected by observers at the junction. This data was backed up by regular flow counts and a continuous time-lapse cine-film record from an automatic camera overlooking the junction. This film provided the collision data.

Day to day variation in daily conflict counts has been shown to exist but demonstrates no consistent day of week or seasonal effects for counts made at the site on weekdays. (The mean daily conflict count was 125, including 21 serious).

There is evidence of daily conflict numbers being closely related to vehicle flow levels in the intersection. The relation is less strong if serious conflict numbers alone are used. Vehicle flow levels themselves showed no obvious day of week or seasonal effects.

Considerable variation in the hourly counts of conflicts has been shown to exist during the day and the number of conflicts are closely related to vehicle flow levels for the same hours. A relation is found for the number of conflicts in each manoeuvre type with the levels of flow in the particular manoeuvres concerned. The exact form of the relation differs between conflict types but in each case is effectively linear over the range of variables concerned (see Fig 8(c)).

The flow dependent relations in the preceding paragraph could be demonstrated for total numbers of conflicts but not so clearly if serious conflicts alone were considered.

At this intersection the manoeuvres producing the most conflicts in total (see Fig 4) also produced the most conflicts per unit of vehicle flow involved, i.e. they were the more 'dangerous' manoeuvres. The most frequent and 'dangerous' manoeuvres were turning right from the minor road: (a) merging with the farside stream of traffic and (b) crossing the nearside traffic stream; in that order. (69% of conflicts of all severities and 77% of serious conflicts involved these right-turning vehicles).

The day to day variability in conflict counts varied with the size of the mean daily count. An empirical relation between the variance of the daily counts ($S^2$) and the mean daily count ($\bar{x}$) was represented by the formula:

$$S^2 = \frac{1}{\bar{x}} \cdot 1.2$$

The data show that at this intersection a two to three day count of conflicts would give a prediction of the long term daily mean conflict number which would usually be within about 10% of the true value.

The location of serious conflicts showed as close a relation to the location of reported injury accidents at the site as could be expected from the small number of accidents available. The location of the most frequent serious conflicts
identified the three interacting manoeuvres which were involved in the reported accidents involving vehicles other than two-wheelers.

Recorded collisions at the site (other than reported accidents) showed a number of nose-tail or shunt incidents which were not apparent to any marked extent in the conflicts or the reported accidents. Again small numbers of recorded collisions made valid comparisons difficult.

This study shows that traffic conflict counts, as made in this type of situation, have adequate repeatability to make them a useful research technique.

The work described in this digest was carried out in the Road User Characteristics Division of the Safety Department of TRRL.

Editors note: The full report can be obtained from the Transport and Road Research Laboratory, Crowthorne, Berkshire, RG11 6AU, United Kingdom.
Fig. 4. MEAN DAILY NUMBER OF CONFLICTS OF DIFFERENT TYPES FOR ALL DAYS (08.00 - 18.00h)

Fig. 8.(c) Conflict type BF

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At the last meeting in Oslo I summarized the results of our efforts to develop a reliable and valid conflict observation technique that could be used as a tool to predict accidents of child pedestrians in residential districts.

At that moment I only could say that we possessed a fairly reliable instrument with which it was possible to get an amount of information in a reasonably short period, of what happened in residential precincts in terms of "encounters" (from "contact" up to "serious conflicts").

I also mentioned that we were trying to test the validity of our instrument that is: can we use serious conflicts to predict accidents?

Although the results of this study are not yet published and I therefore can not give very detailed information, I will try to give an impression of this validity study and some of the results.

The first problem we had to face - and presumably all researchers in this area - is that the reason of trying to find a tool for predicting accidents, limits profound validity research. Why are we developing conflict observation techniques?

Because accidents are often badly recorded and in most situations infrequent.

But in testing the validity of our instrument we have to use these accidents.
We tried to meet this problem by:

- selecting locations in municipalities of which we believed that their accident-registration was fairly accurate,
- working with accident data based on a period of 5 years (1972-1976),
- not selecting locations if there was any doubt about correctness of the registered accidents, or if relevant information was lacking,
- not selecting locations where - in the period mentioned above - changes (of road or surrounding) evidently took place,
- interviewing the population in the surroundings of the selected locations, to get an impression of accidents that were not registered.

We finally selected 25 locations (or spots) with a maximum length of 100 meters. The accidents with child pedestrians (0-15 year) varied from 0 to 5 (in 5 year). Each location was observed (by trained observers) for 34 hour (two weeks observation on working days after schooltimes).

Before mentioning any result, the question should be stated: "If you find a relation between serious conflicts and accidents how strong must it be, to be acceptable?".

We meant that the relation to be found had to fulfil two demands:

1. The relation between serious conflicts and accidents must be stronger then the relation between traffic volume and accidents.

2. The relation between serious conflicts and accidents must be stronger then the relation between people's opinion regarding road safety and accidents.

Both, traffic volume and people's opinion, are used in Holland in deciding to take measures regarding to road safety: they are, in practice, used as an alternative criterion for accidents, to express opinions about road safety, to decide whether or not taking measures to improve safety
and to evaluate taken measures.

An additional reason to take into account traffic volume in our research, was the experience that in some studies traffic volume seemed to be the main explanation for the relation between conflicts and accidents. Because both correlated with traffic volume, they were related with each other.

The population in the surrounding of the locations was not only interviewed with respect to accidents, but we also asked them questions to get an impression of people's opinion of the road safety of the selected locations, for child pedestrians.

At first sight the results of our observations seemed rather disappointing. The (pm) correlation of serious conflicts between wheeled traffic and child pedestrians, with registered accidents was: \( r = .51, p < .01 \). That is, only a quarter of the variance of accidents could be explained. However: accidents in Holland are only registered if there is personal injury or damage (> Hfl. 1000,-).

Our conflict counts include serious conflicts between cyclists and pedestrians.

A collision between a cyclist and a pedestrian rarely will result in an accident with personal injury of the pedestrian. In fact all the registered accidents we worked with, consisted of collisions between fast moving traffic and pedestrians.

Leaving serious conflicts between cyclists and child pedestrians out of our data, we find a correlation of \( r_{pm} = .82, p < .001 \), a much more promising result.

Of all possible indicators of traffic volume (counts of wheeled traffic, counts of fast moving traffic, counts of protected and unprotected child pedestrians (that is with or without the presence of adults) products of
the different counts, etc.), merely the counts of unprotected child pedestrians passing the locations under study, yielded the best result as possible predictor of accidents based on some indicator of traffic volume: \( r_{pm} = 0.44, p < 0.01 \) considerably below the mentioned \( r = 0.82 \) of the serious conflicts.

Multiple correlations of serious conflicts and the various indicators of traffic volume with accidents did not yield correlations above the .82 and the partial correlations showed that only a small proportion of the variance of accidents was explained by traffic counts.

For example:

- **Multiple correlation of serious conflicts and counts of unprotected pedestrians with accidents:** \( r = 0.82 \)
- **Partial correlation serious conflicts with accidents:** \( r = 0.77 \)
- **Partial correlation counts of unprotected pedestrians with accidents:** \( r = 0.11 \)

People's opinion about road safety as possible predictor of accidents yielded one remarkable result. We found a positive correlation between indulgence of parents towards young children and accidents: \( r_{pm} = 0.40, p < 0.05 \). That is, on those locations where relatively many children of 0-4 years were allowed to play without any supervision of parents, there were more accidents registered.

Although this relation is interesting, people's opinion regarding road safety, is no better as predictor of accidents than serious conflicts.

Our efforts to supplement registered accidents with unreported accidents did not yield very much success. Of course we realized that by interviewing people in the surroundings (\( 10,000 / m^2 \)) of the locations, we only would be able to detect a small proportion of unreported accidents, since children living at a greater distance than 100 meter could have had an accident at the locations of our interest.
That this seems to be true, is indicated by the fact that only 20% of the registered accidents we based our research on, was reported by the people we interviewed. However this proportion is not constant and varies per location. The data are too little to calculate correction figures per location. The correlation between serious conflicts with the total of registered and not-registered accidents was \( r = 0.76, p < .001 \).

Finally we checked if the conflict-technique was sensitive for variations in different characteristics of the locations. Of course our technique has already an important limitation: child pedestrians in residential areas, but within this limitation variation is possible: there are broad and small roads, broad and small sidewalks, location with and without junctions, with and without crossing facilities, with and without specific and unspecific attraction points (play facilities, shops). Comparing the distributions of serious conflicts and accidents on locations, distinguished on base of these kind of road characteristics, we noticed that the relation between serious conflicts and accidents was not sensitive to these distinctions.

As I mentioned, the report on this study is not yet finished so I will not draw too many conclusions at this moment. The results of the analysis of the data up to now, confirm our previous idea that this technique could be a good instrument for road safety research in situations earlier mentioned. The generalization of the technique to other situations and other road users can be a subject for new research.