THE TRAFFIC CONFLICTS TECHNIQUE TRAINING PACKAGE.

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Introduction

Local Authorities in the United Kingdom have a statutory duty to carry out a programme of measures designed to promote road safety, including undertaking studies into accidents. However the use of accident data alone to determine the reasons for problems occurring at particular locations has often been found inadequate. Accidents are actually rare events making it necessary to wait several years before there are sufficient incidents for analysis, even then the accident records often contain insufficient and unreliable data.

Considerable research has been undertaken in the United Kingdom to devise a technique capable of detecting, observing, studying and evaluating potential accident locations without necessarily waiting for an accident history to develop. As a result of this research only one technique has so far been found capable of fulfilling all of these aims, and that is the study of potential accidents or "CONFLICTS".

In an effort to promote the use of the traffic conflicts technique within Local Authorities the Transport and Road Research Laboratory funded the development of a Training Package designed to provide an efficient method of training personnel to carry out conflict observations accurately and reliably.

This paper summarises the development of the traffic conflicts technique and then describes in more detail the development and contents of the Traffic Conflicts Technique Training Package.

Development of the Traffic Conflicts Technique

The term "traffic conflicts" introduced by Perkins and Harris (1967), was used to describe potential accident situations which they identified as being useful in the prediction of accidents. They also devised a method of recording conflicts based on the observation of some type of evasive action, such as braking or change of course, taken by a driver in order to avoid a potential collision. This recording method was then developed by Spicer (1971) for use in the United Kingdom. Conflicts between vehicles were found to vary in their severity, and it was decided that they could be classified into one of five grades according to the severity or suddenness of the evasive action taken and the proximity of the vehicles involved. A description of the five grades is given in Table 1. Following further research by Spicer it was decided in 1977 that a new Grade 2+ was necessary
<table>
<thead>
<tr>
<th>CONFLICT GRADE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1 -</td>
<td>Precautionary braking or lane change or other anticipatory braking or lane change when risk of collision minimal.</td>
</tr>
<tr>
<td>2 2 1</td>
<td>Controlled braking or lane change to avoid collision but with ample time for manoeuvre.</td>
</tr>
<tr>
<td>2+ 2</td>
<td>Braking or lane change to avoid collision with less time for manoeuvre than for a slight conflict or requiring complex or more severe action.</td>
</tr>
<tr>
<td>3 3 3</td>
<td>Rapid deceleration, lane change or stopping to avoid collision resulting in a near miss situation (no time for steady controlled manoeuvre).</td>
</tr>
<tr>
<td>4 4 4</td>
<td>Emergency braking or violent swerve to avoid collision resulting in a very near miss situation or minor collision.</td>
</tr>
<tr>
<td>5 5 5</td>
<td>Emergency action followed by collision.</td>
</tr>
</tbody>
</table>

**TABLE 1. Conflict Severity Grade Classification**

To describe incidents which observers felt were more severe than Grade 2 but not as severe as Grade 3. A second revision to the grading system was made in 1979 following the acceptance of the formal definition of a conflict agreed upon at the 1st International Workshop on the Traffic Conflicts Technique, Oslo (1977) which states that a conflict is

"...an observable situation in which two or more road users approach each other in space and time to such an extent that a collision is imminent if their movements remain unchanged."

Grade 1 conflicts were no longer recorded as they failed to satisfy this definition, and the other grades were re-scaled. The effect of the 1977 and 1979 revisions are also shown in Table 1.

In an attempt to maximise the reliability of the classification of conflicts experienced observers were asked to describe the factors they took into consideration when judging the severity of an incident. Four factors emerged, each with up to five levels of severity, as shown in Table 2 below.
<table>
<thead>
<tr>
<th>FACTOR</th>
<th>SEVERITY LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Time before the possible collision that the evasive action commenced.</td>
<td>LONG, MODERATE, SHORT</td>
</tr>
<tr>
<td>B Severity or rapidity of the evasive action.</td>
<td>LIGHT, MEDIUM, HEAVY, EMERGENCY</td>
</tr>
<tr>
<td>C Complexity of the evasive action.</td>
<td>SIMPLE, COMPLEX</td>
</tr>
<tr>
<td>D Proximity of the vehicles involved when the evasive action is terminated.</td>
<td>GREATER THAN 2 CAR LENGTHS, 1 - 2 CAR LENGTHS, 1 CAR LENGTH OR LESS, MINOR COLLISION, MAJOR COLLISION</td>
</tr>
</tbody>
</table>

**TABLE 2. FOUR FACTOR LEVELS**

Observers were then required to assess a conflict along all four factors by recording the level of each factor which best described the incident. A final severity grade for the conflict can then be obtained by referring to Table 3, which defines the relationship between the different combinations of the various levels of the four factors and the five conflict grades. This four factor method was compared with original grading technique by Lightburn and Howarth (1980). They found greater consistency between observers in the recording and classification of conflicts using the four factor method.

**The Traffic Conflicts Technique Training Package**

The original idea for a Training Package came from Mr. S. J. Older formerly of the Transport and Road Research Laboratory, but the research and development of the package was conducted by the Accident Research Unit, Nottingham University under contract to the Transport and Road Research Laboratory.

**Development of the Package**

A survey of local authorities in England and Wales was conducted to determine the extent to which conflict studies were already being used and the type of personnel carrying out the observations. Fifty-three percent of these authorities said they already used conflict studies when investigating accident causation, employing traffic engineers as observers, making the studies expensive to conduct. It was felt that more authorities would use conflict studies if they could be conducted at a lower cost by employing casual personnel as observers. Lightburn and Howarth (1980) had established that it was possible to train persons with no previous experience in this field to carry out reliable conflict observations. Therefore the aim of the Package was to provide local authorities with a comprehensive guide for the training of casual personnel to carry out conflict observations accurately and reliably. Of the authorities surveyed 65% said a Training Package would be useful to them. Opinions concerning
<table>
<thead>
<tr>
<th>PROXIMITY</th>
<th>TIME</th>
<th>LONG</th>
<th>MODERATE</th>
<th>SHORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SEVERITY</td>
<td>LIGHT</td>
<td>MEDIUM</td>
<td>LIGHT</td>
</tr>
<tr>
<td></td>
<td>TYPE</td>
<td>SIMPLE/COMPLEX</td>
<td>SIMPLE/COMPLEX</td>
<td>SIMPLE COMP.</td>
</tr>
<tr>
<td>&gt; 2 Car Lengths</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1 - 2 Car Lengths</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1 Car Length or less</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Minor Collision</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Major Collision</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3. Conversion of Factor Levels to Conflict Grades.
the format and contents of the proposed package were obtained from those authorities having experience with conflict studies and these were taken into consideration during its production.

**Original Training Package**

A package was produced by the Accident Research Unit consisting of a Training Manual and a 16 mm time-lapse film containing examples of real-life conflicts. The Manual contained information on the rationale, design and execution of a conflict study, together with details of how to train potential observers using the four factor classification technique. However, only four grades of conflict severity were defined because the two levels, Minor Collision and Major Collision, of the fourth factor Proximity were removed thus eliminating Severity Grade 5.

An Introductory Training Manual was included which explained to the trainees the concept and formal definition of a conflict and how they should be recorded and classified. Also contained in this booklet were exercises associated with the filmed examples to be completed by the trainees in the Answer Booklet provided. The responses to the exercises were then used to assess the trainees' performance. Finally, the Manual suggested that the trainees be given additional instruction and assessment in a real-life situation.

**Evaluation of the Training Package**

A contract was then awarded to the Accident Research Unit, Nottingham University, to evaluate the usefulness of the Training Package to local authorities in the design and execution of conflict studies. A major part of this evaluation was to discover whether or not the Package enabled authorities to train casual observers to detect and classify conflicts accurately and reliably.

Each of the participating local authorities trained their observers using the Package and then conducted conflict observations at locations of their choice. An "expert" observer from the Accident Research Unit recorded conflicts alongside the local authority observers. This "expert" thus acted as a standard with which to compare the various observers. Data obtained were analysed to determine the inter-observer reliability achieved. Instructors' and trainees' reactions to the Package, the problems they encountered and the areas they felt needed improving were also examined.

All the authorities concerned seemed to be impressed with the Traffic Conflicts Technique and on the whole the Training Package was very well received. Generally the comments and criticisms made were consistent across authorities and suggested that various amendments to the Package were necessary if it was to be used effectively. It became apparent that more detailed instruction was required regarding the detection, recording and classification of conflicts as problems in these areas were encountered by certain trainees. For example, some trainees were applying their own definition of a conflict and as a result dismissing certain incidents as part of "normal" driving.
Criticisms relating to the actual method of training tended to focus on the time-lapse film and associated exercises. Both instructors and trainees disliked the jerky two-frame per second presentation of the film. They expressed a preference for video to enable a smooth presentation with sound. Amendments to the contents of the film were also recommended. The examples of conflicts were too limited and the question of detection was omitted altogether.

Results of this evaluation suggested that the observers' performances could have been improved by more thorough training. Although the instructors adhered to the recommendations given in the Manual relating to the initial training of observers, they seemed to disregard the suggestions for assessment and possible retraining. They also tended not to follow many of the recommendations made concerning the design and execution of a Traffic Conflicts Study. These findings indicated that it was necessary to include in the Manual guidelines on the length of indoor training required, and the form that any re-training should take, together with an emphasis on the need for detailed training and practice in the field, plus adequate pre-study investigations by the supervisor. Instructors/supervisors need to be made aware that it is essential to give precise and detailed instructions to observers regarding the information they should record in addition to the four factors, the position they should observe from etc.

On the basis of this evaluation study a revised version of the Traffic Conflicts Technique Training Package was produced.

**REVISED TRAFFIC CONFLICTS TECHNIQUE TRAINING PACKAGE**

The format of this Package is basically the same as the original in that it consists of a Training Manual for the instructor, Training Video, Trainees' Handbook and Answer Booklet. All the information required to enable an instructor to design and execute a conflict study as well as train personnel to carry out conflict observations is contained in the Training Manual. The Trainees' Handbook aims to be self-explanatory and covers all the essential aspects of the traffic conflicts recording technique. At various stages in the training real-time video-taped incidents are presented which the trainees are required to assess in the Answer Booklet.

**TRAINING MANUAL**

The following information and recommendations are presented to the instructor in this section of the Package.

(i) Introduction to Traffic Conflict Studies: The instructor is presented with the formal definition (Oslo 1977) of a conflict which is then expanded upon, together with a brief discussion of the advantages, limitations and potential uses of Traffic Conflict Studies.

(ii) Designing a Conflict Study: The importance of this stage is emphasized since it is a crucial aspect in the success of a conflict study. Detailed information concerning the procedures which should be followed are provided. Guidelines on the factors to be considered when making decisions regarding the selection of sites for study, the timing and duration of the observations and the number of observers required are also included.
(iii) Training Observers: Before attempting to train the observers the prospective instructors must train themselves thoroughly so that they can be considered experts against whom the observers can be compared. The Trainees' Handbook is designed to be self-explanatory, therefore instructors should be able to use it to train themselves.

Since the aim of the Training Package is to provide a method of training casual personnel to detect and classify conflicts accurately and reliably, it is necessary to ensure that the observers are using the same criteria to

a) Detect a Conflict
b) Classify a Conflict

Broadly, the training is divided into two parts - Trainees' Handbook with Video and On-Site Trial Observations. A suggested Training Programme (reproduced in Table 4) giving a brief outline of the training and time scale involved is included. Although the Trainees' Handbook is largely self-explanatory it is suggested that after allowing the trainees to read through a section the instructor reviews its contents to ensure complete understanding. This also gives the trainees an opportunity to ask questions. Full instructions on the presentation of the Training Video are also given, together with the answers to the associated exercises and a brief discussion of the assessment of a trainee's performance.

Having completed the training detailed in the Handbook it is then suggested that the trainees be given additional on-site instruction. The value of such training is emphasized and it is made clear that the information presented in the Handbook, video-taped examples of conflicts and associated exercises provide an Introduction only to the detection and recording of traffic conflicts. A detailed description of how to conduct on-site trial observations is provided in this section of the Manual. Once the trainees have had some time to practise detecting and recording conflicts on-site, it is necessary to conduct a reliability study to ensure that all the trainees and the "expert" (instructor) are detecting the same incidents as conflicts, and then classifying them in the same way. Information on how to analyse the data obtained from such a reliability study is also provided.

(iv) Executing a Conflict Study: Decisions concerning exactly where and how the study will be conducted should already have been made during the Design stage. At this point it is stressed that the observers should be given very precise and explicit instructions to ensure that they carry out observations that will be useful in the study. Information on how to analyse the conflict data collected is provided. Once the analysis is complete the local authority should be in a position to decide upon the remedial measures necessary, if any, and then a further conflict study could be used to evaluate the effectiveness of the measures implemented.

Trainees' Handbook

The following information is presented to the trainees in this handbook.

(i) Introduction to the Traffic Conflicts Technique: The concept of a traffic conflict is introduced followed by the formal definition. This definition is then analysed and the criteria that dictate whether or not any
<table>
<thead>
<tr>
<th>DAY</th>
<th>SUMMARY OF TRAINING</th>
</tr>
</thead>
</table>
| A.M. | First half of the Trainees' Handbook  
i.e., Introduction to the Traffic Conflicts Technique.  
Definition of a Conflict.  
Situations in which conflicts can occur.  
Factors A - D, video examples and associated exercises.  
Discussion of exercises and any problems arising. |
| 1.   |                      |
| P.M. |                      |
| A.M. | Second half of the Trainees' Handbook  
i.e., Conversion of Factor Levels to Conflict Grade.  
Recording sheets, video examples and associated exercises.  
Detection exercise.  
Other video examples of different Grades of conflicts.  
Discussion of Training so far, problems arising from the exercises and any questions trainees have.  
Summary.  
Introduction to on-site trial observations. |
| 2.   |                      |
| P.M. |                      |
| A.M. | Practise detecting and recording conflicts at a site of similar layout to the one used in the video. |
| 3.   |                      |
| P.M. | Group discussion of problems encountered and any questions arising from these observations. |
| A.M. | Visit a study site of similar layout to the one in the video and practise recording conflicts for half to one hour.  
First stage of the Reliability Study, where trainees spend 2 hours recording and classifying conflicts identified for them by the instructor/expert. |
| 4.   |                      |
| P.M. | Second stage of the Reliability Study, where trainees spend 2 hours recording and classifying conflicts they detect occurring.  
Instructor to analyse the data from the Reliability Study and arrange any re-training necessary. |

**TABLE 4. Suggested Training Programme**
evasive action, and therefore a conflict has occurred are listed. Situations in which conflicts may occur are also discussed.

(ii) Detection, Classification and Recording of Conflicts: This section of the Handbook centres around the training video which contains both contrived and real-life examples of conflicts. The Four Factor Conflict Recording Technique is introduced, the four factors being described as per Table 2. Each factor is then explained in detail, and video examples of incidents illustrating the various severity levels of the different factors are presented. The Handbook also describes how to calculate the final severity grade of a conflict from the four factors, and how to enter a complete conflict on the recording sheet provided, (illustrated in Figure 1). At the end of each stage of training the trainee is required to complete certain exercises associated with incidents on the video. The purpose of these exercises is to provide the instructor with a means of assessing whether or not the trainees are ready to progress with the training, and if they are not, then it should be obvious which aspect they are experiencing problems with.

(iii) Summary: The training contained in the Handbook is very briefly summarised and again described as an introduction to the detection and recording of traffic conflicts. The value and importance of the on-site training and practice which is to follow is also discussed. At all stages the trainees are given every opportunity to ask questions and every effort is made to enable the instructor to ascertain whether or not they have fully understood the information presented.

This revised Training Package has been presented to the Local Authorities who participated in the evaluation of the original. They have said that they feel the problems of the original have been overcome in this version and that the video is an improvement over the 16 mm time lapse film. The Transport and Road Research Laboratory are at present considering where and in what form the Package should be published.

REFERENCES


PROCEEDINGS FIRST WORKSHOP ON TRAFFIC CONFLICTS (1977) Institute of Transport Economics, Oslo.


**FIGURE 1. Conflict Recording Sheet**