# How to assess reliability and validity of a traffic conflict technique?

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## INTRODUCTION

Traffic conflicts are one of indirect safety measures. In order of their description, collection and evaluation, number of various traffic conflict techniques (TCTs) has been developed since the end of 1960s. The two key properties of every indicator are (Laureshyn, 2010):

- **Reliability** refers to the methods used to measure the indicator and the accuracy of the measurements.
- **Validity** refers to whether an indicator describes the quality that it is intended to represent and to what extent.

The question is: **is there a practical way to assess reliability and validity of a traffic conflict technique?** It has been asked in relation with establishment of Czech TCT. There have been two Czech TCT approaches, both used mainly in academia: one has utilised manual observations, the second has relied on video recording and analysis in the office (Ambros, 2011). Current task is to compare the both and draw conclusions with regards to their applicability in practice.

Poster mentions some methods of reliability and validity tests together with examples from the Czech environment.

**T H E O R Y**

## RELIABILITY

- **Internal consistency** of observers (**inter-reliability**): each conflict should be recorded identically by different observers.

- **Repeatability in time** (**intra-reliability**): observer should record the same conflict always identically.

Various TCT training manuals require sufficient reliability results. Also the duration of training and observation length needed to obtain sufficient reliability differs.

Using unreliable observers "*degenerates traffic conflict studies into simply observing traffic.*" (Schroeder et al., 2010)

## VALIDITY

- Construct/**process validity** … level of agreement between safety assessments based on conflict and accident data
- Statistical/predictive/**product validity** … correlation between conflict and accident data

"*Validity should be estimated with regard to what extent TCT is able to detect safety problems. The connection to actual accident data is of less importance.*" (Svensson, 1994).

In addition, there are not only more types of validity, there are also more validity criterions which may be used. "*Actual accident number is also an indirect measure.*" (Laureshyn, 2010)

Reliable / Not Reliable / Not Valid / Valid
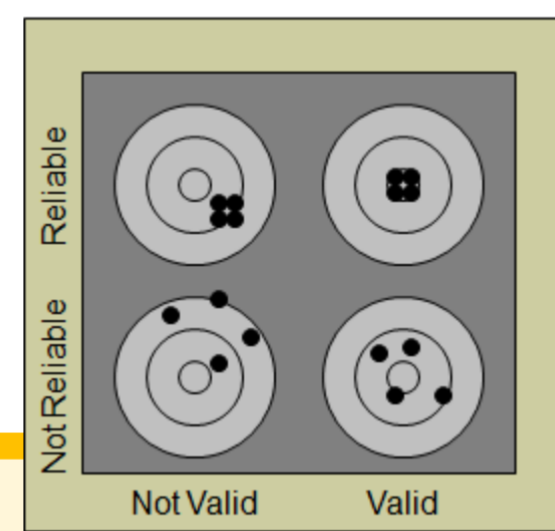
**E X A M P L E S**

1) comparison of **internal consistency**
- reliability 0.6 ☹
- raises to 0.8 if one observer is omitted ☺

2) observation in **various traffic periods** in one day → reliability 0.9 ☺

Low **external consistency** with Swedish assessment ☹?

**Difference between junior and senior** researchers' assessment ☹?
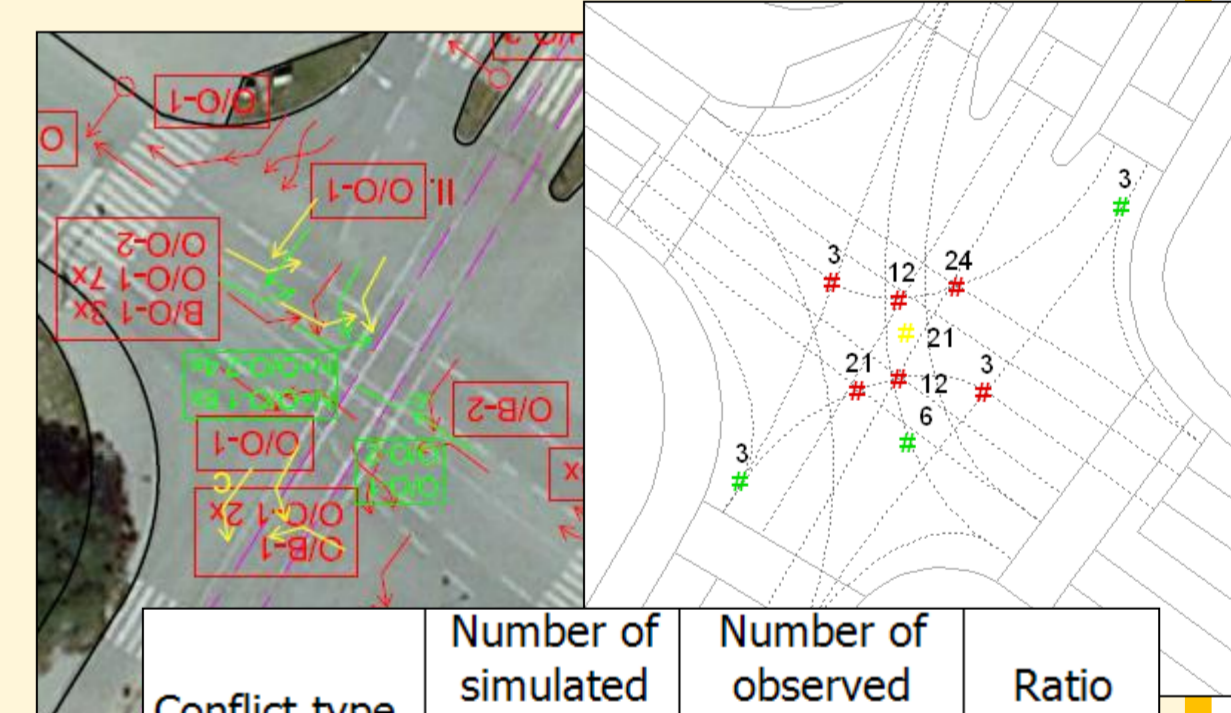
?

- Conflict type counts give similar picture as accident type (**process validity**). ☺

- **Product validity** not proved at the moment; both accident and conflict data are needed from large number of sites. ☹?

- Conflict observation and **micro-simulation** yield relatively similar conflict type proportions. ☺

| Na Jelenách × K Hrnčířům | | | |
|---|---|---|---|
| conflict types from 1-hour count (N = 44) | | accident types from police reports (N = 8) | |
| merging, crossing | 46% | failure to give way | 71% |
| rear | 54% | insufficient gap | 29% |
| | 100% | | 100% |

| | roundabout conversions | | | realignments | | |
|---|---|---|---|---|---|---|
| | Černá Hora | Lipůvka | Ostrava | Brno | Rajhrad | Rousínov |
| ACC | -52% | -33% | -95% | -100% | -60% | +20% |
| CONFL | +33% | -56% | -50% | -93% | -67% | -50% |

| Conflict type | Number of simulated conflicts S | Number of observed conflicts O | Ratio S/O |
|---|---|---|---|
| Crossing | 75 | 16 | 4.7 |
| Weaving | 21 | 4 | 5.3 |
| Merging | 12 | 2 | 6.0 |

## CONCLUSIONS

- For **validation**, larger number of studies has to be studied. Collected conflict and accident data may be related together with various explanatory factors in the form of safety performance function.
- For **reliability**, common training of observers is necessary. Czech observers should be trained according to one common TCT method. Training e-application is under development at the moment (see Ambros et al., 2012).

Observers are one of the *weakest* links in chain of conflict studies, which casts doubt on their reliability and validity (Lightburn and Howarth, 1980). Only when the TCT is *strong* enough, it will yield valid data suitable for safety assessments.

Závažnost / Typ konfliktu
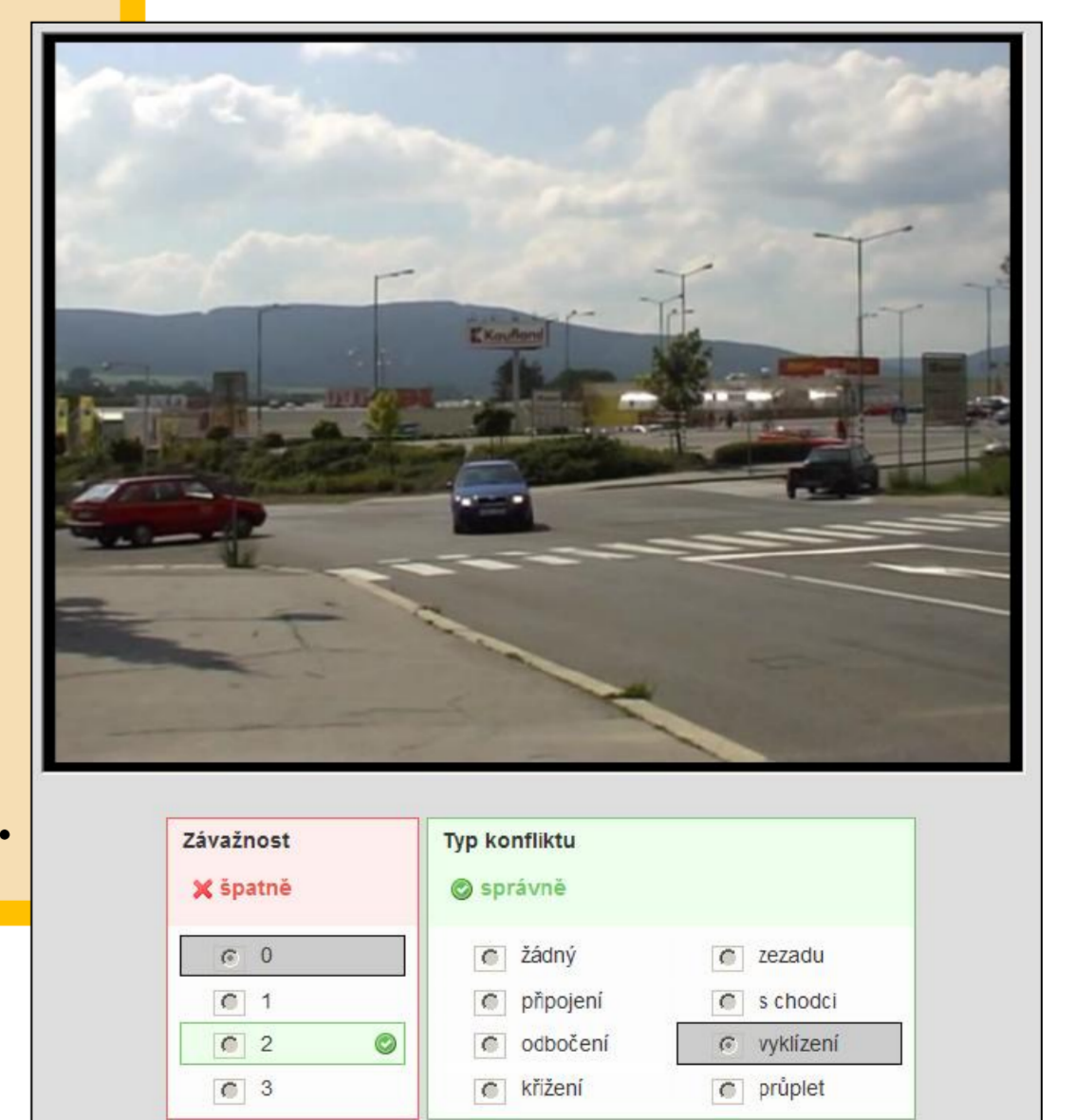
## References in shortened form → please see the paper

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Svensson (1994) Conflict Analysis. In *Guidelines for Retrospective Safety Analysis*. SWOV.

**http://konflikt.cdvinfo.cz**

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