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Vision zero for traffic fatalities and serious injuries—research questions and challenges

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CYCLING SAFETY ASSESSMENT BASED ON USER OPINION AND TRAFFIC CONFLICT DATA

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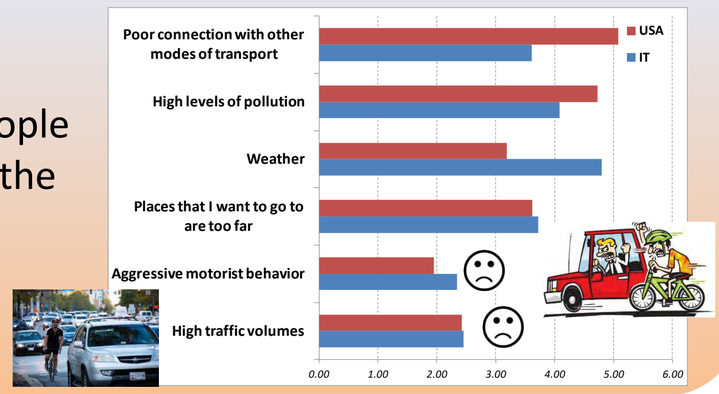
Background

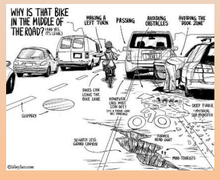
One of biggest barrier for people to choose riding a bicycle is the perceived **lack of safety**.



Aim

Risk Perceptions vs Observed Risk

Risk perception is the subjective judgement that people make about the characteristics and severity of a risk.



Observed Risk is a combination of the chance of a particular event, with the impact that the event would cause if it occurred.

Method

Perceived Risk

A WEB-BASED SURVEY

The survey contained a part related to responses about the safety of selected intersections and routes in the city of Catania, Italy.

	Very safe	Safe	Unsafe	Not at all safe
1				
2				
3				
4				
5				
6				
7				
8				

	Very safe	Safe	Unsafe	Not at all safe
1				
2				
3				
4				
5				
6				

Answers were recorded using a **4-point Likert scale** without ties to force a decision.

Observed Risk

An instrumented bike equipped with a GPS-video system (Video Vbox Lite®) was used to collect data during riding tests in the same routes and intersections of the survey.

Video recording was used to identify ***traffic conflicts*** (TC) as a situation in which the bicyclist approaches another road user in space and time to such an extent that there is risk of collision if their movements remain unchanged

Results

Survey result

The survey collected **78 responses** from bicyclists familiar with the selected route.

Site category	*Count*	*Average*	*Standard deviation*	*Rank Order*
Roundabout	78	1.88	0.837	5
Shared bike lane with bus	78	2.08	0.752	4
Bike lane terminals	157	2.14	0.836	3
Signalized intersections	464	2.25	0.806	2
Cycle track	78	2.81	0.823	1
Total	1094	2.27	0.827	

A ***one-way analysis*** of variance was performed.
Since the P-value of the F-test is less than 0.05, there is a ***statistically significant*** difference between the means of the five variables at the 5% significance level.

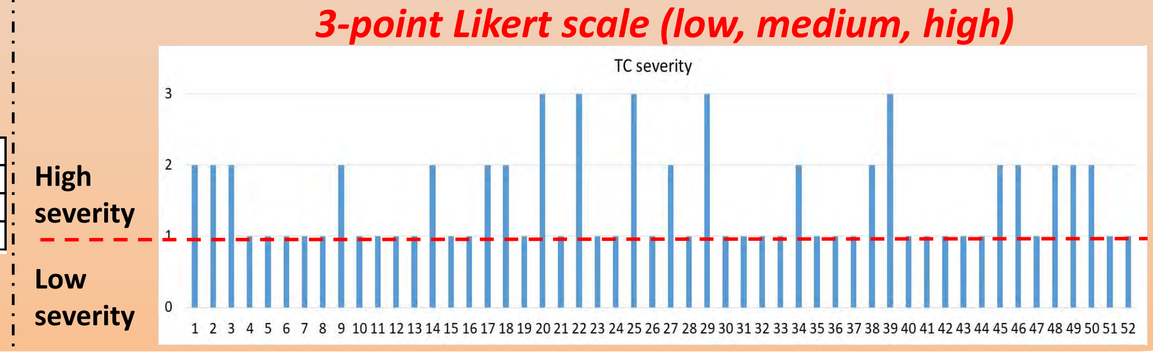
Source	*Sum of Squares*	*Df*	*Mean Square*	*F-Ratio*	*P-Value*
Between groups	38.5789	4	9.64473	14.66	0.0000
Within groups	559.03	850	0.657683		
Total (Corr.)	597.609	854			

Riding test result

N°conflict	User	Date	Type of conflict	Localization	N	E	Vmax (Km/h)	Vmin (Km/h)	ΔV (Km/h)	δTevent (s)	amax (m/s2)
2	ID_1	03/05/2017	Car	Cycle track	37.51967	15.10788	11.384	7.282	4.102	0.9	1.27

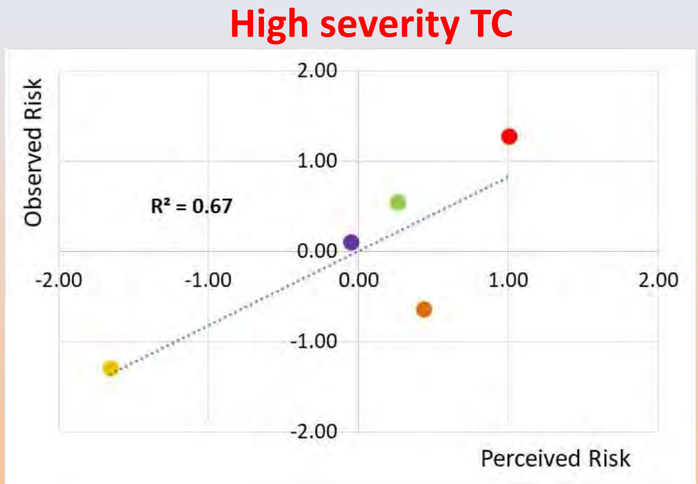
Ten bicyclists participated in the test aged between 27 and 65, made up of both beginners and experienced cyclists.
No particular training was required.

52 Conflict severity classified by a panel of 5 experts in a 3-point Likert scale (low, medium, high)



Perceived vs. Observed

High severity TC



Conclusions

- Perceived risk and observed traffic conflicts can be collected among smart communities and used to analyze the safety performance of different road infrastructures in cycle paths.
- There is better agreement between perceived and observed risks for higher severity traffic conflicts.
- Objective measures of traffic conflicts can be achieved by GPS data collected tracking the cyclists. GPS resolution and data filtering must be appropriate for identification of conflict and classification of severity
- Cycling dynamics for identification of Traffic Conflicts events have to be carried out taking into account cyclist attitude and behaviour.