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A list of accident scenarios for three legs skewed intersections

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ABSTRACT

The term 'scenario' is used in the safety field to designate a prototype or a model of an accident process characterised by chains of facts, actions, causal relations and consequences in terms of damage to people and property. The prototypical scenarios, properly realized, provide a basis on which to consider the action to be taken, but also a concrete backup for accident information for use in information campaigns or training. The objective of this study is to define the prototypical accident scenarios for a particular configuration of road intersection: the skewed intersection. Limited sight distance at skewed intersections leads to safety issues. A non-skewed intersection provides the best operating conditions as drivers can easily sense the direction in which they are travelling, estimate the speeds of the opposing traffic and smoothly complete a maneuver in shorter time. In skewed intersections, instead, the ability of drivers to recognize any conflicting vehicles diminishes in comparison to right-angle intersections. The logical-deductive approach used in this paper for the determination of accident scenarios is based on an analysis of a large database of incidents, which occurred on several roads in eastern Sicily on 35 skewed intersections at three-legs. The skew angle of the minor leg of all the intersections studied is between 15° and 20°. This research allowed to develop accident scenarios related to particular configurations of intersections, compatible with the Italian rules. Prototypical scenarios are constructed using samples of accidents occurring on a particular type of study area, especially when they are based on files from in-depth investigations. The method used is an inductive approach, based on an examination of each case, grouping together similar cases and building a prototypical scenario using this case grouping. From the in-depth analysis of database accidents 9 prototypical accident scenarios have been identified for the skewed intersections.

1. Introduction

The accident investigation involves the inspection of crash scenes and the documentation of all necessary and available information of each component (i.e. human, vehicle, and road-environment). Accident reconstruction approach works backward from the evidence of the accident investigation and the remains of the crash to look into the scenario of before (pre crash), during (crash) and after the crash (post crash). The sequential analysis from end results to the initial condition of the events can establish "how" and "why" a particular type of accident occurs. It can be stated that accident reconstruction goes back to investigate the contributory factors and/or causes behind the crash event based on major and minor physical clues left behind at the accident scene.

In recent years, in Europe, in-depth investigations were facilitated by the spread of methods and systems for the analysis and collection of causal factors in traffic accidents, which are based on the principle of "real-life Investigation" with a data collection that is conducted at the scene of the accident and as soon as possible after the accident. Beside the method ACAS (Accident Causation Analysis System) presented in the study of Otte et al. [1], other European analysis systems such as DREAM (Driving Reliability and Error Analysis Method) in Sweden by Sagberg [2] or HFF (Human Functional Failures) in France by TRACE [3] work according to the same principle in defining human failures with causation parameter. These analysis systems have in common that they consist of a method of analysis, an accident model and a classification system.

Bin Islam and Kanitpong [4] conducted an in-depth study focusing on the application of event analysis through crash investigation and reconstruction. The objectives of this study were the followings: 1) to identify the contributory factors based on the findings obtained from crash investigation and reconstruction by using a case study; 2) to apply an event analysis in establishing the links between the events to describe the crash scenario based on the available information.

The aim of research by Penumaka et al. [5] was to investigate in-depth Powered Two Wheeler (PTW) - car accidents, where human errors were the sole causative factors and not influenced by any environmental or vehicle factor, whereby the true potential of rider and driver

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assistance systems can be evaluated. In-depth accident investigations led to the identification of Merged Accidents Configurations (MACs). Typical characteristics of these MACs were examined thoroughly. Various human errors were identified and classified as perception, comprehension and execution failures. The investigation findings suggest that car drivers made perception and comprehension failures in a large proportion of cases; while PTW riders typically made perception and execution failures resulting in accidents.

The case studies reported above, confirm that the accident is the result of processes of varied and more or less complex dysfunctions.

It is appropriate therefore to formalize the processes tracked down in in-depth analysis of accidents under the shape of typical dysfunctions-generating "scenarios" of accidents, which allow explaining the emergence of human functional failures as a function of the factors and situations which generated them.

The apparently unlimited variety of the road situations does not allow categorizing the accidents on the basis of exclusive criteria. Thus it is around these typical scenarios we need to build profiles accidents presenting a 'family look' from the point of view of the mechanism of "human error" generation.

The aim of this study is to provide a list of accident scenarios for a particular type of intersection that can be used as the basis for the application of the procedure for the identification of the causes of road accidents. The particular configuration of road intersection considered is skewed intersection.

1.1. Prototypical accident scenarios

The term 'scenario' is used in the safety field to designate a prototype or a model of an accident process characterised by chains of facts, actions, causal relations and consequences in terms of damage to people and property. This concept provides a means of combining and generalising the knowledge obtained from accident case studies, based on in-depth investigation methods or on detailed analyses of police reports. Applications of this concept are developed in both the field of traffic accident research and safety studies (diagnoses) in preparation for engineering measures or local safety policies. Fleury and Brenac [6] present the prototypical scenario concept, its theoretical background, and the way it is used for safety research and studies. They define a prototypical scenario as a prototype of an accident process corresponding to a series of accidents which present overall similarities regarding the chain of facts and causal relationships throughout the various accident stages. The appeal to the concept of typical scenario allows to progress from the point of view of the aggregation of similar accidents in their progress.

The sequential accident analysis method (Fleury [7]; Ferrandez et al. [8]; Brenac [9]) has been developed for in-depth investigations but has also been adapted to the study of police reports and the context of safety diagnoses. It favours accident prevention and therefore focuses on the pre-crash stage.

Prototypical scenarios are sometimes constructed using samples of accidents occurring on a particular study area, especially when they are based on files from in-depth investigations. It is then necessary, for these prototypical scenarios to acquire a wide enough domain of application, to verify that they are indeed general 'pathologies' and not specific to a particular site.

This case analysis approach is essential to understanding the phenomena and defining action adapted to the local context. The prototypical scenario concept is a way of combining the results of these case analyses. The prototypical scenarios obtained in this manner provide a basis on which to consider the action to be taken, but also a concrete backup for accident information for use in information campaigns or training.

It is important to make sure that they are not excessively dependent on the person who draws them up.

The methodological approach of the disaggregated analysis of road accidents by means of accident scenarios is made from following step:

1) acquisition of details information on the accidents through police reports;
2) study of the evolutionary dynamics of each accident;
3) aggregation of all accidents on the basis of scenarios created ad hoc or lists in the literature;
4) determination, by statistical analysis, the frequency of occurrence of all identified scenarios;
5) analysis in-depth of the scenario more frequent in order to identify the risk factors.

1.2. Skewed intersection

The skew of an intersection has an influence on the ease with which drivers move through an intersection (Fig. 1).

Limited sight distance at skewed intersections leads to safety issues. In skewed intersections, drivers need more time to cross an intersection. This results in an increased exposure time to conflicting traffic and also intersection sight distance. Longer exposure results in the drivers' presence in a danger zone for longer times, thus increasing the risk of accidents. A non-skewed intersection provides the best operating conditions as drivers can easily sense the direction in which they are travelling, estimate the speeds of the opposing traffic and smoothly complete a maneuver in shorter time.

Intersection angle is one of the geometric factors that affect the sight distance available to drivers at stop-controlled minor approaches. The visibility problem at skewed intersections results in higher crash rates, particularly at left-skewed intersections. Burchett and Maze [10] have examined the effect of skew angle on safety of expressways, and found that skewed intersections had higher crashes and fatality rates than other types of intersections (intersections located on a vertical curve, intersections located on a horizontal curve and intersections on a tangent). A study conducted by Zhong et al. [11] on the relationship between design and safety in China found the skew angle of an intersection is contributing to collisions. The degree of the acute angle is smaller, and the danger of the intersection is higher. It was found the number of traffic crashes occurred at intersections with sharp angles was two to three times higher than that of traffic crashes occurred at intersections with right-angles. Field data showed these intersections usually experience two problems: the drivers' field of view and sight angle for observation of opposing traffic and pedestrian crossing is decreased. Drivers making right turns around an acute-angle radius may encroach on lanes intended for oncoming traffic from the right.

Any deviation from a 90° intersection angle causes a shift from the above scenario making the intersection less safe. The maximum allowed skew used in Italy is 20° (D.M. 19/04/2006). Visibility is better at right-angle intersections than at skewed intersections. In skewed intersections, the ability of drivers to recognize any conflicting vehicles diminishes in comparison to right-angle intersections. In right-skewed intersections, the bodies of vehicles obstruct line of sight to the right. In this case, Garcia and Esplugues [12] suggest a maximum allowable skew angle of 20° (in line with the Italian legislation).

Garcia and Libreros [13] take into account some dynamical variables, specially related to the drivers' behavior, to study the right turn maneuvers within an intermediate skew angle and to study the effect of the skew angle on safety. Microsimulation software was developed to facilitate evaluation for both new designs and current right turn maneuvers (Garcia et al. [14]). As a geometric design criteria, new right turn lane should be designed using a right turn slip lane with a high entry angle (more than 70°), to improve visibility and to enforce drivers to reduce speed before entering.

The logical-deductive approach used in this paper for the determination of accident scenarios is based on an analysis of a large database of incidents, which occurred on several roads in eastern Sicily on 35 skewed intersections at three-legs. The skew angle of the minor leg of

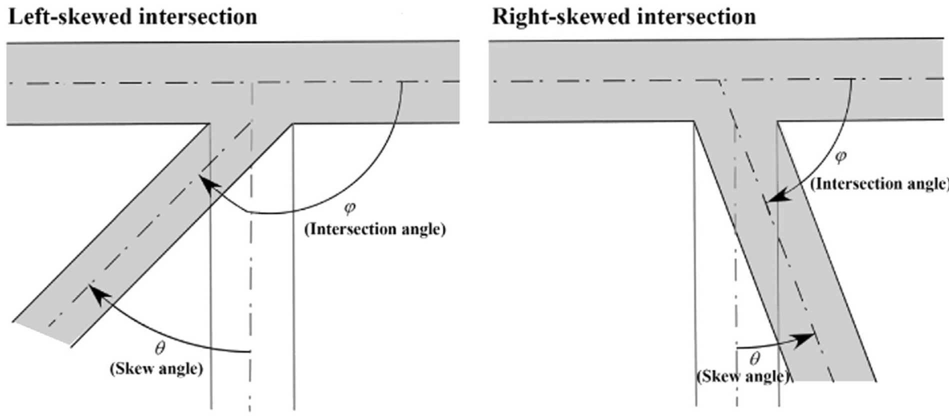


Fig. 1. Schemes of skewed intersections.

all the intersections studied is between 15° and 20°. The research therefore allows to define accident scenarios related to intersection configurations, compatible with the Italian rules and also consistent with the various international studies which confirm that skew angles below 20° ensure the reduction of the level of danger of the skewed intersections.

2. Methodology

The method used for the definition of the Prototypical Accident Scenarios is an inductive approach. The primary purpose of the inductive approach is to allow research findings to emerge from the frequent, dominant, or significant themes inherent in the raw data, without the restraints imposed by structured methodologies. In deductive analysis, such as those used in experimental research and hypothesis testing, key themes are often obscured, reframed, or left invisible because of the preconceptions in the data collection and data analysis procedures imposed by investigators.

The methodology proposal of the purposes underlying the development of the general inductive analysis approach, is structured as:

1. collection of accident data that occurred in specific types of intersection, through the reports drawn up by the police;
2. to condense extensive and varied raw accidents data into a brief, summary format (dynamics);
3. group similar accidents for dynamics;
4. define for each group identified in the preceding step the phases of the accident scenarios;
5. identified by statistical analysis of accident data elements that were recorded more frequently in relation to the specific group.

2.1. Accident data

For to avoid that the definition of the accident scenarios depends excessively from the person who draws up it, it is appropriate to study a large number of reports of traffic accidents to understand the real accident situations occurring in a specific geometric configuration.

Accident data were collected by an analysis of the police reports, integrated with detailed site inspections. The accident data referred to the period 2013–2015; the sites considered are constituted by 35 skewed intersections in eastern Sicily (19 right skewed intersections and 16 left skewed intersections). In the analysis period, 163 total crashes occurred (Table 1).

Police accident reports are probably the most ubiquitous source of traffic accident data analysis. Though the primary purpose of such reports is to provide both summary descriptive statistics on accidents and information that might later be used for litigation purposes, always more often data from these reports are taken at face value for inferential analysis, most notably in the area of traffic safety improvement programs. In the case of analyzing police data, however, the objectives of the researcher may be totally different from those of the policeman who is collecting the data at the scene. Thus, while police reports may be a useful source of information for the evaluation the levels of safety, they are often biased and incomplete. The experience of the authors has allowed us to overcome this gap.

Police reports analyzed contained: summary of the facts, declarations by the people involved and witnesses, accident diagram, main characteristics of the infrastructures, vehicles, people involved, medical documents concerning any injuries observed and photographs.

2.2. Dynamics analysis and scenario definitions

Each accident was analyzed by an in-depth investigation, in order to define the main features, for example: type of accident, number of vehicles involved, age of the driver, visibility of the site, conditions of signage, etc.

The data recorded for each accident have been reported in a specific database. In particular, the dynamics that generated the road accidents have been studied. Within each type of accident, events for similarities were grouped, for example: vehicles that came from the same direction or that carried out the same maneuver, type of vehicles involved, etc.

This step leads to the definition of accident scenarios for skewed intersections at three-legs as proposed by Fleury and Brenac [4].

Each scenario has been defined of the factual accident sequence into sequent phases:

1. the driving situation, which describes the conditions and driving activity on the route and the section of route leading to the accident site;
2. the rupture situation: instantaneous, distinguished by an event (e.g. a maneuver at an intersection) or kinematic conditions (e.g. a high speed on approaching a difficult bend) indicating a shifting over to a critical situation (the emergency situation described below);
3. the emergency situation, where only extreme maneuvers could still, in some cases, prevent collision;
4. the crash situation, which includes the collision itself and its consequences.

Table 1
Number of sites and number of accidents distribution.

Type of intersection	N° of sites	N° of accidents
Right skewed	19	85
Left skewed	16	78
Total	35	163

Table 2
Accident types distribution.

Type of intersection	Accident types				
	Head-on	Angle	Rear-end	Run-off	Other
Right skewed	2	38	30	11	4
Left skewed	1	41	24	10	2
Total	3	79	54	21	6

2.3. Statistical analysis

The statistical analysis has the aim to define if some parameters (e.g. age of the driver, road marking characteristics, light conditions, etc.) influence or not the various phases that define the scenario.

In this study, a frequency analysis was performed in relation to the following parameters: accident types, accident maneuvers, road marking characteristics, road sing characteristic, light conditions, vehicle types involved, age of driver and driver's knowledge of the site.

The elements that are repeated more frequently in an accident scenarios (e.g. age of the driver, road marking, light conditions, etc.) will be used to better define the driving situation of the scenario itself. They are considered, therefore, potential triggers of that incidental dynamics.

3. Results

In order to define the typical accidents in skewed intersections the distribution of accidents by type in function of the minor road

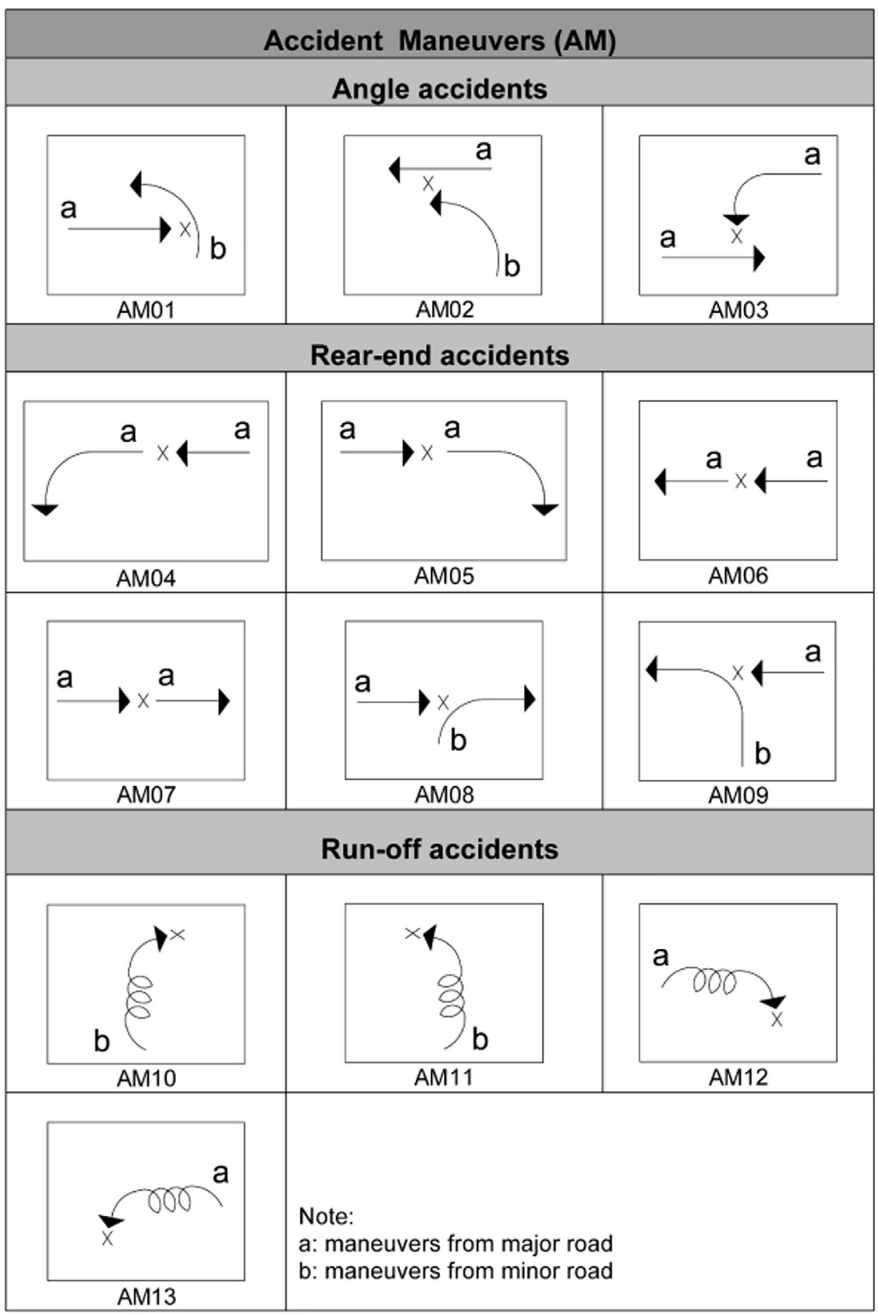


Fig. 2. Accident Maneuvers in three legs intersection.

Table 3
Distribution of accidents by accident maneuvers.

Type of intersection	Angle accidents					
	With vehicle coming from right (AM01)		With vehicle coming from left (AM02)		On the major road (AM03)	
Right skewed	6		28		4	
Left skewed	33		5		3	
	Rear-end accidents					
	On the major road					
	(AM04)	(AM05)	(AM06)	(AM07)	Right turn from minor road (AM08)	Left turn from minor road (AM09)
Right skewed	9	2	8	1	1	9
Left skewed	1	11	2	1	8	1
	Run-off of road Accidents					
	Right turn from minor road (AM10)		Left turn from minor road (AM11)		Right turn from major road (AM12)	Left turn from major road (AM13)
Right skewed	1		3		6	1
Left skewed	2		0		1	7

inclination (right skewed or left skewed) was analyzed. From Table 2, which shows such distribution, it is noted that accidents typical for the sites under study are: angle accidents (55%), rear-end accidents (33%) and run-off accidents (13%).

The accident scenarios identified for three-legs skewed intersections are 9. In particular: 3 related to angle accidents, 5 related to rear-end accidents and 1 related to run-off accidents.

These scenarios were subsequently detailed on the basis of the following statistical analysis.

For assess if the angle of the secondary leg (acute or obtuse) is a key contributor in the occurrence of a specific accident scenarios the vehicle maneuvers that resulted in the accident were studied.

This analysis shows the distribution of the various types of accidents as a function of the maneuvers that generated them (Fig. 2) and of the inclination of the minor road. From this distribution (Table 3) it note that:

Angle accidents in right skewed intersections are generated mainly between the vehicles in turn from the minor road and vehicles on the major road coming from right; while in the left skewed intersections are generated mainly between the vehicles in turn the minor road and vehicles on the major road coming from the left. This is justified by the fact that for right skewed intersections it creates a blind spot zone to the right of the driver on the minor road, even passengers sitting in the right front seat or objects placed on the seat can partially or fully block the line of sight of the driver to the right; in left skewed intersections may form a blind spot zone to the left of the vehicle is running on the secondary branch. The driver's view over her left shoulder is a result of his ability to physically rotate your body and your head to the left and the ability to direct his gaze to look at vehicles approaching from the opposite direction. The difficulty of rotation of the head is one of the concerns most frequently mentioned by older drivers.

Rear-end accidents in right skewed intersections occur mainly between vehicles in left turn from major road and the vehicle following it, and between vehicles in left turn from minor road and vehicle on major road coming from right. In left skewed intersections this accidents occur mainly between vehicles in right turn from major road and the vehicle following it; and between vehicles in right turn from minor road and vehicle on major road coming from left.

Run-off of road accidents mainly involving moving vehicles on the main who want to make a turning maneuver on the secondary. In particular in the right skewed intersections 54% of accidents involving a vehicle that wants to do right turn from major road, while in the left skewed intersections 70% of accidents involving a vehicle that aims to make a left turn from major road.

From the distribution of the various types of accidents as a function of the road marking characteristics in relation of the inclination of the minor road (Table 4) can be seen that:

- Angle accidents occurred more frequently (44%) in sites where the marking is poor, only 22% of the events of that type have occurred at sites with good marking. It is therefore considered that road marking characteristics affect this type of accident but independently of the intersection angle.
- Rear-end accidents occurred more frequently (48%) in sites where the marking is poor, only 16% of the events of that type have occurred at sites with good marking. It is therefore considered that road marking characteristics affect this type of accident but independently of the intersection angle.
- Run-off of road accidents aren't affected of the road marking characteristics, only 33% of the accidents occurred in sites where the marking is poor and 24% of the events of that type have occurred at sites with good marking.

From analysis of the distribution of the various types of accidents as a function of the road sign characteristics in relation to the inclination of the minor road (Table 5) we note that road sign characteristics affect all

Table 4
Distribution of accidents by road marking characteristics.

Type of intersection	Angle accidents		
	Poor	Fair	Good
Right skewed	18	13	7
Left skewed	17	14	10
	Rear-end accidents		
	Poor	Fair	Good
Right skewed	15	10	5
Left skewed	11	9	4
	Run-off of road accidents		
	Poor	Fair	Good
Right skewed	4	5	2
Left skewed	3	4	3

Table 5
Distribution of accidents by road sign characteristics.

Type of intersection	Angle accidents		
	Poor	Fair	Good
Right skewed	19	12	7
Left skewed	14	15	12
	Rear-end accidents		
	Poor	Fair	Good
Right skewed	16	9	5
Left skewed	13	7	4
	Run-off of road accidents		
	Poor	Fair	Good
Right skewed	6	3	2
Left skewed	5	4	1

Table 6
Distribution of accidents by light conditions.

Type of intersection	Angle accidents		
	Daylight	Dawn/dusk	Dark
Right skewed	10	15	13
Left skewed	13	16	12
	Rear-end accidents		
	Daylight	Dawn/dusk	Dark
Right skewed	10	9	11
Left skewed	8	10	6
	Run-off the road accidents		
	Daylight	Dawn/dusk	Dark
Right skewed	1	3	7
Left skewed	2	2	6

Table 8
Distribution of accidents by age of the driver.

Type of intersection	Angle accidents			
	18–25 years	25–50 years	50–70 years	over 70 years
Right skewed	11	13	6	8
Left skewed	16	9	6	10
	Rear-end accidents			
	18–25 years	25–50 years	50–70 years	over 70 years
Right skewed	8	6	12	4
Left skewed	5	11	6	2
	Run-off of road accidents			
	18–25 years	25–50 years	50–70 years	over 70 years
Right skewed	4	5	2	0
Left skewed	5	2	2	1

types of accident independently of the intersection angle for rear-end and run-off accidents, and only in right skewed intersections for angle accidents.

The distribution of the various types of accidents as a function of the Light conditions in relation of the inclination of the minor road (Table 6) shows that the light conditions affect only run-off accidents independently of the intersection angle, in fact that type of accident occurred for 62% in the hours of darkness.

Angle accidents and rear-end accidents mainly involve car, while run-off road accidents are generated by two wheeled vehicles (Table 7).

As regards the characteristics of the driver (age and knowledge of the site) it can be stated that the majority of angle accidents and run-off accidents involve young drivers (Table 8). The number of drivers with lack or no knowledge of the site (unusual driver) is high for all types of accidents considering the low percentage of this type of users compared to usual drivers (Table 9).

From the study of the reports of individual accidents an based on the previous statistics and we have been identified the 4 phases that define the 9 scenarios typical of the three legs skewed intersections. In addition to each scenario it was associated a graphic scheme in which are represented the maneuvers of the vehicles involved and the road environment that characterizes it.

Table 10 shows the list of accident scenarios for three legs skewed intersections useful for an objective disaggregated analysis of accidents in this particular type of intersection.

For example the scenario 01 is mainly manifested in the left skewed intersections while the scenario 02 is typical of the right skewed intersections, as shown in Table 3.

4. Conclusions

The concept of ‘prototypical scenario’, as a construction derived from a combination of several cases considered to be similar, can be used to obtain results with general applications based on sets of accident case studies, thus contributing to the accumulation of knowledge on accident phenomena and providing a useful foundation when designing preventive measures.

In operational studies, the use of the prototypical scenario concept as ‘road traffic pathology’ may produce a diagnosis aid to provide additional knowledge linked to the accident processes and relevant action and thus complete the data obtained from police accident files.

The prototypical scenarios in fact provide a basis on which to consider the action to be taken, but also a concrete backup for accident information for use in information campaigns or training.

In the specific case of skewed intersections seen as some factors (intersection angle, road signs, driver characteristics, etc.) affect some scenarios rather than others. The use of prototypes of scenarios reduces the subjectivity of the analysis in-depth; the content of this work is for the person making the accident analysis a useful tool for understanding the causal relationships directly or indirectly related to the specific dynamics of road accidents.

The future development of this research is to define for each scenario identified a “failures' matrix”, based on logic-deductive of the faults tree, which defines all possible causal factors that originated the scenario itself, so as to complement the tools made available to those working in the field of road safety in order to identify the most effective measures to be implemented.

Conflict of interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

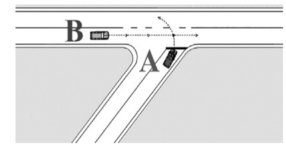
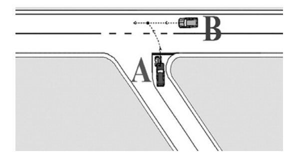
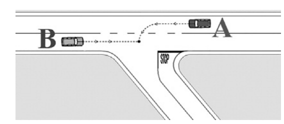
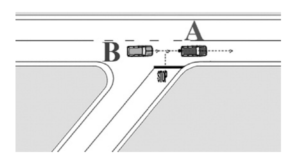
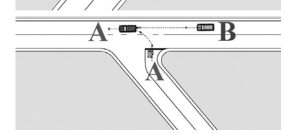
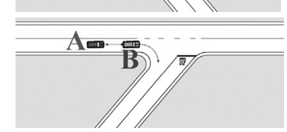
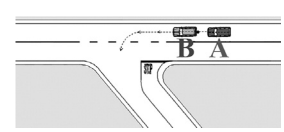
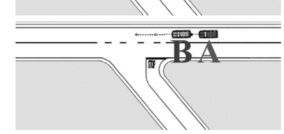
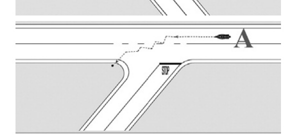
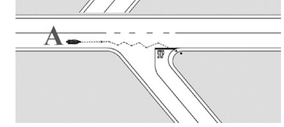
Table 7
Distribution of accidents by vehicle types.

Type of intersection	Angle accidents		
	Heavy vehicle	Car	Two wheeled vehicle
Right skewed	3	29	6
Left skewed	2	34	5
	Rear-end accidents		
	Heavy vehicle	Car	Two wheeled vehicle
Right skewed	3	23	4
Left skewed	2	19	3
	Run-off the road accidents		
	Heavy vehicle	Car	Two wheeled vehicle
Right skewed	0	4	7
Left skewed	0	2	8

Table 9
Distribution of accidents by driver's knowledge of the site.

Type of intersection	Angle accidents	
	Usual driver	Unusual driver
Right skewed	21	17
Left skewed	23	18
	Rear-end accidents	
	Usual driver	Unusual driver
Right skewed	17	13
Left skewed	13	11
	Run-off of road accidents	
	Usual driver	Unusual driver
Right skewed	6	5
Left skewed	4	6

Table 10
Prototypical accident scenarios in three legs skewed intersections.

Prototypical accident scenarios for three legs skewed intersections					
N.	Driving phase	Rupture phase	Emergency phase	Crash phase	Scheme
01	• Driver A, often young or unusual, stopped on secondary leg waiting to turn left on the main road. • The vehicle B on the main road coming from the left side of the vehicle A. • Generally in conditions of poor visibility and poor characteristic of the road marking. • Mainly in left skewed intersections.	Driver A: - does not notice of the oncoming the vehicle B; - stops beyond the stop line; - does not correctly evaluate the position of the vehicle B; - does not respect the rules of precedence.	• Driver A: - does the turning maneuver; - begins the turning maneuver and stops late. • Driver B: - does not react; - tries an emergency maneuver.	The vehicle A collides with the vehicle B	
02	• Driver A, often young or unusual, stopped on secondary leg waiting to turn left on the main road. • The vehicle B on the main road coming from the right side of the vehicle A. • Generally in conditions of poor visibility. • Mainly in right skewed intersections.	Driver A: - does not notices of the oncoming vehicle B; - does not correctly evaluate the position of the vehicle B; - does not respect the rules of precedence.	• Driver A does the turning maneuver. • Driver B: - does not react; - tries an emergency maneuver.	The vehicle A collides with the vehicle B	
03	• Driver A on the main road intend to do a maneuver to turn left on the secondary leg. • The vehicle B moving on the main road, travelling in the opposite direction, usually at high speed. • Generally with poor characteristics of the road marking and sign.	Driver A: - does not notices of the oncoming vehicle B; - does not correctly evaluate the position of the vehicle B.	• Driver A: - does the turning maneuver; - begins the turning maneuver and stops late. • Driver B: - does not react; - tries an emergency maneuver; - reacts but does not come to a stop.	The vehicle A collides with the vehicle B	
04	Driver A stopped on secondary leg waiting to turn right on the main road. The vehicle B on the main road coming from the left side of the vehicle A. Mainly in left skewed intersections.	Driver A: - does not notices of the oncoming vehicle B; - does not correctly evaluate the position of the vehicle B; - does not respect the rules of precedence.	• Driver A does the turning maneuver. • Driver B: - does not react; - reacts too late; - reacts but does not come to a stop.	The vehicle A rear-ends the vehicle B	
05	Driver A stopped on secondary leg waiting to turn left on the main road. The vehicle B on the main road coming from the right side of the vehicle A. Mainly in right skewed intersections.	Driver A: - does not notices of the oncoming vehicle B; - does not correctly evaluate the position of the vehicle B; - does not respect the rules of precedence.	• Driver A does the turning maneuver. • Driver B: - does not react; - reacts too late; - reacts but does not come to a stop.	The vehicle A rear-ends the vehicle B	
06	• The vehicle B on the main road intend to do a maneuver to turn right on the secondary leg. • The vehicle A on the main road behind the vehicle B, often at high speed. • Mainly in left skewed intersections. • Generally with poor characteristics of the road marking and sign.	Driver B notices too late the presence of the intersection.	• Driver B slows sharply. • Driver A: - does not react; - reacts too late.	The vehicle A rear-ends the vehicle B	
07	• The vehicle B stopped on main road waiting to turn left on the secondary leg. • The vehicle A on the main road behind the vehicle B, often at high speed. • Mainly in right skewed intersections.	Driver A notices too late that the vehicle B is stopped before of this.	Driver A: - does not react; - reacts too late.	The vehicle A rear-ends the vehicle B	
08	• The vehicle B moving on the main road. • The vehicle A on the main road behind the vehicle B.	Driver B slows sharply.	Driver A: - does not react; - reacts too late.	The vehicle A rear-ends the vehicle B	
09	• The vehicle A, generally two-wheeled vehicle, on the main road intend to do a maneuver to turn left (right) on the secondary leg. • Often young or unusual driver. • Generally at night and poor sign. • Mainly in left (right) skewed intersections.	Driver B notices too late the presence of the intersection.	Driver A reacts too late.	Driver A loses control of the vehicle and it runs off the road.	 

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