

Fotgängarnas vedermödor i Indien

Ett tvåårigt forskningsprojekt i Jaipur, Indien

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Syfte med projektet

- Main aims:
 - 1/To understand pedestrian safety problem
 - 2/To identify feasible traffic calming measures.
 - 3/ To be able to follow up with after studies

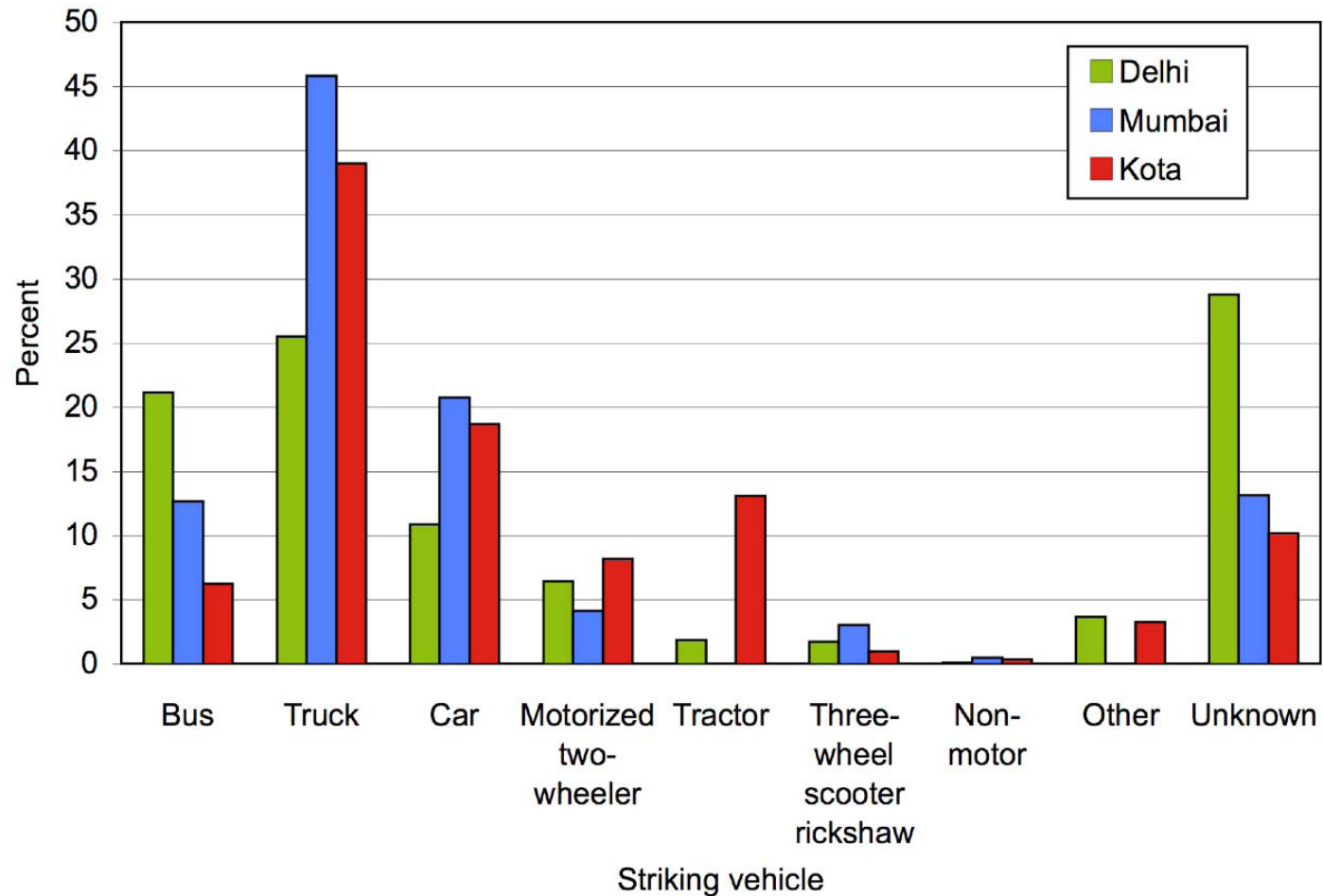
Uppläggnig

- By combining general knowledge about traffic calming measures with the experience from Jaipur measures were proposed
- No measures are unfortunately not yet implemented
- The planned after studies were replaced by studies of various already existing traffic calming measures in Jaipur
- The report presents general conclusions regarding the feasibility of different traffic calming measures under Indian conditions

Traffic Safety in India

- India: 71% were motorcycles, and cars only 13 %.
- In the U.S. for instance cars stand for 66% of all vehicles while motorcycles only stand for 3%.
- Regarding safety, however, motorcycles represent a smaller part of all fatalities, in Mumbai 7%, in Delhi 26%, and in the smaller city of Kota (a bit less than 800,000 inhabitants) 33%
- Altogether pedestrians are by far the most involved in fatalities. They represent 79% in Mumbai, 47% in Delhi and 28% in Kota. Third most involved in fatalities are bicyclists; 7%, 10% and 5% in the three cities.

Striking vehicle in fatal crashes in Delhi (2001-2005), Mumbai (1996-1997), and Kota (2007).



Field studies at the first seven sites in Jaipur

Four of the seven sites

Site 11 Riico Gate



Site 13 Goshala



Site 14 Sector 3



Site 15 Haldi Ghati Marg



Different kinds of studies

- **Conflict studies**
- **Behavioural studies**
- **Interactional studies**
- **Traffic volumes;**

All based on video recordings

Conflict studies in Jaipur

- Conflict observers were trained both in India and in Jaipur
- Every site is video recorded, 4 days, 6,5 hours per site
- Indian team (IT) analysed two of the days and the Swedish team (ST) the other two.
- One day is made by both teams – for comparisons
- All video records are stored and can be reused
- In Lund we use it for the development of a system for automated video analysis

Conflict studies - Results

Table 7 Total number of recorded serious conflicts at the seven sites

	PEDESTRIAN CONFLICTS/ STRIKING VEHICLE				BICYCLE CONFLICTS/ STRIKING VEHICLE				OTHER CONFL	TOTAL	OBS. HOURS
	CARS	MC	OTHER	TOT	CARS	MC	OTHER	TOT			
Riico Gate (11)	9	14	2	25	6	5	1	12	79	116	25.5
Goshala (13)	7	12	1	20	7	6	1	14	66	100	25.6
Sector 3 (14)	9	56	6	71	3	0	0	3	8	82	44.9
Haldi Ghati Marg (15)	4	12	0	16	3	13	0	16	127	159	50.7
Galta Gate (21)	18	16	12	46	4	4	2	10	61	117	52.1
Phakeero ka Mohalla (23) (ST only)	15	7	8	30	5	1	1	7	64	99	26,1
Gopalpura (29)	23	34	2	59	24	18	1	43	79	181	49.5
TOTAL	87	158	34	279	50	45	5	100	470	847	274.0

Conflict studies – Main findings

- The number of serious pedestrian conflicts differ by a factor of 3,5 between locations
- 3 times more serious pedestrian conflicts than bicycle conflicts
- Cars and motorcycles are striking vehicles in more than 90% of the pedestrian and bicycle conflicts
- On average 3 serious conflicts per hour (In Sweden: 2-3 serious conflicts per hour)

85-percentile speeds on approaches to the Seven Sites

	FROM Jaipur		DIFF	TOWARD Jaipur		DIFF
	Car	Mc		Car	Mc	
RIICO Gate (11)	57	54	+3	48	43	+5
Goshala (13)	50	48	+2	50	48	+2
Sector 3 (14)	56	52	+4	52	49	+3
Haldi Ghati (15)	54	53	+1	53	50	+3
Galta Gate (21)	54	47	+7	44	44	0
Phakeero ka Mohalla (23)	54	47	+7	43	50	-7

Involvement in serious conflicts in relation to volumes at the seven sites

	CAR / MOTOR-RICKSHAW	MOTOR CYCLES	/LCV/TRUCK/BUS	TOTAL
TOTAL VOLUMES PER SITE; AVERAGE (N)	800	1852	363	3015
SHARE (%)	27	61	12	100
STRIKING VEHICLES IN PEDESTRIAN CONFLICTS (%)	31	57	12	100
STRIKING VEHICLES IN BICYCLE CONFLICTS (%)	50	45	5	100

Interactional studies

- Pedestrians are observed while crossing the road
- Motorised drivers do almost never interplay with a pedestrian
- A large majority of pedestrians have to stop and wait
- Half of the pedestrians do not walk straight over the street
- At some of the intersections half of the pedestrians walk in the middle of the intersections

General conclusions from studies of conflicts, interactions and movements

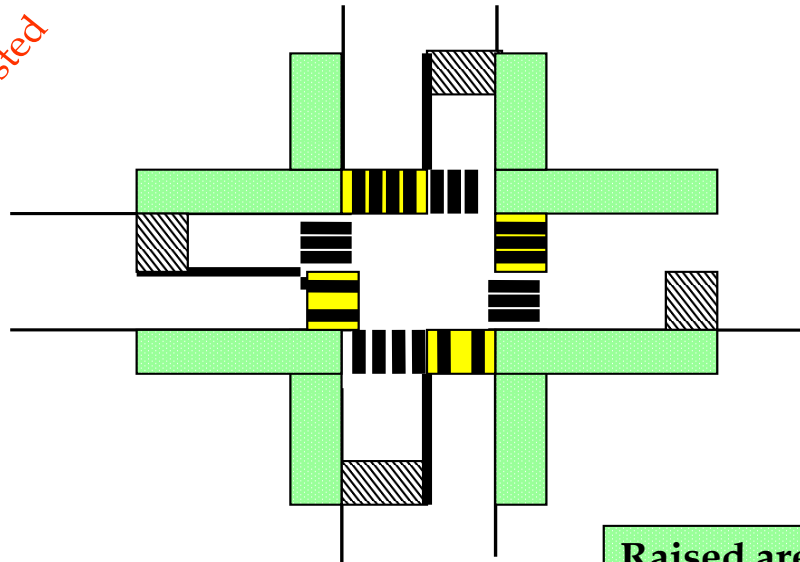
- All movements and conflicts (including pedestrian) mainly occur in the central parts (middle) of the intersections. When passing the intersections **everybody** seeks to minimize distance, effort and delay.
- Vehicles (including bicycles) are quite often involved in serious conflicts at locations in the intersections where they “are not supposed to be” regarding driving direction.
- Motorcycle drivers are not overrepresented in serious conflicts, rather the contrary (bicycle conflicts)
- Car drivers are overrepresented in serious conflicts
- Car drivers have higher approach speeds to these intersections than motorcycles; Car drivers involved in serious conflicts have considerably higher speeds than corresponding for motorcycle drivers.

Interpretation of study results in terms of traffic calming measures in India

- The space available at the intersections is extremely vast → unorganized movements.
- Vehicle speeds are much too high - 85 percentile speeds above 50
- Road users are left without any incentives or physical guidance on how to behave.
- Communication and interaction is poor i.e. motorised drivers seem to neglect the presence of pedestrians and bicyclists, it is the vulnerable road user who has to take the responsibility for a safe outcome of interactions
- **The way forward** is to ensure low speeds and organize the traffic at intersections, cf “Standardised Traffic Calmed Intersection”.

Traffic Calmed Standardised T- and Four Arm Intersection

Measures Suggested



Raised area for pedestrians



Hump - 3,6 m wide, circular top, 10 cm high at its peak, located 10-14 m in advance of the pedestrian crossing.



Zebra crossing



Raised Zebra crossing - Flat top, 5 m wide, 10 cm high, 1 m ramp

Speeds at sites with comparative humps in Jaipur, India and Lund, Sweden

	Length (m)	Height (m)	Mean speed (km/h)	85-percentile speed (km/h)
Collectorate, Jaipur	3,8	0,10	21	24
Lalkothi, Jaipur	3,8	0,11	18	23
Kulgränden, Lund Direction: South	3,5	0,07	21,0	25,0
Kulgränden Direction: North	3,6	0,08	18,7	22,3
hump nr. 1 at Måsvägen, Lund Direction North-east	3,6	0,11	18,1	19,9
hump nr. 1 at Måsvägen, Lund Direction South west	3,6	0,12	17,0	20,1
hump nr. 2 at Måsvägen, Lund Direction North-east	3,6	0,12	16,9	19,3
hump nr. 2 at Måsvägen, Lund Direction South west	3,6	0,09	17,5	19,9
Average, Lund	3,6	0,10	18,2	21,1

Speeds at the different speed reducing measures

- Humps and rumble strips reduce speeds - The 85th percentile speeds of both car drivers and motorcycle drivers are most often around 30 km/h
- Humps affect car drivers' speeds more than motorcycle drivers' speeds
- The dimension and design are of importance - The length to height relation must be correct when a hump is introduced
- Location matters – Should be located only where needed
- Too big speed reduction – with regard to aim and perceived relevance?
- Area-wide in stead of single application – Reduce acceleration, retardation, noise, air-pollution

Conclusions

There is an urgent need for Traffic Calming measures:

- Pedestrians are extremely exposed and vulnerable
- Speeds are too high to allow safe and proper communication
- Road users are not offered any comfortable and safe crossing options e.g. existing pedestrian crossings are not suited for pedestrians

All this creates “chaos” and the Traffic Calming measures we have proposed will most certainly reduce speeds and promote descent road user behaviours as they have proven to do in Europe

Slutsatser för oss svenska forskare

- Stor skillnad mellan svenska och indiska fotgängares situation. Vad gör vi med det?
- Är våra kunskaper valida och användbara i Indien (och i andra länder)?
- Vad kan vi lära oss?