



Publications

Chawla A and Mukherjee S (2007). Motorcycle safety device investigation: A case study on airbags. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 427-444.

Chawla A, Mukherjee S, Nayak A and Mohan D (2007). Investigating the rollover propensity of a 15 seater mini bus. *International Journal of Vehicle Safety* 2, 206-220.

Kale SR, Veeravalli S V, Puneekar HD, and Yelmule MM (2007). Air flow through a non-airconditioned bus with open windows. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 347-364.

Mohan D. (2007). The Politics of Mobility. *Seminar*, No. 579, 14-18.

Mukherjee S, Chawla A, and Iyer S K (2007). Positioning of motorcycle dummies in crash simulations. *International Journal of Crashworthiness* 11, 337-343.

Mukherjee S, Chawla A, Karthikeyan B and Soni A (2007). Finite element crash simulations of the human body: Passive and active muscle modelling. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 409-426.

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Mukherjee S, Mohan D and Gawade T R (2007). Three-wheeled scooter taxi: A safety analysis. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 459-478.

Pinnoji P K and Mahajan P (2007). Finite element modelling of helmeted head impact under frontal loading. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 445-458.

Sen A K, Tiwari G, and Upadhyay V (2007). Should bus commuting be subsidized for providing quality transport services? A case for Delhi. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 329-346.

Tiwari G, Fazio J, and Gaurav S (2007). Traffic planning for non-homogeneous traffic. *Sadhna-Academy Proceedings in Engineering Sciences* 32, 309-328.

Tiwari G. (2007). Urban Transportation Planning. *Seminar*, No. 579, 45-49.

Research & Consultancy Projects

Sustainable Urban Transport in Less Motorised Countries: Research and Training

Sponsor Volvo Research & Educational Foundations

Team D. Mohan, G. Tiwari, A. Chawla, S. Mukherjee, S.R. Kale, P. Mahajan, S. Sanghi, R. Ravi, Dunu Roy and M. Varghese

Planning and Implementation of BRTs Project in Indore.

Sponsor Indore City Transport Services Limited.

Team G. Tiwari and D. Mohan

Operating Plan for Implementation of Road Redesign for HCBS Corridor, Ambedkar Nagar to Delhi Gate

Sponsor Transport Department, Government of NCT Delhi.

Team G. Tiwari and D. Mohan

Safer Bus Design

Sponsor Ashok Leyland Ltd.

Team D. Mohan, S. Mukherjee and A. Chawla

Master Plan for Bus Rapid Transit System Integrated with Bicycle Network in Pune.

Sponsor Pimpri Chinchwad Municipal Corporation.

Team G. Tiwari and D. Mohan

Bicycle Partnership Programme (BPP)

Sponsor Interface for Cycling Expertise, The Netherlands

Team G. Tiwari and D. Mohan

Design Manual for BRT Systems in Indian Cities

Sponsor UNDP and Ministry of Urban Development

Team G. Tiwari

Bus Rapid Transit System in Hyderabad

Sponsor Hyderabad Municipal Corporation

Team G. Tiwari and D. Mohan

Scholarships

Ms. Himani Jain - Ph.D. Scholar awarded Volvo Foundation Research Scholarship for the period 1-1-2008 to 31-07-2008

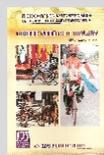
Mr S.V. Ravi Gadepalli - M.Tech student awarded Volvo Foundation Research Scholarship for the period 1-1-2008 to 31-07-2008

Mr. Varun Grover - M.Tech. Student awarded Sumant Moolgaokar Research Scholarship for the period 1-1-2008 to 31-07-2008



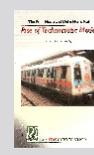
A Handbook for Socio-Economic Impact Assessment (SEIA) of Future Urban Transport (FUT) Projects

Anvita Arora and Geetam Tiwari.
TRIPP, IIT Delhi



Whose Road is it Anyway? The Idea of Non-motorized Mode of Transport and Print Media

Abhay Kumar Dubey.
IDS



Rise of Technocratic Model: The Print Media and Delhi Metro Rail

Abhay Kumar Dubey
:IDS

The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology Delhi, is an interdisciplinary programme focussing on the reduction of adverse health effects of road transport. TRIPP attempts to integrate all issues concerned with transportation in order to promote safety, cleaner air, and energy conservation. Faculty members are involved in planning safer urban and inter-city transportation systems, and developing designs for vehicles, safety equipment and infrastructure for the future. Activities include applied research projects, special courses and workshops, and supervision of student projects at postgraduate and undergraduate levels. Projects are done in collaboration with associated departments and centres at IIT Delhi, government departments, industry and international agencies.





Fact-Based Road Safety



Professor Ezra Hauer

Dr. Ezra Hauer is a Professor Emeritus in the Department of Civil Engineering at the University of Toronto where he has earned international renown as an innovator in engineering principles. Hauer has been active in road safety research and consulting since 1970. He completed his bachelor's and master's degrees in Israel, and later received his doctorate from the University of California, Berkeley. He has served as Vice President and President of the Canadian Association of Road Safety Professionals, and chaired the International Committee of Symposia on Traffic and Transportation Theory..

Do you see any movement toward science-based road safety management systems?

Road Safety management is in transition. The transition is from action based on experience, intuition, judgment, and tradition, to action based on empirical evidence, science, and technology; from consideration of road safety that is tacit and qualitative to consideration of road safety that is explicit and quantitative. In road safety, the transition from reliance on intuition to reliance on science is already in progress and is accelerating. Those who now plan, design, and operate the transport system have had virtually no training in road safety and the guidance documents which they use are the embodiment of judgment, not of empirical fact; there is a gradual emergence of tools and practices that are based on quantifiable empirical fact; the emergence of this new attitude is hungry for knowledge of fact and hungry for trained personnel. Just as health can not be delivered without investment in the training of nurses and physicians, or without steady support for research institutes, libraries, medical schools, and laboratories, so road safety cannot be delivered rationally without stable investment in research and manpower training.

In the past, roads were designed and built without the designer knowing whether crashes could be saved cost effectively by a change of curve radius, grade, shoulder width, and the like. Nor was it known whether by adhering to standards, money is being spent without a commensurate safety benefit. This is now changing. Underway now is the development of the Highway Safety Manual (HSM). The purpose of this comprehensive document will be to: "provide the best factual information and tools in a useful form to facilitate roadway planning, design, and operational decisions based on the explicit consideration of their safety consequences."

Taken together these activities are a clear indication that the management of road safety is moving from the traditional pragmatic style towards the explicit, science and knowledge-based rational style.

Why do we need to have specially trained practitioners and researchers to ensure road safety?

Safety management professionals are the carriers and suppliers of factual road safety knowledge. One can manage road safety in the pragmatic style without reliance on these professionals and what they know. Thus, e.g., one can leave it to municipal politicians to decide when and where to install a new traffic signal, using as guidance the mistaken lay belief that signalization is always good for safety. In contrast, rational management relies on fact-based knowledge and on the professionals who are its purveyors. It is the competent professional who must know, e.g., in what circumstances signalization is expected to enhance safety and the professional's opinion must have a key role in the decision to signalize or not. In the delivery of health we consider it natural that it is trained professionals who diagnose ailments and prescribe remedies, not civil servants or elected officials. Administrators and politicians deal with health policies and priorities, and physicians, and nurses look after with prevention and treatment. The same should (and will) be natural in the rational delivery of road safety. Therefore, rational delivery of road safety will require professionals trained in road safety. Training requires knowledge of fact. Knowledge of fact is the creation of the researcher. The researcher also needs to be trained, albeit not in the same manner as the professional whose task is to make use of the extant factual knowledge.

Is the current knowledge regarding road design adequate for training road safety professionals?

Those who by their work or function have an important impact on the future of road safety should receive training. The training they need should enable them to foresee how their choices are likely to affect crash frequency and severity. The workforce in need of fact-based training are not only civil engineers, police officers, and driving instructors; the workforce to be trained includes town planners, architects, municipal engineers, transportation planners, and all those who advise politicians, officials on planning boards, and perhaps others.

This immediately raises a problem. Even the Manual on Uniform Traffic Control Devices, many transport policies and similar documents are very short on fact-based information about the link between decisions and their road safety consequences. One may therefore ask whether the information to be used to train professionals exists. For, if not, how could one devise adequate training programs?

It would be very peculiar if in the course of nearly a century of road building and road use we did not learn anything about the safety consequences of our decisions. To give an impression about the prevailing state of affairs I will describe my experiences in working on the Interactive Highway Safety Design Model (IHSDM) project. The goal of the IHSDM project was to create software enabling the designer to predict the safety consequences of design alternatives for rural two-lane roads.

Design alternatives may differ in horizontal alignment, vertical alignment, lane and shoulder width, number of driveways, provision of left-turn lanes at intersections, and additional facts. To assess the safety impact of design decisions of this kind the "project group" assembled the relevant published research reports. Some topics were found to have been researched in depth, while others had very little published. Also, as is usual, the research studies varied in quality and in their conclusions. Once the literature was assembled and reviewed a group of experts met to hammer out what seemed to be the best conclusions that could be reached at that time. The results of their work are now published¹.

There is no doubt that when new research results will be published, much of what has been stated will need to be modified. Nevertheless, there now exists an authoritative document that is based on the accumulated empirical research, and that, for a fairly large set of design choices, can guide the designer of two-lane rural roads on the question: "what can I expect to be the annual number of crashes on this road if I decide to use design option X?" That heretofore such a question was not asked by highway designers, and if asked could not be answered, may be puzzling to those who are not familiar with the practice of highway design. In this sense the IHSDM work indeed is a "quantum leap" in present practice. At least in this case, so it turned out, the many decades of accumulated research provided a sufficient basis for building a rational procedure. It follows that the accumulated knowledge on the safety consequences of design decisions for two-lane rural roads is also sufficient for training.

¹Harwood, D., Council F.M., Hauer, E., Hughes W.E., And Vogt A., ~2000!. "Prediction of the expected safety performance of rural two lane highways." FHWA-RD-99-207, United States Department of Transportation, Federal Highway Administration.

The review documents on several subjects can be downloaded from <http://www.roadsafetyresearch.com>



Can one provide similar guidance and training on the safety consequences of decisions for multilane roads and for roads that are not rural? Probably yes. Is the same possible on topics such as transportation planning, subdivision design, traffic calming, traffic signal coordination, turn restrictions, etc.? On some such subjects enough is known, and giving fact-based guidance is possible; on others little is known and guidance must await new research results. This is not unusual. There are diseases about which medicine knows little and phenomena which scientist do not understand. In medicine, in science, and also in road safety, research ensures that the domain of what is known continues to expand. In sum, imperfect as the present state of knowledge is, one could put together a respectable curriculum to cater to many needs.

The problem is not so much that of insufficient factual knowledge; the problem is more in the weakness of the demand for it. Today one can devise a long term transportation plan for a region, one can get approval for road network in a new subdivision, one can implement a traffic signal coordination and timing plan for a metropolis, one can design a new highway, and in all this, never consider the future crash frequency and severity differences between options and alternatives. Because safety consequences need not be anticipated, training in road safety is not required. Because training in road safety is not required, training is not available, and is not given.

Why is it so difficult to promote evidence based road safety practices?

That one needs training and experience for good bricklaying and for good brain surgery is well accepted. Nobody assumes that a brain surgeon can build a good brick fireplace nor trust the bricklayer to wield a scalpel against their skull. And yet, for some unfathomable reason there exists a widespread administrative and managerial notion that common sense and an engineering degree are sufficient to do road safety research.

Civil engineers typically do not receive any training in the kind of research method needed in road safety, nor do they graduate with much factual knowledge about road safety. Furthermore, nothing in routine engineering practice helps to relieve them of this innocence. In addition, all too often, after the first stab at safety research the clever junior engineer moves on to tasks with more responsibility and more pay. Thus, even learning to do research on the job is seldom feasible. The upshot is a road safety literature that is produced in part by dilettantes and is replete with dubious conclusions. Dilettantes cannot help but produce unreliable results.

Dilettantes would not do much harm if their product was kept out of the pages of professional literature. Unfortunately, this line of defence has long been breached. Once a piece of research is funded and done, publication follows. Not having a research report at the end of a research contract reflects badly on the sponsor. Barriers to publication exist, but are low. Poor quality research and its unreliable conclusions will find its way to the Transportation Research Record and the ITE Journal because the concept of peer review has been largely corrupted. To be a referee of a research paper on road safety, all that is demanded is common sense; that training in road safety, in research methods, and experience in road safety research are not necessary to be a "peer". In a cynical sense this kind of peerage is unobjectionable; dilettante reviewers are appropriate peers to dilettante researchers. And yet, it is obvious that only trained and experienced road safety researchers and scholars should referee research papers on road safety.

The problem is compounded by the managers and administrators, those who decide on research needs, on priorities, on funding, and on who ends up researching what. Their judgment is most likely good regarding questions to which their organization currently seeks answers. They may know less about what is already known, what research can and cannot produce, and about methods that are likely to produce defensible results. This limitation seriously impairs the quality of their judgement. Furthermore, the manager-administrators have no understanding of, and no sympathy for, the need of

theory to guide productive research or the need for research on methodology to produce more trustworthy results. As a result, research is done about what is of immediate concern and what is pressing; very little research is done about what is fundamental and essential for reaching sound conclusions.

What is needed to promote excellence in road safety research?

Just as the problem is evident so is the remedy obvious. We must recognize that past research produced too often less than useless results and that we have to accept that execution in research, not managerial rituals, will bring results. With this as common ground it is possible to specify what is needed to have a healthy road safety research infrastructure.

1. To do good research the researcher has to be:
 - Trained in road safety knowledge,
 - Trained in research methods, and
 - Consider research as a long-term career allowing for the accumulation of research experience.
2. Only reports that are "peer reviewed" get to be published. For this purpose "peers reviewers" are persons who are entirely independent of the organizations that sponsored the research and of individuals performing the research. Furthermore peer reviewers are persons who are on top of the current safety lore and who are experts in research methods.
3. The process of formulating a research program must continue to be influenced by agencies that build roads, operate traffic, set policies, standards or warrants. However, the process must not be allowed to be dominated by these agencies for they have an understandable interest in what is researched, what the conclusions are, and in what stones are best left unturned. The trained and independent researcher must be an influential partner in the process of formulating research programs, the shaping of request for proposals, and the selection of researchers to perform the work.
4. To get good research products the sponsoring agencies must recognize that research is not piecework and cannot be managed as if it was.

Our road safety future is shaped by decisions that affect the amount of trip making, mode of travel used, kinds of infrastructure on which travel takes place, vehicle fleet, technology in use, and the prevailing norms of behavior. While in the past most such decisions were based on intuition and judgement, there is an obvious trend toward decisions based on fact and science. This transition from a "pragmatic" to a more "rational" style of road safety management is hungry for factual knowledge and for professionals to be its purveyors. Consequently, a broad class of professionals, those who influence the future of road safety, needs to be trained in what fact-based road safety knowledge exists. In addition, a vibrant, competent community of road-safety researchers has to be created. They need to be trained in the same road safety knowledge as well as in research methods. Above all they need to be freed from the constraints imposed on them by a myopic class of research administrators. The best interest of society is to move toward the gradual establishment of the rational style of road safety management: it is the engineer's professional obligation to promote this societal interest.

(A more extensive discussion on these issues is available in the following publication:

Hauer, E., (2005) "The Road Ahead", *Journal of Transportation Engineering*, 131, 333-339).



Redesignation of TRIPP

The Transportation Research and Injury Prevention Programme (TRIPP) Centre for Biomedical Engineering, IIT, Delhi has been redesignated as a WHO Collaborating Centre for Research and Training in Transport Safety Technology; this has been approved for a period of four years from 16 January 2008. The terms of reference of the WHO Collaborating Centre would be:

- To collaborate in researches with special reference to safety regarding public transport, traffic management, road design, land use planning, vehicle crash modeling, road safety studies, safer vehicle and helmet design;
- To support the development of the regional strategy on transport injury prevention and control through providing information on appropriate transportation planning, traffic flow analysis, minimizing transport injuries and pollution;
- To assist WHO and member countries in studying the epidemiology of transport related injuries;
- To assist WHO in organizing training courses for Ministry of Health focal persons for injury prevention and disabilities and related multisectoral organisations;
- To support WHO in providing technical assistance on transport safety technology for preventing transport injuries

Visiting Professorship

Geetam Tiwari has been invited as the first "Adlerbertska Guest Professor" at the Chalmers University of Technology in Goteborg, Sweden. She will spend three summer months in 2008 and three summer months in 2009.

Future Events

The Better Air Quality 2008 (BAQ 2008) workshop will be held in Bangkok, Thailand on 12 – 14 November 2008, hosted by the Bangkok Metropolitan Administration (BMA). BAQ 2008 will be organized by BMA, the Pollution Control Department (PCD) of the Ministry of Natural Resources and Environment (MoNRE) of Thailand, and the CAI-Asia Center, in cooperation with the United Nations Environment Programme (UNEP) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

<http://www.cleanairnet.org/caiasia/1412/article-72204.html>

International Research Council on the Biomechanics of Injury (IRCOBI) Annual 2008 Conference will be held in Bern, the federal capital of Switzerland. 17-19 September 2008.

<http://www.ircoibi.org/conference.htm>

52nd Stapp Car Crash Conference will be held on 3-5 November 2008 at the Hyatt Regency San Antonio in San Antonio, USA.

<http://www.stapp.org/index.shtml>

"Children and Injuries" International Conference Cape Town, 31 August – 3 September 2008, International Society for Violence and Injury Prevention & The Child Accident Prevention Foundation of Southern Africa.

http://www.uct-cmc.co.za/Conferences/conf-main.asp?Conf_ID=71&Page=Home

The 2nd Asia Pacific Injury Prevention (APIP) Conference, Hanoi, Vietnam, 2-6 November 2008.

<http://www.apacph2008.org/>

The Association for the Advancement of Automotive Medicine (AAAM) 52nd Annual Conference, San Diego, California, USA, October 5-8, 2008,

<http://www.carcrash.org/>

The Safe Communities Foundation of New Zealand is co-hosting the 17th International Safe Communities Conference, which is supported by the WHO Collaborating Centre on Community Safety Promotion, Christchurch, New Zealand, 20-23rd October 2008.

<http://www.conference.co.nz/index.cfm/lsc08/Welcome>

Mobility and Road Safety, IRF Conference, New Delhi, India, 03 - 04 October 2008.

<http://www.irfnet.org/>

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Endowments for perpetual Chairs
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