

A short history of pedestrian safety policies in Western Europe

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Introduction

Before cars were introduced on the roads in Europe, walking was the major means of conveyance for most people ; however, horse-riding and horse-powered vehicles already generated some accidents and fatalities, and horsemen already claimed priority over pedestrians in view of their higher status. In urban areas, traffic mixed pedestrians and other forms of non-motorized transport which conflicted with other activities (street vendors, workers, etc.) [Boileau, ca 1690].

Introduction of cars was careful at first : at the beginning of the 20th century, in France for example, maximum speed was fixed by law at 5 km/h ! This was bound to change with growing motorisation : speed limits were gradually raised and finally disappeared (in France, a limit of 60 km/h was re-introduced in urban areas only in 1954). After the second World war, motorisation started increasing faster, as it is now doing in China, India and other high-growth countries, due in particular to access of larger segments of the population to cheaper cars. Cars had become a status symbol as horse-drawn carriages had been in previous centuries. Pedestrians rights to the carriageway were not recognized any longer and the highway codes enacted in the 50's severely limited the legal possibilities of crossing flows of vehicles : pedestrians had become by law "moving obstacles" in the path of cars and sources of disturbances to motorized traffic.

In the 60s and the 70s, efforts of decision-makers and engineers in the transport sector concentrated on adapting the road infrastructure to growing motorised traffic, both in rural and in urban areas. This was done by building separated motorways or expressways, but also by widening carriageways of existing roads at the expense of pedestrians and cyclists whose moving space got reduced. Pedestrians were more or less considered as a future "extinct species" anyway. Speeds of motorised traffic increased, both through technological progress on vehicle design and through the changes brought to infrastructures to reduce traffic jams. As a result, walking along roads and crossing carriageways became increasingly difficult and dangerous for pedestrians, which resulted in high proportions of pedestrian fatalities and injuries, particularly as concerns children and elderly pedestrians, and contributed to the decrease of walking as a major transportation means [OECD, 1990]. Moreover, adapting infrastructures to the needs and desires of drivers confirmed the social hierarchy between them and the pedestrians and encouraged bold behaviour from motorists and neglect of what was left of pedestrians' rights.

In this context, we will review the main steps taken since the 60s to improve pedestrian mobility and safety in urban areas. It will be seen that the measures taken have primarily addressed speed reduction [see also Muhrad, 2000] and repossession of space for pedestrians, which has meant opposing the social and economic pressures to give full priority to individual transport by car, freedom of driving, and allocation of greater and greater road space to motorised traffic.

In the 60s and the 70s: New urban and transport planning approaches

1. Developing urban and transport planning methods for better road safety

While transport and road engineers and decision-makers were busy with car traffic, it is urban planners who first became concerned by pedestrian safety problems, especially those involving children on urban streets at a short distance of their own houses. A foundation to their work was found in what is known as "the Buchanan Report" [Buchanan, 1963], commissioned by the British Ministry of Transport, which advocated a road hierarchy for urban areas separating roads used primarily for motorised transport from the networks of access streets in "environmental areas" ; in the latter, environmental criteria bearing on the quality of life of local residents and users were to be considered as a priority. The first guidelines directly related to planning for road safety were produced by the University of Göteborg, Sweden and published by the Swedish road administration in 1968 [SCAFT, 1968]: the planning principles in the guidelines applied to the design of new "environmental areas", mostly residential, with a view to eliminating through traffic and reducing speeds in order to provide safe public space for children to walk and to play. Given the high urbanization growth then experienced in Europe, the SCAFT principles were extensively used in Sweden and also spread to most Northern European countries.

Meanwhile, residential neighbourhoods in old parts of European cities were mostly built on a square grid which allowed through traffic and encouraged high speeds. The new "environmental areas" developed according to the SCAFT guidelines displayed good safety records, so that existing neighbourhoods started being "improved" following similar principles, for example in Denmark and in Great Britain, in the early 70s [Department of the Environment, 1974, Jorgensen, 1978] ; this was achieved through a number of physical road closures carefully located on the grid to recreate cul-de-sacs and eliminate through traffic which was redirected onto the surrounding streets acting as a ringroad. The first examples were widely followed in European cities where "zoning" had been effective and the residential and work functions were well separated ; this was not the case in older cities where a mixed urban fabric had developed, which made a hierarchy of roads according to purpose of traffic impossible to define.

Densely built old city centres also became a concern : adapting urban streets to growing traffic there meant destroying historical areas, increasing noise and pollution, and as a consequence discouraging citizens to live there, or to go there during their free time, and thus damaging trade. Planners willing to revive dying city centres based their action on redeveloping safe and comfortable walking (and cycling where this mode of transport was popular), although pedestrian safety was not their primary aim. Principles inherited from the SCAFT guidelines thus started to be applied to city centres in the 70s, with however a broader goal – eliminating through traffic *and* reducing access to the area by personal cars - and using a broader range of methods than in residential areas : reduction of the number of vehicle entry points to the centre, street closures and a one-way system to make it impossible to drive through the area, narrowing of carriageways to provide wider sidewalks for pedestrians (and sometimes cycle paths), parking restrictions ; for safety reasons, the surrounding streets also had to be organised into a formal ringroad with limited pedestrian access to the carriageway and redesigned junctions. Public transport systems had to be developed to provide adequate access, and park-and-ride systems were provided by some cities such as Nottingham in the U.K. as a further incentive for inhabitants of peripheral neighbourhoods or suburbs to leave their vehicle on their way to town. Pioneer cities included Göteborg and Uppsala (Sweden), Nottingham (U.K.), Belfort (France), Groningen (the Netherlands). The first experimentation results were documented and disseminated by OECD in "Better Towns with Less Traffic" [OECD,1975].

While the SCAFT principles and their direct and indirect applications were based on risk reduction for pedestrians and other road users through lower speeds and lower traffic volumes, planners also worked on reducing risk exposure through complete segregation of pedestrians (and often also cyclists) from motorised traffic. While most of the segregation was implemented in the "environmental areas" understood according to Buchanan (residential areas and city centres), some "new towns" built in Britain (Stevenage, Cumbernault, etc.), the Netherlands (Bijlmermeer), France (Cergy-Pontoise, le Vaudreuil), provided segregated pedestrianized networks not only inside neighbourhoods, but also for the first time across town to link major urban services to residences and workplaces. Large scale pedestrianized areas also began to appear in city centres in the 70s (for example in Copenhagen, Denmark, in Rouen, France, in Vienna, Austria), following the first example of Stevenage where a pedestrianised centre had been implemented as early as 1959 [OECD, 1977, 1979].

However, full pedestrianization, and more generally segregation of motorised and non-motorised transport modes, had to be very well designed to effectively ensure elimination of conflicts between pedestrians and vehicles, and soon appeared to be expensive and to have other drawbacks such as complicating the operation of bus lines and making access routes into some areas difficult to read ; the principle was moreover easier to apply to new towns or new urban developments than to the old urban fabric. New schemes to organize safe "mixed traffic" on streets designed so that pedestrians and vehicles moving at low speed (i.e. "walking speed") could safely mingle on the same space were thus devised, at first in residential neighbourhoods in the Netherlands where the "woonerf" concept gave full priority to pedestrians [ANWB, 1977]. The example quickly spread throughout Europe [OECD, 1979]. However, mixed traffic streets and "urban yards" ("woonerven") remained quite small in size.

Meanwhile, from the early 70s onwards, "traffic plans" were implemented in Western European cities and medium-size towns (this meant, for example in France, towns of more than 40,000 inhabitants) with the aim to rationalize the use of existing urban road space to improve smoothness of traffic flows and reduce bottlenecks and traffic jams. Although road safety was one of the criteria to take into account when designing the plans, knowledge of how to proceed to reduce the number of injury accidents was still very limited. However, planners, again, took the opportunity to introduce on a larger scale the new ways of thinking about non-motorised transport and its importance for urban life: from a simple reorganisation of car traffic in densely built city centres with minimum changes to the infrastructure (one-way systems, junction re-design, installation of traffic lights, introduction of "green waves" then of area-wide coordination of lights, etc.), traffic plans developed in the late 70s to include the measures aimed at reducing personal car travel, eliminating through traffic from areas with high pedestrian flows, developing public transport and facilitating walking (and often cycling) ; moreover, traffic plans started covering wider parts of urban areas than just city centres [Muhlrad, 1977].

2. Discussion

While the Buchanan report envisaged a city as a system that had to be adapted to cars without neglecting environmental aspects even at an economic cost (a point that was not well received at the time) [Hall, 2004], SCAFT guidelines, "environmental" or "general improvement" area, pedestrianized streets or neighbourhoods, or mixed traffic schemes in "urban yards" remained limited in scope and addressed road safety at a very local level. Moreover, they were fully compatible with traffic growth, provided the urban road network was properly hierarchized and the bulk of traffic was thus kept outside the areas considered as sensitive : so, while introducing pedestrian safe mobility as a concern in urban planning, they did not radically counter the trend of "adapting cities to car traffic" at all costs and giving priority to car travel.

Impact on road safety of the application of such principles was not fully assessed prior to implementation as there was a logic to them. After implementation, the level of safety observed inside the newly built areas according to the SCAFT principles or the re-designed old residential areas or city centres was quite high, but problems arose at the exit of such areas, and on the ringroads if those were not properly adapted for receiving the traffic expelled from the neighbourhoods. There were also questions as to the difficulties encountered by children brought up in surroundings with very little traffic once they would have to cross the border of their home area to attend high school or other activities. More important, the SCAFT guidelines and their further applications did not address the most serious problems of pedestrians having to cross busy urban thoroughfares, or conversely, the design of high traffic routes to take into account pedestrian mobility needs and safety as well as efficiency of car travel and smoothness of traffic flows [Hagson, 2004].

In other words, walking was not yet really considered as a full-fledged means of transport. Large-scale pedestrian-friendly networks were still mostly unknown, and pedestrians were basically treated as "automobilists having succeeded in parking their cars". On the main through-traffic and "distributor" roads, minimal facilities were still offered to enable pedestrians to cross the carriageway, often with no consideration to their needs in terms of continuity of walking route and time to cross several lanes of traffic, especially for slow pedestrians (elderly or mobility-impaired people, people carrying heavy burdens or pushing baby carts, etc.). In the late 70s, second generation traffic plans which included provisions for public transport, cycling and walking as well as parking restrictions were the first real attempt at an effective systems approach to urban transport, including non-motorised modes.

It has to be noted that taking into account pedestrians in urban planning and developing specific approaches to plan for pedestrian safety did not come without some lobbying and pressure from the pedestrians themselves and some early support from research. Psychologists started investigating the behavioural and safety problems of young children, introducing the idea that they could not manage risks in traffic and therefore that traffic conditions had to adapt to them [Sandels, 1968]. The beginnings of international cooperation between European countries in research and in practice, strongly supported by OECD, was instrumental in passing along ideas and innovations that were quickly adapted to the national context. Pedestrian associations were also vocal in demanding rights and safety for the youngest and the most vulnerable, and were for example instrumental in getting the "urban yards" or "woonerven" implemented in the Netherlands.

In the 70s and 80s: Remedial approaches, correcting errors

1. Accident analyses vs transportation planning approaches

Road safety researchers who, in the 70s, had yet little experience of safety problems in cities and towns and had just begun to understand the multi-factoral processes generating road crashes and injuries started analysing "pedestrian blackspots" in the same way as they did on rural roads. In some countries (France, the Netherlands, the U.K., etc.), special multidisciplinary units including the police, local authorities and local road professionals were institutionalized at the local level to analyse blackspots and propose solutions. This first effort at tackling road safety in urban areas on a multidisciplinary basis provided new experience in inter-sectoral cooperation and did increase knowledge and awareness of pedestrians' problems. Frequent design mistakes were identified through in-depth accident analyses such as traffic-light cycles that did not take into account pedestrian crossing times, pedestrian subways too insecure to use or with staircases preventing old or handicapped people to use them, stretches of market streets with no proper crossing facilities, unprotected school exits,

crossing facilities ill-integrated into pedestrian routes, ill-maintained sidewalks, obstacles in the path of pedestrians, insufficient public lighting, etc. Some local remedial measures could be implemented on the basis of such analyses carried out at a micro-level. However, it soon appeared that injury accidents accumulating at identified urban blackspots only accounted for a few percent of urban road crash victims, and, moreover, that blackspots could seldom be treated in an isolated way : on a dense urban road network, any measure taken at one location impacted on other parts of the route or the area around it. This meant that more extensive work was necessary to re-organize traffic if one wanted to obtain safer pedestrian trips and reduce the number of injury accidents scattered over the street network. Moreover, walking had to be thought of as a continuing activity with its own performance needs in order to properly design and locate pedestrian facilities.

Getting the viewpoints of road safety specialists and planners to meet did not come easily. The natural trend when accidentology had just come to life was to concentrate on corrective approaches addressing identified road safety problems in the most direct way, so that linking into a higher level of traffic organisation and of balancing transport modes required some convincing [Muhlrad, 1977, 1985, Muhlrad & Faure, 1987]. By the beginning of the 80s, the urban planners and decision-makers most aware of pedestrian safety problems and mobility needs as well as of the negative effects of high traffic volumes on the quality of life in towns had come to regard road safety measures as unacceptable restraints on pedestrian mobility: they focussed, of course, on such features as barriers to prevent crossing high-traffic streets outside dedicated areas (often ill-positioned for use by pedestrians), the multiplication of traffic lights, etc., all of these measures taken to avoid conflicts locally with no thought given to negative side-effects.

Opportunities for global thinking came with urban traffic plans, but by the late 70s, priority was still to traffic flow improvement in spite of the new dimensions of public transport development, reduction of car traffic in city centres, and pedestrianization of some limited areas. No solution was yet found to facilitate pedestrian movements and reduce accidents on major arterials with through traffic. In spite of the current ideas that making traffic smoother would surely result in less crashes, there was no evidence that those traffic plans actually improved safety.

When it became clear that pedestrians could not be simply channelized away from cars and would not comply with measures restricting their movements or demanding too much extra physical effort, urban speeds became a real issue ; urban speed limits started being lowered to 50 km/h in order to reduce bodily damage from crashes between vehicles and vulnerable road users, which resulted in significant safety improvement as showed by evaluations carried out in particular in Denmark [Engel & Thomsen, 1988] and later on in Sweden [Hydén C., Odelid K., Várhelyi A., 1995].

However, 50 km/h was still a dangerous speed on streets where conflicts between motorised traffic and vulnerable road users were frequent. Developing methods and knowledge to apply traffic calming principles to high traffic routes through parts of urban areas much used by pedestrians became crucial, and in the early 80s, experimental programmes including incentives for local authorities were launched in particular in Denmark (Vinderup, Skoerboek), France ("Safer Cities, Accidentless Neighbourhoods"), the Netherlands (Eindhoven and Rijswijk), and the United Kingdom to develop and evaluate new road designs aimed at further reducing vehicle speeds, not only on access streets but also on main thoroughfares with high traffic volumes [Borges, 1987, 1988, CETUR, 1989, Herrstedt, 1996, Ward & Allsop, 1982]. Reconstruction of through-roads was often carried out to correct mistakes (from the road safety point of view) made in the 60s such as widening carriageways and multiplying traffic lanes, which induced high speeds and a difficult crossing task for pedestrians. Combinations of measures were implemented including roundabouts, narrowing of carriageway, widening of sidewalks, painted or solid central reservations, chicanes, speed humps, visual displays indicating entry into an area with pedestrians and local activities, etc. Such schemes, although primarily meant to improve road safety, also

addressed other issues of interest to the local population such as improvement of environmental amenities, reduction of noise and pollution, increased pedestrian activity, and boosting local trade. This raised acceptability for road-users and local residents and contributed to justify operational costs. As the measures implemented were experimental, a consensus was needed of all actors involved and the local stakeholders, so that local inter-sectoral working groups and consultation of the citizens at an early stage were a condition of success [Muhlrad & Faure, 1988, OECD, 1990].

After such "traffic calming" schemes were evaluated, the new design principles developed for high traffic streets were broadly disseminated and used by municipalities [CETUR, 1989]. Meanwhile, neighbourhoods inside the grid of primary roads were not forgotten, but the principle of entirely evicting through traffic, ill-adapted to the plans of many old cities, was revisited in the light of the experience gained in speed-reducing measures : organising low speed "mixed traffic" was often preferred. The urban yard concept developed in the Netherlands in the 70s was found somewhat too constraining ("walking speed" is not easily achieved by car drivers, and changing the priority system in favour of pedestrians was far-fetching) ; it also involved expensive reconstructions when applied to existing streets. Various other forms of area-wide traffic calming were experimented in several countries (Belgium, Germany, Switzerland, etc.) and the emerging solution was the 30 km/h zones : laws enabling municipalities to lower the speed limit to 30 km/h in designated urban districts were passed, and special signing and low-cost speed-reducing measures were added to the existing infrastructure to warn drivers and make the new limit self-enforcing. Such dispositions seemed to reduce the need for changing the priority system.

2. Discussion

Activities to improve pedestrian safety were intense in Western Europe over the period, particularly during the 80s. The dual approach by road safety specialists and urban and transport planners finally widened the scope of pedestrian safety measures, and led to a completely different way of considering walking. In particular, full priority to car traffic was questioned, and it was recognized that some urban activities required contacts within the population that could only be achieved while walking (or possibly cycling) and were furthermore incompatible with the nuisances of heavy and/or fast traffic flows. Streets became again "public space" to be designed to cope with a variety of functions other than traffic (children plays, leisure walking, meeting, selling and buying, etc.). Most important is the fact that pedestrian needs for continuity of routes, comfort of physical amenities and environmentally-friendly surroundings started to be taken into consideration, just as the drivers' needs and vehicle performances had been taken into account all along.

The changes appeared gradually and involved a growing number of practitioners from diverse fields of action as well as greater influence of the stakeholders, both at the national and the local levels, both in the public and the private sectors (for example, local and national NGOs played a part in promoting traffic calming, and the population was more and more often consulted in the planning, design and implementation phases of are-wide improvement schemes). Research and practice were closely inter-linked as measures were at first experimental and had to be monitored and evaluated. When implementing traffic calming schemes on high traffic routes, conflicts between actors defending the drivers' or the pedestrians' viewpoints often occurred, long discussions were necessary, and some compromise had to be reached [Muhlrad & Faure, 1988, OECD, 1990].

The image of European cities and towns changed considerably during the period and in the following decade. It seems that traffic safety, particularly safety of vulnerable road users, acted as a motor for urban renewal and increased quality of life. The share of pedestrian fatalities decreased dramatically in most Western European countries. However, environmental nuisances from car traffic remained alarming (pollution, noise) and increasingly became an issue in the following years.

From the late 80s until now: Long term planning, integrating road safety and environmental issues

1. Long term road safety goals

Road injuries are not unavoidable : once the idea becomes clear, citizens become more and more demanding with regards to their own safety. Meanwhile, a "safety culture" has also started to develop in other areas than transport (in work places, in consumer products, in food production), which confirms a shift of the demand towards safer living environments, and therefore safer systems' design. Such trends call for ambitious and long term action.

After the progress made in the 80s, some countries thus adopted long term goals and developed programmes to eradicate road fatalities and serious injuries according to a public health logic (see "Vision Zero" in Sweden, 1997, and more recently in Austria, Germany, Switzerland) or within the framework of sustainable development (the "Sustainable Safety" policy in the Netherlands) [BPA, 2003, Koornstra, 1994, National Swedish Road Administration, 1998, Schermers & van Vliet, 2001]. Implementing such programmes has called for complete redesign of roads in rural and urban areas in order to control speeds and reduce conflicts. Application to urban areas showed that the earlier approach by Buchanan was still of use, although simplified road classifications according to location, type of traffic and other local functions were to be preferred for operational reasons [Marshall, 2004, Wramborg, 2000]. In the Netherlands, "Sustainable Safety" policies have now been integrated into broader-scale transport plans involving a modal shift towards public transport [Heijkamp & Kraay, 2001].

It is believed that new electronics and communication technologies applied to the vehicle and the road environment may also contribute to reach the goal of zero serious injuries and fatalities, and research is under way at the European level, including on systems that may help pedestrians in traffic. However, threats on future petrol prices and availability may ultimately limit the usefulness of vehicle-based technologies, and make integrated planning approaches aimed at decreasing motorised traffic more promising.

Long term goals or "visions" are meant to radically improve global road safety by focussing on safe system design, but should logically have a most significant impact on pedestrian safety as they target serious injuries and fatalities for which unprotected road users are a high risk group. Long-term goals can be operational only if they are based on a broad social consensus involving both citizens and the governing politicians. Once established, the consensus needs to be officialized, for example by passing a law as in Sweden, to ensure sustained commitment and to prevent changes in politics from interrupting implementation of the road safety policy.

2. Integrating road safety and health, environmental, and security issues

More recently, three particular events have had a bearing on road safety activities, especially as regards pedestrians : the agenda for Sustainable Development, the Kyoto Agreement on reduction of CO2 emissions, and the stand taken by WHO to promote road safety as a major health issue [WHO, 2004]. Transport is a key issue for sustainable development and it seems logical to integrate the environmental, health and road safety approaches as they share common requirements such as reducing vehicle speeds, reducing traffic volumes, and re-developing non-motorised transport modes [OECD, 1997]. Walking is a non-polluting transport mode in itself and also a natural complement to the use of public transport. Moreover, pedestrians exercise daily as a matter of fact, which is conducive to good health. Pedestrian mobility needs and safety are thus at the core of integrated policies [Carré & Mignot, 2003, COST 358, 2006].

Safety and environmental policies are implemented over long periods of time and need to be made a part of national transport policies developed within the Sustainable Development agenda and Kyoto agreement. Moreover, urban and transport planning need to be closely linked, which has seldom been the case until the 90s. The process has been under way for a decade in some European countries such as Switzerland or Germany, but still lags behind in others, mostly due to institutional routine or barriers.

In some countries such as France, environmental considerations have boosted the pedestrian mobility and safety issue : the Law on Air and Rational Energy Use enacted in 1996 has made it mandatory to introduce provisions for non-motorised transport routes in long-term Urban Mobility Plans [Faure & Muhlrad, 1999, Fleury, Yerpez et al, 2000]. Such laws addressing local authorities support their action when they have to face citizens with unpopular measures such as restricting the use of private cars in urban areas [PROMISING, 1999]. However, at least in Southern Europe, designing Urban Mobility Plans in this spirit still meets with strong resistance in medium-size towns where traffic congestion has so far been limited and the negative environmental and health effects of individual car travel are not yet felt as strongly as in the larger urban metropolis. The levers to change public attitudes and trigger substantial modal shifts towards non-motorised transport modes still require some research.

Another event with a bearing on road safety (and transport safety in general) has been the terrorist attack on the Twin Towers in New York in September 2001, an event commonly known as the "9 -11". This event and subsequent ones that affected London's and Madrid's rail systems led most European countries to strengthen their security policies. To some extent, road safety actions have been embedded in security activities at the national or the local level, which puts renewed emphasis on enforcement of safe behaviour, sometimes at the expense of the systems approach at the root of long term visions. In some instances, this produced some positive effects, such as in France where automatic speed enforcement which had long been on the agenda was finally implemented with results passing all hopes (a reduction of 27 % of road fatalities over three years) [Chapelon, 2006]. However, pedestrians seem to have benefitted less than other road users, probably as the speed limits enforced (over 50 km/h) are not all that relevant.

3. Discussion

Pedestrian safety issues are central in the new environmental and health policies applying to transportation, but mobility is emphasized at the planning level while effective safety will also have to be taken care of at the micro (or "operational") level. All the experience accumulated from the approaches developed since the late 60s will thus need to be put to use. Further research on pedestrian travel behaviour and qualitative needs is also needed and has been undertaken with a view to designing more adequate infrastructures for walking [Carré & Julien, 2000, COST 358, 2006]. Moreover, Urban Mobility Plans, Sustainable Safety, Vision Zero and other such policies are long term exercises, and therefore do not preclude analysing the current road accident situation in order to make significant improvements in the shorter term. Balancing long term and short term policies has already proved a difficult exercise.

Integration of road safety into broader urban schemes, including linking urban and transport planning, involves co-operation of an increasing number of decision-makers and practitioners, which implies that, at least at the local level where planning takes place, institutional organisation must be open to include the participation of non-governmental actors, and flexible to enable inter-sectoral contacts and work. Strong political will and leadership, a greater emphasis on shared responsibility of actors, more transparency in the goals pursued and the measures taken and sustainable funding are needed to make this possible and national programmes and incentives have been found necessary to push action [OECD, 1997, Tiwari & al, 2005].

Integration of road safety and environmental issues as well as integration of road safety within broader transport policies requires methodologies and knowledge which have partly been developed with regards to measures and actions to reach long term road safety goals and to environmental impact assessment of transport plans, but still require research in other areas such as road safety assessment of transport alternatives and of mobility plans, forecasting effective transfer from individual to collective transport modes, and designing innovative means to precipitate such transfer [WALCYNG, 1999]. As long as the "tool-box" is not complete, it will be too easy to consider road safety improvement as an implicit effect of the new transport policies which does not require specific attention. Thus the role of research, both for developing methodologies and monitoring the implementation process and effects of long-term road safety and integrated policies is more important than ever [OECD, 1997].

Conclusion

Throughout the history of pedestrian safety in Western Europe, it can be seen that the image of the pedestrian has gradually been changing from "a moving obstacle in the way of vehicles" to a means of transport of its own right, with its own constraints and travel objectives. Moreover, it has been recognized that cities cannot live without pedestrians, and urban streets have more uses than just accommodating car traffic, one of them being to provide contact between unshielded citizens... which means on foot ! All along, research boosted and accompanied the changes, both by helping design and evaluate new solutions to improve pedestrian safe mobility and through European and International programmes which enhanced the work performed in some countries more advanced than others at one time and helped disseminate good practice (OECD Research Groups on Pedestrian Safety, DUMAS and PROMISING Projects, etc.). Learning from practice was also performed through direct exchanges between European practitioners and local authorities, who made a point of adapting concepts and programmes to their own context and requirements.

The evolution in the way to think about walking, which has been instrumental in improving pedestrian safety, besides giving birth to new laws (30 km/h zones, laws establishing long term goals, etc.), has been incorporated into new dispositions of the Highway Code, for example in the Netherlands, where pedestrians are no longer required to cross streets at designated locations, while in other countries such as France, the existing law is now interpreted so that drivers are always allocated a share of responsibility in pedestrian accidents. The fact that laws and regulations have followed experimentation and supported the changes involved is the sign of a sustainable modification of attitudes. Another such sign is the promotion at the European level of cars with "pedestrian-friendly" fronts, a design which had been researched into since the 70s and has finally been acknowledged.

Adapting urban roads to unrestrained vehicle traffic without giving "equal rights" to the vulnerable road users, as was done in the 60s and the 70s in Western Europe, has proved a great mistake and a lot of money has been spent in reversing the trend over the following decades. It is hoped that the same mistakes will be avoided in countries where motorization is now fast developing and current technologies facilitate fast changes in infrastructures. To this purpose, raising awareness and changing attitudes of both the decision-makers and the public will have to be done much faster than in Europe, and pressure from researchers and the civil society through NGOs as well as international cooperation to pass on basic concepts if not operational designs are greatly needed. However, prospects of global warming and petrol and gaz shortage may help in reversing the current trends of building for cars much more easily than expected.

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