BUILDING AN INFRASTRUCTURE FOR THE AUTOMOBILE SYSTEM; PIARC AND ROAD SAFETY (1908-1938)

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INTRODUCTION

This contribution intends, for the first time to the knowledge of this author, to analyze the efforts by PIARC to help build an international 'automobile system'.[1] Because of the rather overwhelming volume of source material (PIARC conference proceedings alone typically generate in the neighborhood of 2000 pages) and the complexity of the topic, the focus in this contribution will be on the first period of what can be called the heyday of PIARC, the years up to the Second World War in which the organization sponsored eight large international conferences. Also, I attempted to reduce the automobile system's complexity by exploring a single case study in one part of the world: road safety in Europe, a concern which was present at the PIARC conferences from the very beginning, although it not always was a part of the core of these conferences.

The advantage of this case study is that it includes technical as well as managerial aspects, both of which were well represented within the PIARC community before the war. At the same time the case opens to view the full complexity of the field under study, because the safety problem crosses all levels of governance (local, national, international) and includes a broad array of actors (governments, vehicle manufacturers, automobile and touring clubs as well as road users). Solving the road safety problem proved to be well beyond the grip of even the best equipped international organization in its field, in terms of intellectual depth and breadth of social network.

This paper begins with an overview of the main issues of the PIARC conferences, divided into two phases: three conferences during the period 1908-1913 and five conferences spanning 1923-1938. This is followed by a sketch of the road safety problem as it was formulated by the main European actors during the Interbellum, also outside PIARC. I will then try to explain why the road safety problem could not be solved by PIARC and will suggest the consequences of this 'failure' for the postwar period. The analysis of that post-war period must wait until a later occasion.

THE FIRST THREE PIARC CONFERENCES

In 1908, the French government, acting through its diplomatic channels, called upon its fellow-governments to convene in Paris for a road conference,

[1] I thank Bruce Seely for his willingness to help me in improving the English of this contribution. I also thank Luísa Sousa and Sjoerd van der Wal for their help with the illustrations, and Frank Schipper for his comments on an earlier draft.

motivated by two acute problems. The first problem was the rapid 'degradation' of the condition of roads by the recently introduced automobile, and the second was a direct consequence of the first: the problem of dust formation. In fact, the latter problem had already formed an important issue on the agenda of several previous international meetings (for instance, on medical hygiene), but the 1908 conference held in the Tuileries in Paris was the first to define the problem as a serious enough concern for national governments.

Indeed, the French initiative can be read as an answer to a movement led by several truly 'European' actors. For instance, European touring and automobile clubs at an early date decided to cooperate at an international level, founding the *Ligue Internationale des Associations Touristes* (LIAT, 1899) and the *Association Internationale des Automobile-Clubs Reconnus* (AIACR, 1904), respectively. The international character of the very early bicycle and automobile movements placed the issue of transborder travel on the agenda of these clubs (resulting in a struggle between automobile and touring clubs over acquisition of the - lucrative! - responsibility for issuing 'triptyques' and 'carnets de douane'). In addition, the touring clubs even managed to agree (as early as 1900 and 1902, respectively) upon standardized designs for road warning signs used to mark corners, obstacles, railroad level crossings and dangerous cross-roads. The national clubs themselves subsequently started to place these warning signs along the roads, using them at the same time as a means of advertising their existence by printing their national club names on the signs (Figure 1).[2]

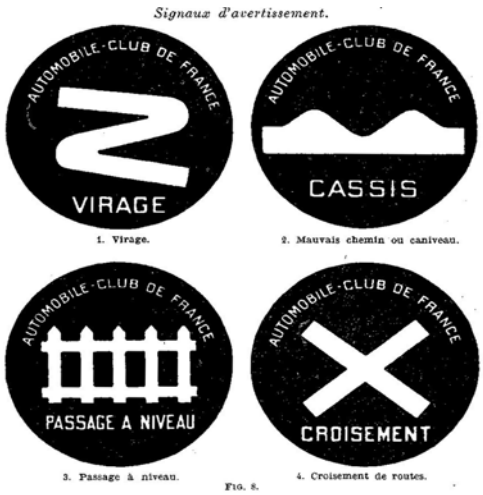

Figure 1: Road signs approved by the LIAT conference in 1908 and the Convention on traffic, Paris 1909 (Source: Juan Agustin Valle, 'Police de la circulation' (report 77 of PIARC conference Washington 1930) 12).

[2] *Compte rendu Paris 1908*, 293, 364-365; *Compte rendu Bruxelles 1910*, 425. Three of these signs were accepted during the LIAT conference of 1900 in Paris, the fourth during its conference in Geneva in 1902. Titles of the PIARC proceedings (published in French, German and English) differ per conference; they have been replaced by a much shortened formula consisting of *Compte rendu* plus the location and year of the conference. Also, conference reports have very lengthy titles, including the question and sub-question they are supposed to answer; they have been replaced by author name(s), a shortened version of the title followed by the phrase 'PIARC conference' plus location and year of conference.

Another initiative, Guglielminetti's founding of a League against Road Dust (*Ligue contre la poussière sur les routes*) in Monaco, gained a surprisingly rapid following in most Western-European countries. Although his role was downplayed at the first Paris conference, it cannot be denied that his initiative, like that of the clubs, formed a powerful 'movement from below', despite (or perhaps even because of) the unmistakably elite character of this movement. The format and structure of the initial conference in 1908, however, was clearly inspired by quite different, much earlier initiatives at another level related to transport management. The strategy was to centrally formulate a set of questions and invite national, officially recognized experts to prepare reports that answered those questions, and to use the conference itself to vote on the answers (the 'conclusions') proposed in a synthesis formulated by experts nominated by the conference organizers. This approach was modeled after both the international railway and inland navigation associations founded in 1885 and 1901, respectively.[3] Voting was allowed only on conclusions proposed in officially requested 'reports', not on other reports, called 'communications'.

The Paris conference, opened by initiator and Minister of Public Works Louis Barthou in the amphitheater of the Sorbonne, was a clear success, both measured by the number of attendants, the number of papers submitted, and, especially, the support from governments all over the Western world (Table 1). This resulted in the foundation, in 1909, of the *Association Internationale Permanente des Congrès de la* Route (AIPCR, internationally better know under its English acronym, PIARC – Permanent International Association of Road Congresses). The constitution, nearly literally drawn from the inter-national navigation association, emphasized that the Executive Committee should consist of Frenchmen (a rule revoked only after the revival of PIARC after the Second World War), but the most active countries were represented in a Permanent Council. PIARC's official seat was located in Paris. Table 1 shows that French reports and attending engineers dominated, at least in numbers, the entire period under study, although the Anglo-Saxon countries were not far behind (French attendees wrote 15 % of the 736 reports of the eight conferences under consideration, followed by the UK (13 %) and the US (9 %)). The table thus testifies that the French were successful in the construction of a truly international organization in which all relevant actors were gathered and all relevant topics pertaining to the construction, financing and management of automobile-friendly roads were discussed extensively and sometimes even quite fiercely. Remarkably, after selecting the president Lethier (Inspector General of *Ponts et Chaussées*), Albert Ballif (president of the *Touring Club de France*) and Albert Mahieu (Chief Engineer of *Ponts et Chaussées*) were nominated as Vice-Presidents. The influence of the Touring Club as the major user organization should be seen against the background of a power struggle between touring clubs and automobile clubs in several European countries. Although this should be supported by evidence from other countries, recent research in the Dutch history of road building clearly

[3] *Compte rendu Paris 1908*, 37; *Compte rendu Londres 1913*, 286.

Year	Location	A	B	C	D	E	F	G	H
1908	Paris	28	2411	1600	UK (279), Germany (191), Belgium (121), Austria (74), Italy (58), USA (50), Netherlands (48), Switzerland (43), Russia (40), Spain (32), Denmark (25)	46	107	France (40), UK (19), Belgium (13), Germany (12), US (9)	The present road; Maintenance; Dust and Wear; The future road; Effects of vehicles upon roads; Effect of roads on vehicles; Road signs; Road transport services
1910	Brussels	32	2118	1200	France (511), Germany (276), UK (160), Austria (113), Italy (56), USA (55), Switzerland (53), NL (51), Spain (39), Russia (35)	71	125	France (23), Belgium (18), UK (13); Italy (11), Germany (12), US (12), Hungary (8), Germany (6), NL (6)	Paving technology (incl. dust); Soil foundation; Tramways; Cleansing; Paving type choice; Tracing and lighting; Influence of vehicle weight and speed on roads; Specifications of vehicles; Exploitation of public transport.
1913	London	44	3793	2000	France (610), Germany (286), Belgium (173), USA (139), Italy (136), Austria (107), Russia (80), NL (63), Switzerland (51), Spain (32)	52	149	UK (30); France (19); US (19); Germany (17); Austria (14); Russia (13), Hungary (10), Italy (9), Bulgaria (6); NL (4)	New roads; Pavement of bridges; Stone roads with bituminous binders; Wood paving; Lighting of roads and vehicles; Wear detection methods; Traffic regulation; Centralization and decentralization of building and maintenance; Financing
1923	Sevilla		1891	600-700	France (495); Spain (375); UK (225); USA (166); Belgium (135); Italy (62); NL (54); Switzerland (42); Sweden (35); Tchechoslovakia (32)		59	USA, France, UK, Italy (all 6); Belgium (5); NL, Switzerland (both 4)	Concrete roads; Asphalt roads; Tramway tracks in road surfaces; Development of motorized traffic; Traffic regulation; Congestion.
1926	Milan	55	3429		France (562); UK (410); Poland (174); USA (168; Belgium (142); NL (93); Hungary (92); Switzerland (91); Tchechoslovakia (75); Rumania (67)	75	48	Italy (12); France (6); UK (6); US (6); NL (5); Sweden (5); Belgium (4); Switzerland (4)	Concrete roads; Asphalt roads; Testing of asphalt; Road censuses; Town planning and traffic; Special automobile roads.
1930	Washington	64	3380	1000	France (512); UK (431); Poland (165); Italy (123); Belgium (105); Spain (88); NL (81); Sweden (80); Germany (76); Portugal (73)	74	69	USA, France, UK, Germany, Italy (all 6); NL, Denmark, Switzerland, Siam (all 4)	Concrete and bricks; Asphalt; Roads in colonies; Financing; Road transport (coordination); Urban traffic regulation.
1934	Munich	52		2100			86	France, Austria, Japan, Italy, Sweden, Germany, UK (all 6); Hungary, China (both 5)	Concrete and bituminous materials; Economic pavement construction; Road safety; Mutual influence of vehicles and road; Standardization and regulation of vehicle weight and dimensions
1938	The Hague	53	3938	2200	UK (648), France (516), Germany (507), USA (186); Poland (158); Belgium (141), Italy (128), Rumania (105), Switzerland (100), Spain (99)	89	93	NL (16); UK (7); Germany, Australia, USA, France, Sweden (all 6); Hungary, Japan, Poland, Czechoslovakia (all 5)	Concrete, bricks and bituminous materials; Road accidents; Flow separation; Road surface slipperiness and glare; Sub-soils;

Table 1: PIARC conference characteristics, 1908 - 1938 (Sources: *Comptes rendus* of PIARC conferences; Munich: *Verslag van het zevende internationale wegencongres gehouden te München in 1934* (The Hague: Algemeene Landsdrukkerij, 1937), ANWB archives)
A = number of officially represented governments at the conference - B = number of PIARC members - C = number of conference attendants - D = main foreign countries represented among members (indicative of conference attendance) - E = share of foreign members [%] - F = number of reports - G = countries dominating as source of official reports (number of reports) - H = official questions discussed at the conference (reformulated by this author)

supports the thesis of a strong influence of the local touring club, *if* the club was prepared to prioritize car traffic over all other forms of road users.[4]

Beginning in 1911 PIARC published a *Bulletin*. During the 1920s, several national PIARC committees were founded; the Dutch *Vereeniging Het Nederlandsche Wegen-Congres* (Road Conference Association) probably was one of the first, in 1920. Other countries with national PIARC structures before the Second World War were Austria, Czechoslovakia, Denmark, Germany, Great Britain, Italy, Poland, Spain, Switzerland, the United States and Yugoslavia.[5]

At the first conference, the manner of treating the issue of road safety made visible several tendencies that played a role throughout the entire first period until the Second World War. At this early date before the Great War, safety problems seemed to most observers to result from an unresolved conflict of interest between old and new road users. Initially a form of co-existence was advocated, but soon it became clear that motorists' desires of unrestricted 'flow' and, especially, concerns about the safety of pedestrians, cyclists and domestic animals made a more radical solution necessary. The majority of conference attendants made abundantly clear their view that the solution was to be found in disciplining horses, pedestrians, and bicyclists according to rules formulated by the newcomers.[6] A more in-depth study is needed to explain this reflex of chasing 'old-fashioned' opponents from the recently conquered territory. Even so, it is not controversial to conclude that, apart from a general belief in the 'modernity' of the vehicles (representing both technical and economic 'progress'), the experience of many attendants earlier in their careers with centrally controlled railways and inland navigation provided an inspiration for their automatic claim for monopoly. Nevertheless, because many official representatives previously had served the interests of other transport modes, it is remarkable that the reflex to put the automobile at the front was so easily adopted. No doubt the prominent place of the touring and automobile clubs, following the close cooperation between these clubs and the highest echelons of the European nation-states (and especially the French state), played a supporting role in this respect. In fact, the only actors who initially resisted this claim of dominance were horse owners and riders who (rightfully) feared that the paving with smooth surfaces (especially asphalt) would force horses to their own 'paths'.[7]

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[4] *AIPCR - PIARC 1909 - 1969* (Paris: Association Internationale Permanente des Congrès de la Route/Permanent International Association of Road Congresses, 1970) 16-17, 21. In 1920, Ballif was replaced by Defert (then president of the *Touring-Club de France*) (ib., 20). Also see: Daniel Boutet, 'Permanent International Association of Road Congresses; Its origine and its activity,' *Bulletin de l'AIPCR* 40 No. 128 (3e trimestre 1951) 1-8. See for the Dutch history: Gijs Mom and Ruud Filarski, *De mobiliteitsexplosie* (forthcoming).

[5] *AIPCR - PIARC 1909 – 1969*, 20; Gijs Mom and Ruud Filarski, *De mobiliteitsexplosie* (forthcoming Fall 2007).

[6] For a detailed analysis of how the norms of automobilism became inscribed in early German motorization, see Uwe Fraunholz, *Motorphobia; Anti-automobiler Protest in Kaiserreich und Weimarer Republik* (Göttingen: Vandenhoeck & Ruprecht, 2002).

[7] *Compte rendu Paris 1908*, 132, 135. Horse traction proponents also criticized the decision to make the inner part of road curves lower than the outer part, meant to support easy cornering of fast automobiles.

On the issue of the road signs, however, the conference was less unanimous. In fact, the issue caused quite a discussion between representatives of the clubs and of the governments, because LIAT had changed its opinion during its 1908 conference in Stockholm. It now favored one single warning sign in the form of a diagonally placed red bar. LIAT representatives pleaded in vain for such a change during the Paris conference, stressing that bicyclists also would benefit from the simplicity of a single sign. They were opposed by representative from AIACR (and the Italian Touring Club, which was dominated by motorists) who rejected the single sign as dangerous. In the end, most touring clubs (except the Swiss, Belgian and Dutch clubs) joined the automobile clubs and voted in favor of the four-sign compromise, although the Dutch finally decided pragmatically (and typically, because like the Italian club it was also quite early taken by the automobile virus) to join the ranks of the four-sign proponents 'without renouncing its opinion'. As a result, the road sign issue was delegated to a special diplomatic conference held in October of the following year in Paris, where the signs were included in a Convention on traffic. LIAT representatives complained that this convention exclusively focused on car traffic, and they also deplored the fact that responsibility for placing these signs now was centrally controlled by the states. This controversy led to a row, during the second PIARC conference in Brussels in 1910, between auto and touring club representatives, but the dice were already thrown. The issue did not appear in the conference conclusions because the topic was not discussed in the official 'reports', but remained a 'communication' on which voting was not allowed.[8] This episode clearly documents the 'official' (state-supported) character of PIARC and the dominance of automobile interests over the interests of other road users. By the time of the second PIARC conference it was clear that the 'road problem' was defined as a 'car problem'. First the horse owners (in Paris 1908) and then the bicyclists (in Brussels 1910) were relegated to their own 'paths'.[9]

Once established as primarily a matter of concern for motorists, the paved road became, during following PIARC conferences, firmly embedded in a rudimentary automobile system of which the highway formed the material spine. Elsewhere I have shown that during the first conferences before the war, the special automobile road was rejected (Paris 1908; Brussels 1910). Instead the attendees emphasized the importance of the improvement of the existing road system. I also have shown elsewhere how from a very early date it was stipulated that *new* main roads should avoid routes through towns (London 1913) and how subsequently the asphalt pavement option, as an engineering compromise, was rescued from the French who were in favor of the much more expensive, but – from a maintenance point of view - technically superior solution of pavement by setts or cobblestones (London, 1913).[10]

[8] *Compte rendu Bruxelles 1910*, 424-434 (quote on 431). Also the Dutch automobile club was in favor of only one sign (ib., 434).
[9] *Compte rendu Bruxelles 1910*, 451.
[10] Gijs Mom, 'Roads without Rails; European Highway-Network Building and the Desire for Long-Range Motorized Mobility,' *Technology and Culture* 46 No. 4 (October 2005) 745-772; Gijs Mom, "Inter-artefactual Technology Transfer: Road Building Technology in the Netherlands and the

During these conferences participants formulated a rudimentary state-of-the-art through a careful process of consensus building during the discussions on the 'conclusions'. These included a maximum speed (25 km/h); a maximum axle load (4 tons; in case of 5 tons the maximum speed was to be reduced to 15 km/h); a maximum wheel pressure; a minimum road width (6 m) and curve radius (50 m, after the war, in Sevilla, increased to 200 – 300 m[11]); the construction of only 'moderate gradients' and 'parabolic tangents' for main road access and exit; the avoidance, if possible, of level crossings; the struggle against dust (first by tarring, then by asphalt paving); the opinion that street cars and trams were road obstacles that preferably should operate on separate tracks (and if that wouldn't be possible, their rails should be constructed inside the pavement instead of upon it); the placement of distance markers between large towns; and, of course, the necessity of separate horse and bicycle 'lanes'.

I must, however, nuance my earlier conclusion about the second defeat for the French position on the centralization of the road network. It is true that during the third PIARC conference in London (1913) the idea of centralizing road management was rejected, but this was not the result of an opposing position from the official British delegation. On the contrary: British county engineers had mobilized their colleagues at the London conference against the more centrally-oriented engineers and they rejected in massive numbers any plan for centralization. Later conferences, however, clearly embraced the French concept of centralized management of *national* roads (supported, too, by the British official delegations), whereas the lower-order roads could be delegated to the counties, provinces, *Länder* or *départements* (also according to the French delegations).[12]

A fourth conference, meant to be held in Munich in 1916, did not take place because of the war which also ended this early program of structuring the conception of roads. The three pre-war conferences had clearly adopted an unambiguous conclusion: although special roads for cars were rejected, the automobile, and especially the passenger car, had been accepted as the norm on the brink of the Great War. And as pedestrians and cyclists were the primary victims of the first car accidents in big cities, these same cyclists and especially these pedestrians, 'who represent the majority of the public', also were seen as 'the cause (of these accidents) because they are unaccustomed (...) to this new type of traffic.' It was assumed that they needed to be educated and as soon as they had gotten used to the novelty of the automobile, 'the number of accidents will diminish automatically.'[13]

Competition between Bricks, Macadam, Asphalt and Concrete," *History and Technology* 20 No. 1 (April, 2004) 3-23. See for the avoidance of towns: *Compte rendu Londres 1913*, 315.

[11] *Verslag van het vierde internationale wegencongres, gehouden te Sevilla, 1923* (The Hague: Vereeniging het Nederlandsche Wegen-Congres, 1924) 34.

[12] Edo J. Bergsma and L.C. Steffelaar, *Het derde Wegen-Congres te Londen, 23 – 28 Juni 1913* (The Hague: ANWB, Wegen-Commissie, 1913) 26; French centralization proposal in: E. Marion, 'Autorités chargées de la construction et de l'entretien des Routes, etc.' (Report 55, PIARC Conference London, 1913) 22-23; official British centralization proposal in: H. Hampton Copnall e.a., 'Autorités chargées...etc.' (Report 56, PIARC conference London, 1913) 7.

[13] *Compte rendu Londres 1913*, 504.

Early debates on this issue clearly reveal how the main actors struggled to define the 'road problem.' They were inclined to find 'technical fixes' to this problem, but they were not yet sure whether these fixes had to be applied at the level of the single vehicle or of the infrastructure. To the extent that vehicle speed was recognized as a constituent factor in road safety, the choice was clear: the speed of automobiles must be curtailed, with speeds adjusted to 'la sécurité publique et la commodité générale' (public safety and general standards). Most attendants at the London conference of 1913 agreed with a German representative that fixing a maximum speed was necessary, because 'one cannot ask from Engineers that they must construct roads that would be absolutely adapted to the demands of automobilism.' On the issue of lighting, however, the opinions were still mixed, as the conclusions of the same conference show. It was an open question whether automobiles should be equipped with lighting systems or the entire road system should be illuminated. This tension between vehicle solutions and 'system solutions' would be present during the entire period until the Second World War. For instance, during the first post-war conference in Spanish Sevilla, a discussion took place about the question of whether mirrors for better and safer vision should be constructed inside automobiles only, or also along the roads, and especially at crossings.[14]

THE FIVE CONFERENCES DURING THE INTERBELLUM

During the Interbellum the 'road problem' was defined as an international question, and, within the confines of our case study, a truly European problem. Germany, for instance, was only allowed to rejoin PIARC if and when it was accepted as a member of the League of Nations, and then its membership would be automatically granted.[15]

Circumstances related to the war formed an important backdrop for the first postwar conferences, including the devastations of the Great War and, even more seriously, the destruction of roads by heavy trucks bought *after the war* from military dumps and depots by eager entrepreneurs who then used the roads for freight and passenger transport. Many conference attendees agreed that the war had played a decisive role as the real starting point of 'automobilism.'[16] When, during the second half of the 1920s, most Western nations started massive road improvement projects financed by new automobile taxes, the Great War was again invoked to stress the exemplary role of the European initiative. An American representative, for instance, referred to the two-and-a-half million American soldiers 'who during two years (1918 and 1919) had experienced the vast road networks in good shape,

[14] *Compte rendu Londres 1913*, 506, 512, 635-637; *Compte rendu Seville 1923*, 179.
[15] *Verslag van het vierde internationale wegencongres, gehouden te Sevilla, 1923* (The Hague: Vereeniging het Nederlandsche Wegen-Congres, 1924) 5.
[16] *Compte rendu Seville 1923*, 126.

which gave birth to the desire to make the American network in a similar way as, if not superior to the European network.'[17]

Later during this phase, the transfer of ideas, both in technology and in management, was reversed, and the United States became the example as soon as it started its own impressive road improvement campaign. From the painting of white stripes upon the road to the struggle against automobile parking in cities by simply putting written notes on the windscreen (with the request to pay the fine at the police station[18]), the European debate became more and more colored by American examples. In this sense, PIARC slowly evolved into an open road lobby. For instance, in 1923 in Sevilla, the conference called upon national governments to 'encourage the development of motor traffic' and even subsidize motor buses, where it, before the war, had defined the motor bus solely as a feeder for the railways.[19] No doubt, the rehabilitation of concrete as an alternative to asphalt also can be attributed to a large extent to the preference of many American road engineers for this technology, as I have argued elsewhere. Concrete was considered the ideal pavement choice, but its application was dependent on the increasing scientification of the road building profession, for the composition of the mixture and the manner in which concrete should be applied during actual road building were much more critical than was the case with asphalt.[20]

Thus, if we are to characterize the Interbellum period, two major tendencies emerge. The first tendency is an increasing scientification (and quantification) of the road problem, and, second, an accompanying acceptance and promotion of the centralization of planning and financing of the ever-growing national road improvement projects.[21] During the fifth PIARC conference in Milan (1926), this tendency revealed itself in the insight that central control had to be supported by 'soft control' of centralized statistics, both of road censuses and accident statistics. However, as I have argued elsewhere, the Italian *autostrade* project, started in 1922 by a private company endorsed by Mussolini, was not unanimously supported within PIARC because it rested on the adoption of toll financing. Elsewhere I have analyzed in a detailed way the reluctance to embrace the freeway idea, so I will only add here that the British

[17] H.L. Bowlby, 'Transports militaires par routes', quoted in: D. Blas Sorribas Bastaran, 'Le développement des Transports Automobiles' (*Rapport Générale* IV, PIARC conference Sevilla 1923) 15.
[18] *Verslag van het vierde internationale wegencongres, gehouden te Sevilla, 1923* (The Hague: Vereeniging het Nederlandsche Wegen-Congres, 1924) 59.
[19] *Ib*., 42.
[20] Mom, 'Inter-artefactual Technology Transfer'; *Verslag van het zesde internationale wegencongres, gehouden te Washington (D.C.) in 1930* (The Hague: Algemeene Landsdrukkerij, 1933) 12-13.
[21] See for an overview of European road building in this period, with an emphasis on the Dutch case: Gijs Mom, 'Constructing Multifunctional Networks: Road Building in the Netherlands, 1810 – 1980,' in: Gijs Mom and Laurent Tissot (eds.), *Road History; Planning, Building and Use* (Lausanne: Alphil, 2007) 33-62; for the scientification process among American road building engineers: Bruce Seely, *Building the American Highway System; Engineers as Policy Makers* (Philadelphia: Temple University Press, 1987) and: Bruce E. Seely, 'The Diffusion of Science into Engineering; Highway Research at the Bureau of Public Roads, 1900-40,' in: Peter J. Hugill and D. Bruce Dickson (eds.), *The Transfer and Transformation of Ideas and Material Culture* (College Station: Texas A&M University Press, 1988) 143-162.

delegate in Milan gave as a special reason the active opposition to this idea by the British national railroad companies.[22]

The following conference, held in Washington in 1930, came at exactly the right moment to impress most visiting European road engineers. At this conference, conference participants witnessed the management of 'traffic' (defined as a flow of automobiles), and with this the definitive shift in the unit of analysis from the single vehicle to a systems approach. This shift was reinforced by the founding of road research laboratories in most countries during the second half of the 1920s and the early 1930s. These agencies then took up the issue of road construction technology and materials, as well as the testing of alternative solutions. This division of labor allowed the PIARC conference free space to concentrate on management and control. The reports on road financing written for the Washington conference clearly reveal the differences between national approaches to highway programs, which ranged from the totally decentralized British tradition to, on the other extreme, French centralization. In fact, before the Nazis took power in 1933, the German financing tradition was even more extreme than the British, because the highest authority on road building in 1930 were the individual German states. Despite these differences all Western European nations (except Germany) agreed that the national state at least paid for the construction of a network of national roads, and that the construction of most other, lower-order roads could only receive state support if their design complied to a centrally imposed standard. To enable this approach, most countries worked according to some sort of Road Plan, identifying a list of road improvement projects that were qualified according to their function within the system: national roads, secondary roads at a regional level, tertiary (local) roads, and in some countries such as France, also quaternary (agricultural) roads.

Many countries, too, completed development of these networks well before the Second World War, a fact which is often neglected in road historiography because of its fascination for the more spectacular freeway projects. In many countries these huge improvement projects of paving, straightening and widening existing roads were enabled by new taxes on fuel, a very efficient method because of the 'spiraling effect' of mutually supportive increasing car registrations and increasing road building, use and wear. In Washington, 'congestion' and the struggle against it (the priority to keep the flow of vehicles moving) joined the other factors to further enhance this 'spiraling effect'. In fact, had this effect not occurred, the history of Interbellum road building would have looked quite different in Europe, because, as a German road engineer remarked in Washington, 'we can hardly think of increasing the tax rate without causing protests by the auto industry. The increase of the revenues from that source can thus only be reached through the increasing number of automobiles.' The result of the 'spiraling effect' can hardly be underestimated, although it is not given its proper place in national motorization histories. Once established as a 'growth mechanism', a surprisingly rapid process (also for the contemporaries) of national and secondary road improvement all over

[22] Mom, 'Road without Rails'; Lynden Macassey, 'Les routes spéciales' (Report 52 of PIARC conference Milan 1926) 12.

Western Europe was set in motion. For the Netherlands, it is now well-proven that national road building engineers looked with great concern to the diminishing car registration figures during the depression of the 1930s, and they were all too happy when they discovered unemployment relief to compensate for this momentum loss of the spiraling growth of cars and fuel tax revenues.[23] Nonetheless, at the Washington conference of 1930, French representatives concluded that 'the national network could be considered to be more or less finalized', but that maintenance required ever larger sums.

Washington was also the place where a consensus was reached on the civilizing role of roads in the opening up of new territory (including the colonies), a clear shift of emphasis from the similar task of the railways in a previous period, and quite decisive in view of the struggle raging both in Europe and the United States about the relationship between railway and road networks. Here, too, the differences between the countries were quite large, but most European countries started to use road funds to alleviate general state budget problems, most notably the deficits of the (often nationalized) railroads. The French delegation did not succeed, however, in preventing the Washington conference from accepting a conclusion that the principle of a 'dedicated tax' (implying the allocation of all car tax revenues to road building and improvement) should be regarded as 'inviolable.'[24]

From the perspective of our safety case study, the approach of the 'road problem' as a 'system problem' in Washington led to the first recognition of what we now would call the highway system's 'social costs', however narrowly defined from our current point of view. Remarkably, a British delegate successfully proposed adding 'the accident risk' to the 'economic losses' resulting from congestion, fuelling the 'spiraling effect' even more by introducing a clear economic argument to the safety discussions.[25]

At the seventh PIARC conference in 1934 in Munich, the centralization ideal was further promoted (although the Americans had refused to submit reports for this conference) and concrete as an alternative received a second boost, without, however, convincing proponents of asphalt (such as France, the UK and the Netherlands) to give up their alternative. In Munich, ironically, the 'harmonious cooperation between railroad and automobile road' was celebrated as realized in a unique way under the ultimately centralized one-man leadership of Fritz Todt. (Hitler had assigned Todt to construct the *autobahnen* under the aegis of the *Reichsbahn*, thereby linking roads and railroads.) In Munich, 450 of the 2000 delegates decided to attend the Nazi Party Day and a Dutch engineer remarked that the speech by the representative of the German government at the closing session 'was rather

[23] Mom and Filarski, *De mobiliteitsexplosie*.
[24] M. Lipmann, 'Budget des Routes' (report 53 of PIARC conference Washington, 1930); Arthur Collins and W. Rees Jeffeys, 'Budget des Routes' (report 54 of PIARC conference Washington, 1930); G.J. van den Broek and J.M.H.R. Kersemaekers, 'Budgets des Routes' (report 58 of PIARC conference Washington, 1930); quote: Hellich, Fuchs e.a., 'Budget des Routes' (report 47 of PIARC conference Washington, 1930) 15. On the civilizing role of the road network see: *Compte rendu Washington 1930* (Paris, 1931) 120ff.; on the coordination debate, see: ib., 152-157.
[25] *Compte rendu Washington 1930*, 192.

far away from all things related to traffic and roads'.[26] For many engineers, the Munich conference was much too 'political', despite the admiration they voiced for the *autobahnen* project of the Nazi government.

Also in Munich, for the second time in PIARC's history, the asphalt road was rescued, this time from its competition by concrete, because one of asphalt's greatest drawbacks, its slipperiness, appeared to be to a large extent resolved by improvements in automobile construction, especially its suspension and tires. Four years later, at the conference in The Hague, asphalt's slipperiness was unanimously regarded as being largely solved, mainly by carefully mixing the right amounts of broken stones and bituminous substances.[27] The solution of the slipperiness problem clearly showed a systems approach in which the vehicles and the infrastructure were mutually adapted in a process lasting two decades.

The last conference before the war, then, was held in The Hague in 1938 (the conference announced for 1942 in Budapest did not take place). This meeting can be seen as the occasion where, under certain circumstances, special automobile roads became to be considered a safe solution to the 'road problem', mostly because of the radical separation of flows (between slow and fast traffic, and between traffic in opposing directions) this road type allowed.[28]

But PIARC did not have a monopoly on the 'road problem'. Recent scholarship on European freeway system planning has revealed that a separate community, partly overlapping with the PIARC constituency but dominated by a group of road building contractors and promoters from countries with a tradition of central and even authoritarian state control (such as Puricelli from Italy, Kaftan from Germany, and Lucien Lainé from France), promoted the concept of a transnational European freeway network as a means of bringing international peace and unemployment relief during the depression.[29] This group managed to get the support of Albert Thomas of the International Labour Office (ILO) in Geneva who was close to the main actors

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[26] *Verslag van het zevende internationale wegencongres gehouden te München in 1934* (The Hague: Algemeene Landsdrukkerij, 1937) 40, 42-43, 46.

[27] *Verslag van het zevende internationale wegencongres*, 18-19. Nevertheless, 90 % of the German *autobahnen* in 1938 were paved with concrete, mainly because it, according to a German engineer, was 'particularly suited to fast traffic' (Grossjohan, Mallison and Temme, 'Construction and maintenance', Report 22 of PIARC conference The Hague 1938, 3). Norway also was enthusiastic about concrete, as were The Netherlands, at least for application on national roads (Thor Larsen, 'Bau und Unterhaltung', Report without number, PIARC conference The Hague 1938; M. de Bussy, A.J.P. van der Burgh and J.G. Fol, 'Aanleg en onderhoud', Report 16 of PIARC conference The Hague 1938). France, however, rejected the tendencies of the Washington and Munich conferences by sticking to asphalt pavement. Maitre-De Vallon, Schwartz and Balensi, 'Construction et entretien' (report 43 of PIARC conference Munich 1934) 14. Also the British were against concrete. Osmond Cattlin, E.H. Collcutt and Thomas Somers, 'Moyens dont on dispose...etc' (Report 44 of PIARC conference Munich 1934, 10-12; *Generale rapporten; VIIIe Congres 's-Gravenhage 1938* (n.p., n.y.) 16).

[28] *Compte rendu The Hague 193* , 293.

[29] Frank Schipper, 'The Drive for Peace? Road Planning and the European Project during the Interbellum' (November 2005) online at www.tie-project.nl as TIE project working document number 12; Erik van der Vleuten, Irene Anastasiadou, Vincent Lagendijk and Frank Schipper, 'Europe's system builders: The contested shaping of transnational road, electricity and rail networks' (forthcoming *Contemporary European History*).

within the League of Nations. Although most of these plans came to nothing, despite the organization of two dedicated conferences (in 1931 and 1932) on the topic and the formation of a *Bureau International des Autoroutes* (BIAR, 1931) in Geneva (in 1932 renamed in *Office International des Autoroutes*, OIAR), a plan for the construction of a single road corridor between London and Istanbul, promoted by the British Touring Club AA and adopted by the international tourism association AIT (successor of LIAT), received some national support in Eastern Europe, where parts of this corridor were actually realized.[30]

Although the acceptance of the freeway concept as a possible solution to the road safety problem at the last two PIARC conferences before the war can be interpreted as a response to the mounting pressure generated by this European freeway lobby (at least for the Netherlands this influence can be substantiated, especially after the freeway lobby dropped its concept of toll levying[31]), the failure of these plans on a European scale can be explained by the reluctance of two dominating countries within PIARC (France and the UK) to address the issue of freeways even on a national scale. For the UK, the reluctance to opt for a 'technical fix' of the safety problem through the adoption of the freeway concept can perhaps be explained by the early British initiative of a massive Safety First campaign addressed to the existing road network. Another factor which may have played a role in retarding the application f the freeway concept at a European level is the fact, that the early freeway plans were based on another image of 'Europe' than was the case within PIARC with its North-Western European dominance. For instance, ILO director Thomas was an admirer of Francis Delaisi's *Les deux Europes* (1929) in which a plea was made to connect the wealthy Western Europe with the agricultural Eastern Europe through the construction of infrastructures. The League of Nations' Communications and Transit Committee followed PIARC's hesitant policy towards transnational road network building and tried, instead, to stimulate international mobility through regulation of driving licenses and customs formalities. Comparable plans advanced by French and Italian railroad engineers favoring railway corridors connecting Southern-European countries were also turned down during this period.[32]

But the main reason for the only limited success of the freeway lobby was no doubt the dominance, within this lobby, of entrepreneurs and contractors and their indifference to the axiom of most PIARC members about the predominantly local (or at the most: regional) character of road traffic, mostly around the larger cities. The historian who is looking for pre-war predecessors

[30] Alec Badenoch, 'Touring between War and Peace: Imagining the Transcontinental Motorway 1930-1950', *Journal of Transport History*, Third Series, 28 No. 2 (September 2007); Ingrid Strohkark, 'Die Wahrnemung von "Landschaft" und der Bau von Autobahnen in Deutschland, Frankreich und Italien vor 1933' (unpubl. diss. *Hochschule der Künste Berlin*, 2001).
[31] Mom/Filarski, *De mobiliteitsexplosie*.
[32] Irene Anastasiadou, 'Networks of Powers: Railway Visions in Interwar Europe,' *Journal of Transport History*, Third Series, 28 No. 2 (September 2007); Van der Vleuten e.a., 'Europe's system builders,' 16, 20; later Delaisi made a plea for the construction of rural roads in Eastern Europe. For the French pre-war reluctance to build freeways see: J. Nicod, "Les autoroutes de l'Europe Occidentale et la formation d'un réseau de grandes routes européennes," *L'information géographique* 19 (1955) No. 1, 3-19, here: 11.

of the postwar International Road Federation IRF will find them not within PIARC but in the neighborhood of the freeway lobby: the German HAFRABA, the group around the Italian contractor Puricelli, the French *Compagnie des Autoroutes* of road builder Lainé, the British Road Federation (1932) founded by car manufacturers and road transport companies, and the Dutch *Algemeene Nederlandsche Verkeersfederatie* ANVF (General Dutch Traffic Federation) founded by car manufacturers and importers, oil companies and the touring club ANWB. Indeed, the personal and ideological 'bridge' between the two communities was formed by the touring and automobile clubs. Although this should be analyzed more closely in several European countries, in the Netherlands the position of the touring club shifted during the Interbellum from a proponent of road building *per se* (emphasising the road's importance for the national economy) to an open promoter of international tourism during the 1930s at a moment that the technical expertise of road construction and planning was securely transferred to the community of the State engineers. Freeways were considered essential in this policy. But in most countries, the freeway lobbies were not able to convince the national leading road engineers of the freeways' necessity. In a process lasting some thirty years, PIARC had evolved into what one could call a technocratic society, clearly in the lead when it came to the (mostly technical) solutions to the 'road problem.'[33]

THE ROAD SAFETY PROBLEM

Perhaps because of this technocratic tendency, the road safety issue cannot be defined as the smooth and 'progressive' story that describes the scientification and centralization trends. In Sevilla, again, the issue of road signs became a controversial topic; similarly, the efforts of some automobile clubs (such as the Danish automobile club) to change the Convention of 1909 was fiercely opposed by a representative of the French automobile club. Now, the consensus ran that this issue should be solved within the framework of the League of Nations and, indeed, within this organization preparations were undertaken for a second Convention in 1926 that again, like the one in 1909, convened in Paris upon invitation by the French government. As Hans Buiter and Peter Staal have shown, however, at the level of the League of Nations agreement was not reached on many other issues, such as the issue of traffic lights.[34]

Nevertheless, both in Munich (1934) and in The Hague (1938), special sets of questions and conclusions were dedicated to the safety issue. Whereas before the Great War the number of accidents was expected to decrease automatically as soon as horse riders, pedestrians and cyclists had learned to 'behave' as true modern traffic participants, the Dutch general reporter in The Hague (vice-director of the national statistics bureau CBS, dr. Johan Hanrath)

[33] Mom/Filraski, *De mobiliteitsexplosie*.
[34] *Compte rendu Seville* 1923, 138-139, 160-161; Hans Buiter and Peter Staal, 'City lights; Regulated streets and the evolution of traffic lights in the Netherlands, 1920 – 1940,' *The Journal of Transport History*, Third Series, 27 No. 2 (September 2006) 1-20. I thank Frank Schipper for information provided about the Paris 1926 convention.

observed that 'in nearly all countries traffic accidents still tend to be on the increase.'[35] Indeed, the rare statistics available at the moment clearly illustrated this increasing trend, at least for the 1920s and the early 1930s, except for the UK (Figures 2 and 3). In France, for instance, road traffic fatalities started to dominate national accident mortality statistics from the mid-1920s onwards (Figure 4). Nevertheless, American initiatives to organize special safety campaigns in selected cities suggested that something could be done against this. Most American cities that started safety campaigns reported drastically diminishing fatality figures, and the curves of Paris and Berlin in figure 2 seem to confirm this trend.[36] Road safety, at last, seemed 'makeable'.

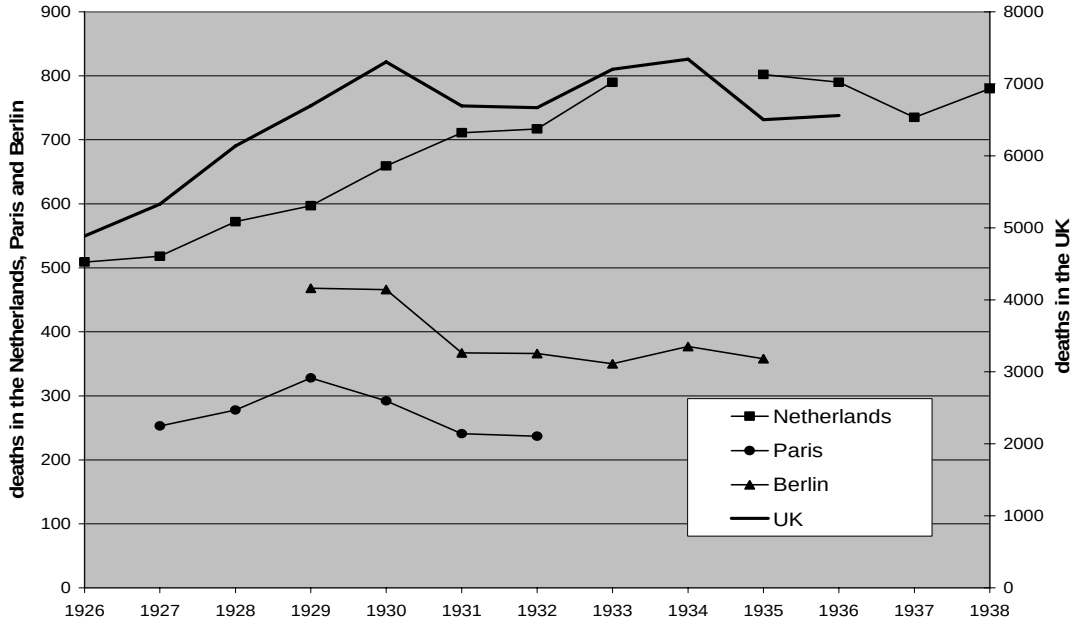

Figure 2: Road safety statistics during the Interbellum (Source: several reports for the PIARC conferences in Munich, 1934, and The Hague, 1938).

[35] *Compte rendu The Hague 1938*, 161.
[36] Sidney J. Williams, 'Die Unfälle auf den Strassen' (Report 45, PIARC conference The Hague 1938) 17-18

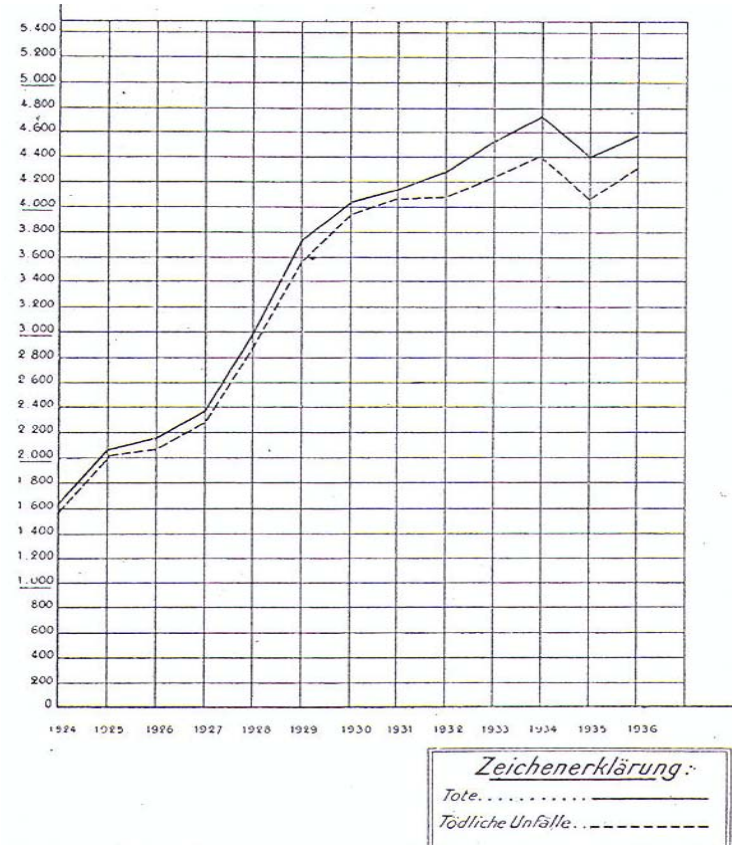

Figure 3: French road safety statistics during the Interbellum (solid line: road deaths; dotted line: lethal car accidents) (Source: Bedaux, Nativel, Fossier and de Rohan, 'Die Unfälle auf den Strassen' (report 46 of PIARC conference The Hague 1938) 6).

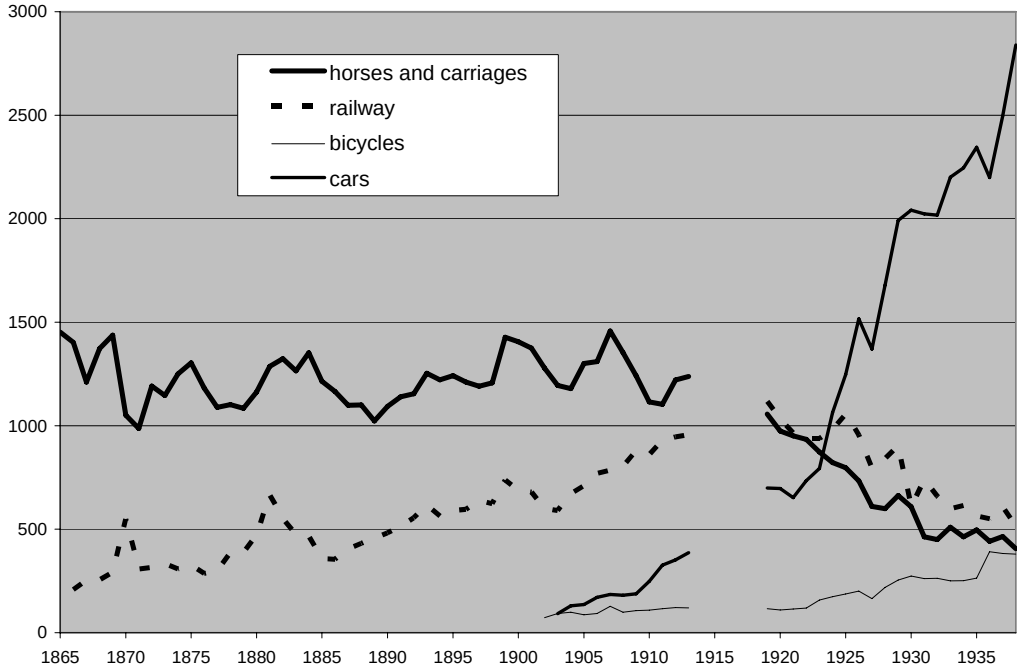

Figure 4: Traffic deaths in France, 1865-1939 (Source: Jean-Claude Chesnais, 'La mortalité par accidents en France depuis 1826,' *Population* (French edition) 29 No. 6 (November – December 1974) 1097-1136)

What most worried many conference delegates was the alarmingly large share of pedestrians and cyclists among the traffic deaths. In the UK for instance, cyclists were involved in one-third of all accidents, and they formed one-quarter of all road deaths. British pedestrians fared even worse: they formed 41% to 54 % of all road deaths in 1933-1936. In cities, these figures were even more alarming. In Paris in 1932, cyclists and pedestrians accounted for three-quarters of all road deaths, an improvement from the absolute record year 1929, when their share was 87 % (75 % alone for pedestrians). In the Netherlands, 500 children younger than five years had died or injured in the 40,000 annual accidents and nearly a thousand children in the age of 6 to 11.[37]

No wonder that the general reporter in The Hague called for a 'crusade' against this phenomenon. He also observed that in all national reports on this matter 'an immense mass of facts' was produced, although the national reporters 'had refrained from indicating the ways to ascertain the means to prevent these accidents.' He therefore was unable to formulate one 'common thread', so he proposed to install a special commission to study this issue during the next conference in Budapest. In the subsequent discussion it appeared that a subgroup of the Committee for Communications and Transit of the League of Nations had meanwhile (in May 1937) produced a report which contained a call upon the national governments to unify their accident statistics before the end of 1940.[38]

The discussion also resulted in a controversy about the degree of centralization necessary to reach this goal of standard statistical reporting. A representative of the statistics bureau in Amsterdam accused the general reporter of being biased, observing that the large cities especially were perfectly capable of organizing their own statistics. After all, in the Netherlands, Amsterdam had started this task as far back as 1920, followed in 1922 by the other large cities. These steps occurred well before the national statistics bureau had launched a national annual statistical survey in 1926.

Similar situations existed in the UK, France and Germany, the Dutchman observed. His plea for a partial decentralization, however, was not accepted by his colleagues.[39]

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[37] W.C. Clemens, H.R. Hepworth, T. Peirson Frank and Robert J. Smith, 'Massnahmen zur Trennung der Verkehrsarten au der Stasse' (report 61 PIARC conference The Hague 1938) 13-15; Delemer, Giraud, De Rohan and L. Auscher, 'Les moyens propres à assurer la sécurité de la circulation' (report 60 of PIARC conference Munich 1934) 5; *Compte rendu The Hague 1938*, 166-167. In 1932, according to the Parisian police, only 49 of the 236 lethal accidents were caused by 'imprudence des piétons', and the majority of identified causes was related to excessive speeding (ib., 7). In The Hague, however, local authorities in 1933 abandoned the speed limit, because a relationship between accidents and vehicle speed could not be confirmed by the statistics. H.W.O. de Bruyn, 'Les moyens propres à assurer la sécurité de la circulation' (report 65 of PIARC conference Munich 1934) 5.

[38] *Compte rendu The Hague 1938*, 162-165, 171-172 (quotes on 162 and 163). See for a proposal to address the safety statistics issue at the level of the League of Nations: J.H. van Zanden, 'L'uniformité dans la statistique des accidents de la circulation,' *Revue de l'Institut International de Statistique* 4 No. 2 (July 1936) 260-265. I thank Frank Schipper for bringing this source to my attention.

[39] *Compte rendu The Hague 1938*, 181, 185.

This controversy suddenly revealed that the opinion and experience of one particular large player was hardly ever heard at the PIARC conferences and if it was, it had little chance of being accepted. Although representatives of local and regional road building authorities were present during the PIARC conferences, they did not develop their own perspective on the 'road problem' during the Interbellum. This may have been due to the fact that they, and especially the urban planners of the large cities, were represented in another transnational organization called IULA (International Union of Local Authorities) that, ironically, did not gain access to the League of Nations' Communications and Transport Committee because of jurisdictional controversies among the nations about the issue of 'intermunicipality.' As a result, IULA changed its strategy from discussing political and diplomatic topics to technical topics, an interesting shift that still waits to be fully analyzed.[40]

This situation had the effect of largely excluding the larger cities from international debates about motorization. That outcome was all the more remarkable because by far the greatest problems of motorization were felt first and foremost within these same cities: congestion, parking problems, the concentration of many transport modes, pedestrians and cyclists as dominant traffic partners. In a way, a conflict of interest can be observed between national metropolises and the countryside. Whereas inhabitants of the smaller towns and villages benefited the most from the rapidly emerging road network, the larger towns were kept out of the debate when the first negative results of motorization became manifest upon their territory. It must have been the accident that the PIARC conference was held in the Netherlands that brought one of the most eloquent Dutch representatives of the urban group, urban planner and director of the Urban Development department of the city of The Hague, ir. P. Bakker Schut, to the PIARC podium. Elsewhere, I have shown that Bakker Schut and his fellow-urban planners also were marginalized within the national Dutch context. Despite its long planning tradition, national road planning in the Netherlands was dominated by civil engineers who saw in the scientification and technocratisation of their profession an ideal path to emancipation, a view which was based on some basic concepts of efficiency and speed. Recently, a comparable observation has been made by an American planning historian about the United States, and he explained the adjustment of urban planners to the efficiency paradigm of the engineers out of the fact that their profession was less based on quantification as a token of scientification. Such planners were considered to be 'dreamers' by their opponents, because they were prepared to compromise between optimum flow speed and the consequences for the city's social and architectural cohesion of constructing through roads within that city.[41]

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[40] Stève Bernardin and Sébastien Gardon, 'Cities and Traffic Regulation: Transnational Exchanges During the Interwar Period' (paper presented at the International T^2M conference, 28 September – 3 October 2006).

[41] Mom and Filarski, *De mobiliteitsexplosie*; Sidney J. Williams, 'Die Unfälle auf den Strassen' (Report 45, PIARC conference The Hague 1938) 8-9; Jeffrey Brown, 'A Tale of Two Visions: Harland Bartholomew, Robert Moses, and the Development of the American Freeway,' *Journal of Planning History* 4 No. 1 (February 2005) 3-32.

It must have come as a surprise to the conference participants that Bakker Schut, in his general report, concluded that 'the majority of road accidents, as the bulk of the (national) reporters observe, are caused by imperfections of the road, by the road's incapacity to adapt to the actual traffic, even though the direct causes of these accidents are not so much attributable to the road as to the car drivers.'[42] This was a remarkable conclusion because his fellow Dutch reporter, who called for the 'crusade' against the rising traffic deaths statistics, concluded that he could not find a 'common thread' in the national reports. Instead, he listed twenty measures proposed in these reports, varying from regulations against alcohol use (which at this point in time especially seemed to be a concern among American road engineers[43]), to better lighting of vehicles and the creation of a black list (an 'index') of incapable drivers. His conclusions, prepared for the voting session at the conference, did not lay the blame for the increasing accident statistics on the road as badly adapted to modern traffic. Instead, he emphasized the majority of 'human errors' and pleaded in favor of obligatory education on schools. In fact, in the Netherlands by then, two-thirds of the 4,000 elementary schools in the country already had organized this education on a regular basis, supported with printed material by the touring club ANWB. Fully in keeping with the dominant ideology within the touring club, and thanked by applause from the conference participants, the conclusion the Dutchman proposed emphasized the 'moral responsibility' of all traffic participants.[44]

Although further research into this matter is necessary, it is quite probable that planners and engineers found each other in a technocratic compromise. At The Hague Bakker Schut proposed a conclusion in which the new freeway concept was presented as a way out of the safety dilemma. He borrowed this argument from the Dutch freeway lobby, which was unsuccessful until it started to use the dual arguments of economy (the freeway is cheaper to build than a 'mixed road' for all types of traffic) and safety, arguments that were also brought forward by freeway proponents in other countries.[45] Fully according to Bakker Schut's functionalist point of view (also expressed in the famous CIAM declaration of Athens of 1933 by functionalist architects[46]), the proposed conclusions stated that 'freeways, i.e. roads only accessible to motorized traffic, provide the most satisfying solution for long-distance traffic, both from a safety point of view and from the perspective of traffic speed and of capacity (of the road).'[47] This conclusion, based upon the concept of the separation of flows already introduced at PIARC conferences before the First World War,

[42] *Compte rendu The Hague 1938*, 198. For a simialr view that it was the road itself that caused many of the car accidents, see: E. Lauber, 'Anforderungen des Automobilisten an Strassenbau und Strassenverkehr,' *Der Strassenbau* 18 No. 26 (10 September 1927) 445-449.
[43] Williams, 'Die Unfälle auf den Strassen', 8-9.
[44] *Compte rendu The Hague 1938*, 167-168.
[45] Mom, 'Roads without Rails.'
[46] The Congrès Internationaux d'Architecture Moderne (CIAM), founded in 1928 by Le Corbusier and Siegfried Giedion, formulated a declaration on the 'functional city' during its conference on the steamship 'Patris II' sailing from Marseilles to Athens in 1933, which was published by Le Corbusier in 1943 in 95 theses. Hans van der Cammen and Len de Klerk, *Ruimtelijke ordening; Van grachtengordel tot Vinex-wijk* (Utrecht: Het Spectrum, 2003[5]) 137.
[47] *Compte rendu The Hague 1938*, 293.

suddenly put the technical fix of the 'freeway' in a new light, despite the reservations expressed by both the French and the British delegation in The Hague against (what the French still considered as an) extremely expensive solution, and despite the assessment of a Swedish traffic expert in Munich who claimed that not enough international traffic existed to justify such a solution.[48] Now, the freeway could be presented as a 'rational' alternative for *domestic* problems as well.

The consequences of this new policy can be derived from the scarce fatality statistics, although it is not clear whether this was observed by the contemporaries themselves. For instance, in the United States (where the construction of 'highways' during the Interbellum had the same separating function as the national roads and especially the freeways in Europe) the share of children in the fatality statistics declined from the very moment these statistics began to be constructed (figure 5).[49] Instead of pedestrians and cyclists, car drivers now started to kill each other, and around this annual onslaught a careful statistical myth began to be constructed of a constantly declining 'death rate.' This is not to say, of course, that road building engineers conspired to play down the lethal aspects of their professionalism, but it is remarkable how eager any signs (whether real or imagined) of a decrease of traffic risks were received by engineers, both inside and outside PIARC. It is no coincidence, however, that this desire for an optimistic 'reading' of traffic fatality data occurred within the context of the same process of scientification which had driven general road building culture. Such an optimistic 'reading' was achieved by 'normalizing' the resulting graphs, dividing absolute accident, injury and death numbers by some constantly increasing factor, mostly the number of cars or the number of vehicle-kilometers. In other words: the factor that drove the 'spiraling effect' of road building financing upward also fuelled the fears and concerns about this novel contribution to what later would become known as the 'risk society.'[50] But the effect was in the opposite direction: initially, more automobile roads meant less (fatal) accidents, simply because the chance of an 'encounter' with potential victims was reduced because automobile-friendly road length increased more than automobile registrations. From this perspective the solution resembled the traditional railway solution of building the train's own road and, whatever one's view on the train's societal role, it was no doubt much less dangerous than road traffic.[51]

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[48] Clemens e.a., 'Massnahmen', 22; Bressot, Giguet and Delaigue, 'Massnahemen zur Trennung der Verkehrsarten auf der Strasse' (report 60, PIARC conference The Hague 1938) 22; Gösta Kullberg, 'Circulation, Exploitation et Administration' (report 95, PIARC conference Munich 1934) 8.

[49] Clay McShane and Gijs Mom, 'Death and the Automobile: A Comparison of Automobile Ownership and Fatal Accidents in the United States and the Netherlands, 1910 – 1980' (unpubl. paper presented at the ICOHTEC conference, Prague, 22-26 August 2000) 9.

[50] Ulrich Beck, *Risikogesellschaft; Auf dem Weg in eine andere Moderne* (Frankfurt am Main: Suhrkamp Verlag, 1986); also see: Charles Perrow, *Normal Accidents; Living with High-Risk Technologies* (New York: Basis Books, Inc., Publishers, 1984).

[51] Mom, 'Roads without Rails.'

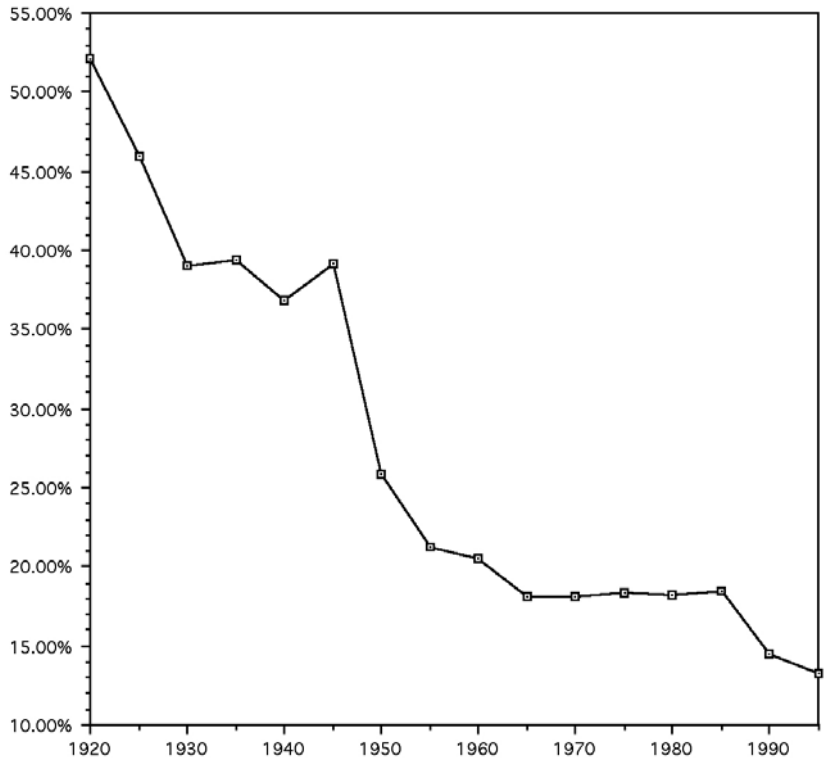

Figure 5: Pedestrian fatalities as a percentage of all traffic fatalities in the United States. Source: National Safety Council, Accident Fact; graph taken from Clay McShane and Gijs Mom, 'Death and the Automobile: A Comparison of Automobile Ownership and Fatal Accidents in the United States and the Netherlands, 1910 – 1980' (unpubl. paper presented at the ICOHTEC conference, Prague, 22-26 August 2000).

But whereas these normalized statistics only make sense when they are used for intermodal safety comparisons, for comparisons with other types of accidents, or with other causes of death in general, absolute numbers, or normalized statistics on the basis of population density, are better suited. In the latter case, the decrease of traffic deaths during the Interbellum is much less spectacular or even hardly visible. In fact, the statistics normalized on the basis of vehicles or vehicle-kilometers functioned as a self-fulfilling prophecy, because accident numbers increased with increasing traffic (and, hence, the increased chance of violent 'encounters' between vehicles), but after a while their lethality decreased because of decreasing speeds, due to congestion, especially within the cities. Only in the beginning of the 1970s also the absolute number of annual traffic deaths started to decline, but that belongs to another, post-war story (figure 6).[52]

[52] No analysis of Interbellum road safety, let alone of the effectiveness of the different safety measures upon accident statistics, exists so far. See for a post-war analysis of the Netherlands: *De top bedwongen; Balans van de verkeersveiligheid in Nederland 1950 – 2005* (Leischendam: SWOV, 2007); also see: S. Oppe, 'Possibilities and limitations of accident analysis' (*Safety evaluation of traffic systems: traffic conflicts and other measures.* Proceedings of the 6th ICTCT-Workshop in Salzburg, October 1993).

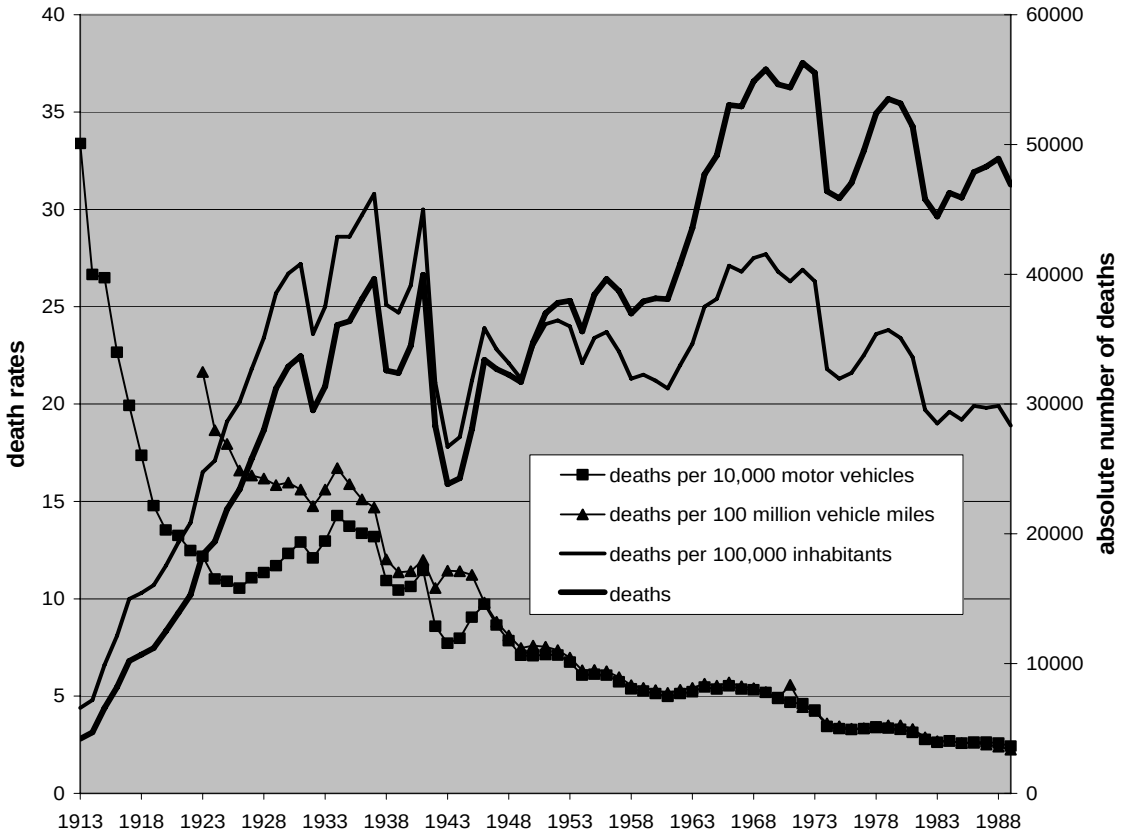

Figure 6: Mystification of road death statistics by constructing 'death rates'; example: United States, 1913 -1989 (Source: see figure 5).

Such a post-war story, however, should take long-term developments into consideration, such as have been made visible by the excellent work of the French demographer Claude Chesnais (figure 7). Such statistics (either expressed in absolute numbers or normalized on the basis of population density) reveal, how societal risks increased during the 19th century 'horse economy' due to increased construction work and related traffic as a result of a heavily gendered increase in male deaths (female deaths seem to have been hardly affected by this: women kept being the victim of accidental falls in the home). These statistics slightly declined during the first two decades of the twentieth century, whereby the First World War seems to have resulted in a breach in this trend to much lower levels, soon to be compensated by a largely male dominated explosion of automobile-caused deaths during the Interbellum, announcing the second, and much more powerful, explosion during the postwar mass motorization.[53]

[53] Jean-Claude Chesnais, 'La mortalité par accidents en France depuis 1826,'*Population* (French edition) 29 No. 6 (November – December 1974) 1097-1136.

Figure 7: Long-term statistics (1835 – 1973) of French accidental deaths, including gendering (Source: Jean-Claude Chesnais, 'La mortalité par accidents en France depuis 1826,' *Population* (French edition) 29 No. 6 (November – December 1974) 1097-1136).

CONCLUSION

On Monday 20 June 1938, president (and French senator) A. Mahieu opened the 8th PIARC conference in The Hague referring to the unifying work of the association during the previous thirty years. 'Our efforts (...) have led to tangible results and everyone of us can nowadays even observe that road technology has become very similar, whatever the country we visit.'[54] The question we would like to answer here is whether we agree with Mahieu's judgment, both on the unification of the technology *per se* and on the leading role of PIARC in this unification.

As we explained in the Introduction, our answer to this question rests upon the limited case study of road safety. Although this was only one of the many themes discussed during the eight conferences of our study, road safety played a role from the very beginning of PIARC, in several shapes: as part of a public health theme before the First World War (dust), as a theme of accident liability and of behavioral rules in traffic (national legislation) as well as danger prevention for motorists (road signaling) in the same period, and especially during the Interbellum when the first reliable statistics started to appear documenting a clear relationship between increasing motorization and a paradigmatic shift in societal safety patterns in all member countries.

As far as the most visible aspect of the road safety issue is concerned (road signs), we found that the first standardization of these signs took place *before* the foundation of PIARC, through the transnational cooperation of the automobile and touring clubs. When controversies arose about the utility and

[54] *Compte rendu The Hague 1938*, 64.

effectiveness of these signs, the matter was removed from the official PIARC agendas and relegated to the diplomatic Conventions of 1909, 1926 and 1931 and to the Committee for Communications and Transit of the League of Nations. The 1931 convention resulted in the definitive standardization of a set of signs, which we still know today (figure 8), but it is not clear how much of them were really implemented before the war. It seems that, even though within the League of Nations several Conventions (also on other topics, such as the standardization of electricity in order to build a transnational electricity network) were ratified by several members, often these conventions were not implemented on a national level.[55]

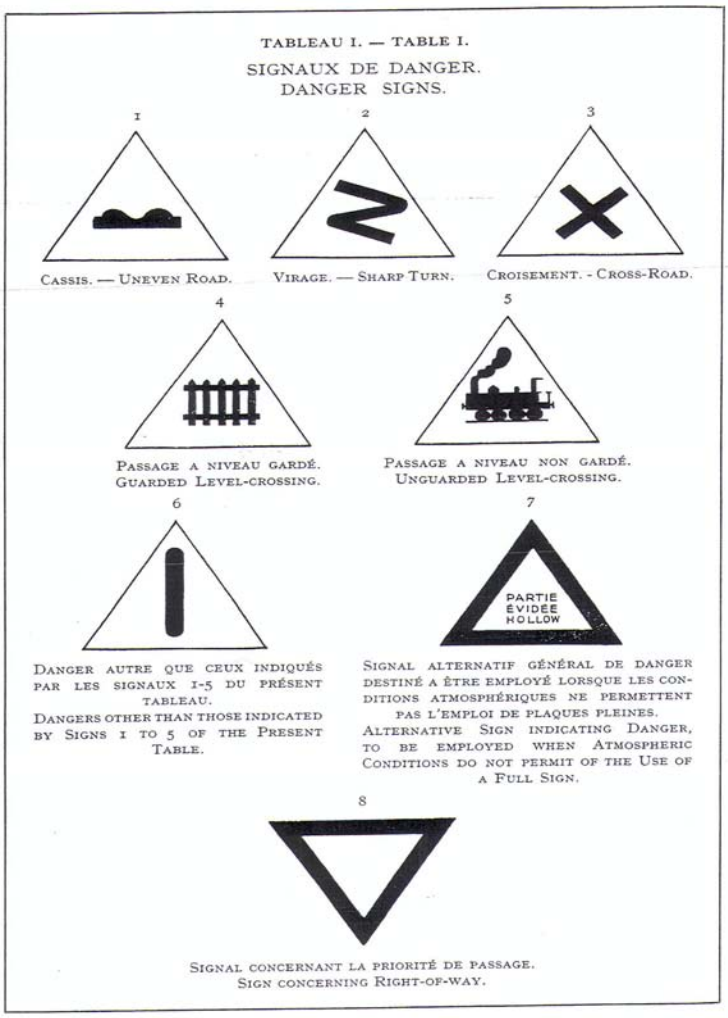

Figure 8: Road signs (selection) standardized during the Paris Convention of 1931 (League of Nations, *Convention concerning the unification of road signals* (Geneva, March 30th, 1931).

Against this background, the role of PIARC can hardly be called 'unifying'. Instead of enforcing certain solutions upon individual members, and asking these members to give up a part of their sovereignty (which is how 'unification'

[55] Private communication Vincent Lagendijk, Eindhoven University of Technology. I thank Frank Schipper for providing me with the documentation on the 1931 Paris convention.

or 'integration' can be defined), PIARC worked as a *transfer machine*, a *synchronizer* of local best practices. The history of PIARC until the Second World War shows many instances of successful transfers between members, but in many cases these transfers did not result in a full synchronization. Hence, European countries adopted both asphalt and concrete road pavements, differed in legislation as to the maximum allowable axle loads on these pavements, developed different road widths and curve radii, and followed different financing schemes and tax regimes to support their Road Plans. And if real controversies arose, the proposed solutions often involved studying the matter further, until consensus could be reached at a later date. Then again, several solutions often were allowed, based upon the argument that every country had its own style and culture.

The basic question, of course, is whether this pattern of outcomes mattered. I think not. Despite the variety of solutions (or better perhaps: due to the general acceptance of this variety) a basic agreement on the main principles of road planning and construction was slowly created. Reduced to one single paradigm, this agreement boiled down to the dual technical principles of efficiency and speed of flow, both based upon an engineering ethic governed by scientification and quantification. This paradigm can be called *technocratic*, because it preferred 'technical fixes' over other types of solutions, such as political ones. And if standardization was really urgent, such as in the case of uniform accident statistics, the topic was transferred to a special commission. This happened with the unification of national road censuses (decided during the conference of Milan in 1926) or with the standardization of bituminous emulsions (decided during the conference of Munich in 1934).[56] When the topic was too complicated for a largely technically oriented association, it was simply transferred to *real* transnational political organization like the League of Nations. That even there such topics often could not be resolved tells us something about the maneuvering space available for transnational standardization during the Interbellum in Europe.

Against this background it is understandable that PIARC could not solve the road safety problem. During the period under study this problem was still defined as a problem of *morality* rather than as an engineering problem, probably the result of a continuing influence of the national touring clubs.[57] This conclusion demonstrates that it is very hard, if not impossible, to assess the exact role of PIARC without taking into account the road building history of at least one single country, and preferably more.

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[56] *Compte rendu The Hague 1938*, 250.

[57] As stated earlier, this conclusion is based upon a study of the role of the Dutch touring club ANWB in national road matters. See Mom and Filarski, *De mobiliteitsexplosie*. The leading figures of ANWB played a dominant role in the organization of the PIARC conference in The Hague in 1938. This was due, among other things, to the dominant role of the ANWB in the Dutch PIARC organization, de *Vereeniging Het Nederlandsche Wegen-Congres* (The Dutch Road Congress Association). The Dutch study shows, how ANWB during the Interbellum slowly lost terrain to the professional road building engineers from the *Waterstaat* department in technical matters, but managed to claim a dominant role in the road safety issue. ANWB (and its international counterpart AIT) was instrumental in building an international network around annual road safety courses in Europe after the Second World War.

Apart from being a transfer machine for knowledge and practices, PIARC also was a vehicle for the emancipation of the road building profession, to the detriment of another main player, the urban planners. Here, too, only a study of the local history can help explain why these planners did not manage to play a more explicit, international role. The Dutch history, at least, suggests that at the national level by the 1920s urban planners were no match for the power of the engineers.[58] Issues of urban planning *did* play a role on several PIARC conferences (see Table 1), but protectionism and nationalism during the Interbellum prevented urban planners from building a truly transnational association. They also were regarded as less scientific. The result was that the urban effects of consensus formation at PIARC conferences were rarely taken into account at these conferences, with very large consequences indeed for the post-WWII period of freeway building. From this perspective, PIARC was a reflection of the balance of power within member countries.

This tendency was reinforced when a third player appeared on the scene. The freeway lobby, in its planning practices working on the basis of a top-down approach, was even less concerned with the full extent of what happened at the local level. And although this may have been one of the reasons for its limited success, its appeal apparently was strong enough to pressure parts of PIARC to embrace this approach, especially so as the safety problem threatened to jeopardize the promise of the road builders' claim of modernization of society. Thus, PIARC's bottom-up approach and the freeway lobby's top-down approach merged and converged during the latter years of the Interbellum resulting in an ideological framework that would form the basis for the post-war frenzy of European freeway building.

This preparatory role of the Interbellum period brings us to our final point. The eight PIARC conferences analyzed in this essay have made abundantly clear that most elements of the post-war debate on freeway building were explicitly formulated during the pre-war period. These ranged from the need to separate traffic flows, to the warning not to build main roads through towns, as well as the conviction that dedicated tax regimes were necessary to finance the ambitious and prestigious road network projects. It is, therefore, the final conclusion of this contribution, that the post-war history of road building can not be fully understood if the pre-war history is not brought into view, because it was during the period 1910-1940 that the main viewpoints were formulated though an elaborate process of consensus formation, a technique which had proven its value at least since the mid-1880s. The leading national postwar road builders had been educated and their views were shaped during these pre-war PIARC debates. When the European states, within the framework of the United Nations' Economic Commission for Europe in the 1950s and 1960s, formulated their ambitious plans to build a European E road network, they did so on the basis of a technocratic engineering culture which had been carefully constructed during the previous thirty years, including the optimistic belief that road accidents and traffic fatalities, by applying the proper technology, could be solved. The standardization of road signs is another

[58] Mom and Filarski, *De mobiliteitsexplosie*.

case in point: although agreed upon within other gremia than PIARC itself, the set of signs was laying ready, so to speak, to be implemented after the war.

If, as some post-war histories claim[59], the International Road Federation IRF remarkably easily convinced many European governments to embark on their ambitious freeway building projects, that outcome was the harvest of seeds sown by PIARC during the previous half century. In this sense, the postwar unification of the freeway system was carefully prepared by a prewar unification of a civil engineering culture, a culture in which land-use planning and urban concerns were marginalized.

To reconstruct this culture, it is apparently not enough to include only one country into the in-depth analysis. As we have seen previously, Norway and Sweden did not have their own local PIARC structure. Generalizing from such a country to an assumed 'European road building culture' would then obviously run the risk of distorting the historical picture. A better plea for a wide-spread study of national road building cultures within a 'European' context can hardly be made.

[59] Pär Blomkvist, 'Roads for Flow – Roads for Peace; Lobbying for a European Highway System,' in: Erik van der Vleuten and Arne Kaijser (eds.), *Networking Europe; Transnational Infrastructures and the Shaping of Europe, 1850 – 2000* (Sagamore Beach: Science History Publications, 2006) 161-186.