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The Historical Interrelationship of Railways and Cities from an Urban Viewpoint. Conceptual review and application to the Iberian Peninsula

La interrelación histórica de ferrocarril y ciudad desde el punto de vista urbanístico. Revisión conceptual y aplicación a la Península Ibérica

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Abstract: This paper offers a conceptual overview of the state of the art relating to the historical interrelationships between railways and cities from the point of view of town planning, covering the good century and a half that there have been railways in the Iberian Peninsula. It addresses both urban and railway history, reconsidering major issues in this relationship. These are: 1) the tracks of lines as they cross cities and the role they play in urban life, 2) the passenger buildings of stations, seen as a focus of urban centrality, 3) the developing complexity of cities and railways, together with the installation of new road and port infrastructures, and 4) the problems emerging from urban expansion in the final third of the twentieth century, mostly after the restoration of democracy, specifically the question of the limited permeability of rail tracks and the interpretation as a social barrier of the physical barrier thus constituted by the railway. An idea that railways are a problem grew up within this historical interrelationship.
Keywords: Interrelationship between railways and cities; centrality; permeability; social barriers.

Resumen: Se plantea una revisión conceptual del estado de la cuestión sobre la interrelación histórica de ferrocarriles y ciudades desde el punto de vista urbanístico y a lo largo del siglo y medio largo de existencia de los ferrocarriles en la Península Ibérica. Esta comunicación de historia urbana e historia ferroviaria reconsidera lo que entiende como los asuntos principales de esa interrelación: 1) el trazado de la línea férrea a su paso por la ciudad y su papel urbanístico, 2) el edificio de viajeros de la estación como foco urbanístico de centralidad, 3) la progresiva complejidad urbanística y ferroviaria así como la implantación de nuevas infraestructuras carreteras y portuarias, y 4) la problemática aparecida con la expansión urbana del último tercio del siglo XX, sobre todo en democracia, en especial la relativa a la falta de permeabilidad transversal de las vías y a la interpretación de la barrera física de las vías como una barrera social. En esta interrelación histórica, se ha ido formando una idea del ferrocarril como problema.
Palabras clave: interrelación ferrocarril-ciudad; centralidad; permeabilidad; barrera social.

INTRODUCTION

This paper addresses the implications for town-planning of the historical relationships between railways and cities from their beginning down to the last decade of the twentieth century. The cases needing study are very numerous, even if only the Iberian Peninsula is considered. Hence, apologies must be offered in advance for this boldness of approach, although it has been adopted in the honest conviction that it is possible to make an orderly and refined contribution based on a range of ideas shaped by investigations going back over two decades. The paper's structure is thus that of an essay.

It covers the permanence and changes of urban forms in the specific context of the interrelationships between railways and cities. To undertake the general hypothesis that the railway gradually became an urban problem (Santos, 2007, 2008, 2020), I proceed to a generic discourse and, as I go forward, I refer to the cities of the Iberian Peninsula, whose specificity lies in the late industrialization and the late and inoperative urban planning. There are significant differences between the Spanish and Portuguese cases, but they share numerous railway and urban aspects, and it is worth having this overview.

A first section is given over to the general theoretical foundation of the historical and town-planning keys of these relationships and to consideration of the concepts that emerge. A second section is dedicated to the urban planning links between railways and cities over time, in so far as they can be interpreted as falling into phases. These phases correspond to a combination of major changes in railways and cities. The third section concentrates on describing the historical trial-and-error developments of railways and cities, from central stations to connections and the integration of railways into townscapes. Some brief conclusions and a simple bibliography conclude this essay.

1. PRIOR THEORETICAL OVERVIEW: STATIONS AND TRACKS, URBAN AND RAILWAY PROBLEMS

The starting point here is an approach combining the issues railways raise for town planning with the issues cities pose for railways. In this way, as well, it is possible to address with some precision the use of technical terms that must necessarily appear in this setting.

The main topic under consideration is an intra-urban relationship, in terms of structure and form, of a railway presence in cities, equally valid for large and for small conurbations, although probably seen most clearly in medium-sized cities. It must be made clear that there is no attempt here to discuss several macro features of the railway-city relationship, whether in land-use or in demographic terms, or in respect of the scale of networks, be they of railways or of cities. Similarly, there is no discussion of certain questions specifically affecting major metropolitan areas, such as the role in town layout and buildings played by certain suburban rail lines designed with the specific aim of relocating people and expanding into new areas, or by tram and underground networks.

There are two main town-planning purposes, strongly differentiated, in the railway-city interrelationship that must be covered by urban and by railway history: stations and the routes taken by railways as they pass through cities. A station is a place organized around a point on a route, routes being linear arrangements embodied in tracks. The stopping point and the track have integrated functional roles for the railway. However, in contrast, the parts they play in town-planning are distinct and very different. An understanding of the relationships between railways and cities requires a grasp of these two facets: stations and routes, stops, and tracks.

1.1. The station in the city

A station is a railway space defined by the stopping of trains there. It is a functional pivotal location for the railway, at which the main operations of rail transport are performed. In cities, it is also an inescapable urban element, acting as a transfer point and as an urban pole of attraction.

Any station, even the most specialized or the smallest, has zones given over to users or customers, along with other areas for internal use of a technical nature, necessary for the functioning of the system. Classic mixed-use stations were planned to cope with three major functions that as far as possible, were intended to form three differentiated sectors. There was a space for passengers, another for goods and a third for technical facilities. These three areas could not always be accommodated in the whole in such a way that the functioning of their three purposes would be optimal. Rather, the design of a station responded to an adaptational compromise interlinking all its functions.

Thus, a station comprises the entirety of this complex, whether it is more or less visible, more or less familiar. Its extent is usually considerable, even when efforts have been made to keep the size of the premises to a minimum. This is an outcome of the implications of such a rigid infrastructure tied to the track layout and of always having to be ready for future expansion.

In larger cities, from the latter part of the nineteenth century onwards attempts were made to separate the three sectors relating to the three functions by creating specialized stations covering smaller areas at different places within the city: passenger stations, goods depots, and technical facilities. Such a separation of functions, which succeeded in considerably reducing the requirement for urban land, allowed some passenger stations to be brought into the heart of the largest cities. Despite this, the inertia resulting from the huge costs that this always involved explains why stations have mostly remained in the same place for more than a century and a half.

That said, to understand the town-planning issues arising it is necessary to be fully conscious of a potential confusion of part and whole. It is usual for the passenger building alone to be called the station. This is not a problem, but only if this shortcut in terminology is kept in mind, since otherwise the understanding of the realities would become limited and trite (Lalana and Santos, 2017). A passenger building or, where this is the case, a passenger station, is a very useful and highly appreciated point in the city, socially valued from its very origin, as it permitted physical connection with the rest of the world. The passenger terminal building is usually in the first place a communications node of the highest level. The word *node* is here taken as meaning a strategic point at which transport networks converge or provide greater accessibility or connectivity. Secondly, it is normally an urban *focus*. A focus or focal point is a place of prominence and influence. It radiates value in such a way that in town-planning terms it is a *pole* of attraction, in other words a salient point drawing interest, a place of affinity for the bourgeois habitat, the best planned formal city, and urban centrality. Thirdly, it is commonly an urban landmark, in a sense like that used by Kevin Lynch in *The Image of the City* (1960): a reference point in the city, a special physical element making it easier to *read* the urban area. The concept of landmark is thus to be understood within the framework of Lynch's study of urban morphology, markedly analytic, and applied or practical, in accordance with the physical elements or form shaping the image of a city.

Hence comes the statement of the centrality of stations: theirs is a central position that has been built up over the course of their existence. The opposite occurs with the goods and technical facilities. The first are highly important, the second indispensable, but socially they have not been considered attractive parts of any city, but rather as sites repelling central urban features, because of their nature as places of employment, and thus localities linked to working class districts.

Consequently, it may be argued that centrality is a key to the urban phenomena relating to the role of stations in a city. Centrality is a very important concept in town-planning, complex and multifaceted, hard to define without some ambiguity emerging. However, it is tied to other features, such as financial worth, the level of equipment and services, accessibility, privileged social spaces, seats of power and iconic images. Only an evaluation of urban centrality can yield an understanding of the part played by the passenger installations of stations in the city in which they are set. Drawing up the history of a station requires the compilation of a history of its city in terms of centrality. This implies analysis and interpretation of the historical relationship between such passenger terminals in stations and the building up of nineteenth-century bourgeois cities through transformation of inherited cityscapes and, where present, the construction of new suburbs as an expansion, together with the long-term creation of contemporary urban centrality.

As urban growth gradually enveloped stations, the outcome was that the purpose of their passenger facilities, originally intended to provide a service to the places focused upon by the line, also evolved. Therefore, the nineteenth-century concept of a station as the *gateway* to *the city* had to change into seeing stations as *gateways* for *the city*. In other words, they had to offer services in all possible directions within the urban space. Side-platform stations demanded access routes, and had to attend to customers, on both sides of the lines, which was certainly both complicated and expensive. These needs constituted one of the reasons that passenger buildings were sometimes constructed directly over the tracks.

Stations as nodes required services facilitating this function, which was the origin of the design of passenger concourses and goods yards. Urban public transport had to treat stations as privileged destinations and provide itself with stopping points next to them. When the time came for thoughts to go to the building of bus stations it was often seen as appropriate for them to be located next to the railway station. From the last third of the twentieth century onwards, the concepts of multi-modality

and inter-modality emerged as improvements to transport services in general, this on occasion necessitating modifications of some size to stations.

Stations as focal points also required facilities aiding in this role. Initially, the "permanent" passenger building, which was in many instances designed and built decades after railway operations first began, simply reflected the image of the company by means of iconic, high-quality architecture. Likewise, town councils generally constructed at least one new street leading directly to the passenger terminal. However, from the last third of the twentieth century onwards, the idea of a station as a centre for services emerged. This took advantage of its central position and connections to make of the station much more than just a transport location, adding installations such as offices, shops, leisure facilities and hotels. These circumstances were obviously favourable for the owners of stations, but also constituted both an opportunity and a threat to the functioning of cities.

1.2. Rail Tracks and the City

> At that moment in Zenith, three hundred and forty or fifty thousand Ordinary People were asleep, a vast unpenetrated shadow. In the slum beyond the railroad tracks, a young man who for six months had sought work turned on the gas and killed himself and his wife (Sinclair Lewis, 1922, chapter 7).

The principal routes for long-distance railway lines were generally chosen in such a way as to avoid urban areas, the principal motive for this being the higher costs of expropriating or otherwise acquiring land. However, they also had to be located in such a way as to ensure that stations were in the best possible positions, if feasible as close as they could be, but above all as centrally as practicable to towns, as noted above. It is only by keeping this in mind that it is possible to understand some curves and counter-curves of the traces as they pass through cities, or some occupations of the riverbanks.

The result was that when an intermediate station was involved, the route of the line was almost always chosen to run along the outskirts of the city, and very rarely ran across the urban area. When it was a terminus, the opportunity of getting as far into the heart of the town as possible was taken, although, bar a very few exceptions, there was no penetration

into what the core of ancient walled settlements had been. Hence, railways mostly avoided urban spaces, with the aim of reducing the huge initial investment. They basically addressed their own internal necessities, such as the need for space, and their external requirements, for example, connections to ports. Nevertheless, there were other constraints and determining factors of a very varied nature, from topography and watercourses to the availability of land at a cheaper price because it was state or publicly owned.

The presence of the city on the other side of the tracks was thus later than the installation of these rail lines. The generalized idea that railways cut across, divided or bisected cities is therefore in most cases an unhistorical concept. It was uncontrolled urban growth that gave rise to problems, responsibility for which was later heaped on the railway.

The passenger buildings of stations are urban landmarks, focuses of attraction linked to their centrality. The railway platform is just the opposite, acting as a band or strip of repulsion of centrality. The first reason is that it is an area affected on a day-to-day basis by noise and fumes. The second is that a direct connection with the railway was a plus point in choosing a location for many types of industrial and transport enterprises. The track from its earliest years was an area associated with toil and workers' dwellings.

During their first decades of existence, in contrast with what happened with stations' passenger buildings, which were urban focal points, nineteenth-century rail tracks behaved as a *limit,* in other words, an obvious *edge* up to which cities could be extended, especially their working-class quarters. At the turn of the century, towns spilled over to the other side of the tracks, in the shape of town-outskirt settlements and slum suburbs, based on unofficial divisions into building plots and illegal squatting. The tracks then ceased to be a *limit*, an urban Land's End, to become another sort of *edge*, which may be termed a *barrier*, an obstacle that can be crossed but which is always a difficulty for crosswise traffic. Moreover, de facto urban development and, later, actual town planning made use of the railway as an easy argument for social and spatial segregation; what lay on the other side, with just a handful of exceptions, was an area either for industrial production or for proletarian residential quarters. For the whole of the twentieth century, the other side of the tracks was a part of the city that was poorly developed, lacking high-quality installations or urban fixtures and fittings of any value. Later, from the mid twentieth century, and especially the 1980s, onwards, a point of view

was gradually built up that saw the railway as a *social barrier*. This is one of the reasons that railways have been considered an urban problem in the Iberian Peninsula, unlike what has happened in some other parts of Europe. It was not vain talk when Lewis Mumford, in *The City in History*, established a vague cause-and-effect relationship between railways and urban blight, not so much because of noise and soot, but because they brought into the city industries and poor-quality housing (Mumford, 1961, 461). In these comments in the chapter entitled "Factory, Railroad, and Slums", the author possibly had in mind the hellish image of Chicago's Loop and of other industrial cities, but its general validity cannot be denied.

It should be noted that the previous paragraph uses three words: *edge*, *limit*, and *barrier*. These should be given differentiated senses in town-planning terms.

The word *edge* is to be understood here in a similar way to its use by Lynch (1960), that is, as a linear element that is perceived by the observer as a break in spatial visibility and continuity, since it is neither a route nor a pathway. It acts as a transition between two phases and forms a lengthwise reference, with some capacity to disorganize or interrupt, moreover. Hence, urban edges are to be taken as all those landmark lines in the image of the city that are marked by physical indications. Thus, a railway is an edge in the urban image whatever its role may be in the structure of the city, whether it is its ability to constitute an obstacle or its social significance, just as might be the case for a brook or stream. Nevertheless, whilst edges are clear lateral reference markers in town functioning and image, there is no reason that they must be impenetrable fences; rather, they can even be seams or lines of exchange (Lynch, 1960, 65, 100). Hence, only when strong edges prove to be a fence in their urban meaning and effects can they be limits or barriers.

Indeed, limits are a type of edge; they are the sort of urban edge that constitutes a closure, a wall, or a boundary to the city, acting as fixation lines, to echo the terminology employed by Conzen (1962). After all, the shape of any object is determined by its limits, and so town limits contribute to the accommodation of urban forms. Thus, as a function of spatial differentiation and town growth in general, an edge becomes a limit when a city does not go around it, or simply ends there (coastlines, great rivers, major communication routes, considerable changes in topographical heights, and the like). In this way, *limit* should be understood as the line marking a separation and is used here with the sense of town bound-

ary. Urban spaces as they grew historically tended to mould themselves around the edges presented by railways, so that for decades the latter took on the role of city limits, places were the town began or ended. Rail tracks indicated where the city started in so far as they delimited it, because on the other side there was open country, or the city's neighbouring settlements. Moreover, railway boundaries had to be closed in, even if the legal requirement for enclosure was often not properly complied with, so that if, or when, a formal enclosing was undertaken, it made the separation between town and country even more robust. The closure characteristics of a limit are determined by the openings in it, in other words, in the case of a railway, the city streets that run across it. This leads to the third concept, *barrier*, which in Conzen's approach to urban morphology would be seen as an interruption of a fixation line defined as an urban limit.

The word *barrier* is to be understood as meaning a physical element acting as an obstacle to traffic and thus impeding access; it does not prevent it absolutely but does make it slower and more awkward. Thus, a railway is a barrier to the extent that it makes passage difficult. This depends upon the number and nature of the crossings available.

Finally, when the expression *social barrier* is used, what must be stressed is that railways are not the cause of social and spatial segregation (in other words the erroneous idea that the railway is to blame for them). Rather, by being a barrier, it could be used as an implicit or explicit argument in town planning when investing in buildings and zoning towns, such that the other side of the tracks, in most cities in Spain and Portugal, was the site for workers' dwellings, a part of the city that was worse planned, worse built, and worse equipped. In fact, the physical barriers that are normally implied by railway lines have also served as very clear landmarks in processes of development, and in general for the social and spatial segregation accepted or supported by town planning. This is how physical barriers have gradually become social barriers. However, the railway is not the cause, despite frequent assertions to the contrary, but rather merely an external argument used in favour of socio-economic discrimination and zoning. What lies on the other side of the tracks normally has different urban characteristics in one way or another. However, the identifying as one and the same of two different phenomena, the barrier effect, and social and spatial segregation, has been socially successful. In consequence, the railway infrastructure itself has been thrust into the heart of the debate and cause-and-effect relationships have been over-

simplified, leading to erroneous claims that the disappearance of the physical barrier would automatically eliminate social barriers. The defence of this commonplace that segregation is triggered by the railway is in most cases merely foolish. Elements and factors in spatial segregation and social inequality need to be scrutinized in terms of the behaviours and actions of agencies undertaking town planning: the assignment of *roles* to urban spaces, the lack of equipment at a citywide level, mediocre building standards, vulgar town development, the insufficiency of amenities provided, and so forth. To sum up, social and spatial segregation has not been caused by railways; rather, they have been used as a cover for putting these into practice. If a railway acts as a social barrier, this is not because it divides the city, since even if it disappeared social frameworks would continue as they are.

Nineteenth-century rail lines, as they passed through cities, generally avoided the construction of overpasses (flying crossings) or underpasses (burrowing crossings) when they met with road routes. Level crossings not only were and are a problem for city functions, but also were and are a problem for railway operations, especially safety. The companies did not build overpass and underpass crossings because public concessions did not make this a requirement, and because their cost was very high. To the extent that cities grew, level crossings became a serious difficulty. Some of them, the most problematic, had to be replaced with bridges or tunnels many decades later. Moreover, the number of crossings was fixed to suit the lanes and highways leaving the city, not with an eye to the development of streets and avenues, so that the shortage of crossing points became ever more evident. What should have been done, but was not, was the installation of sufficient overpasses and underpasses within the urban context, costs being covered by building promoters or city councils, with the aid of the state and the rail companies.

Finally, with regard to the routes of railways within towns, there has always been a lack of care for their edges, especially on their inner faces, that is, those looking toward the lines: inadequate enclosure, negligent accumulations of bits and pieces such as left-over sleepers, odd spare parts, or piles of ballast, carelessness or laziness meaning they are not kept clean and tidy; in brief, they present a scenery of environmental blight. To this must be added what Jane Jacobs called "the curse of border vacuums", in her *The Death and Life of Great American Cities* (Jacobs, 1961, 257-269), this concept applying to large installations or uses, major parks and waterfronts, among others. Jacobs explained that exten-

sive or lengthy single-use areas form urban borders, these not merely being limits or barriers, but exerting an active negative influence that leads to the destruction of neighbourhoods. As for railways, furthermore, Jacobs states that the immediate surroundings of their tracks, on either side, function particularly poorly. The rail line may be not just a social barrier ("social border", to quote Jacobs), but also a generator of a border vacuum, as streets running alongside them always face problems of vitality in their communities, arising from the lack of one side of the road, so that their urban life is restricted. Hence it is crucial to ensure that lines are properly enclosed, as also to guarantee the quality of the design, functionality, and uses and activities of all those urban spaces affected by borders like railways.

Now that the four terms *edge*, *limit*, *barrier*, and *border* have received an adequate profiling, and railways have been accepted as one of the pieces in the urban jigsaw, the conditions have been attained for gaining a grasp of what the problems are in the interrelationship between railways and cities. When considering railways as characteristic components of the urban scene, two different viewpoints are possible. The first states that the logic of railways has habitually been poorly understood and consciously avoided in municipal management and within the discipline of town planning. The second takes the opposite line, asserting that railway management has been inward-looking and self-complacent, isolated from urban realities and apparently indifferent to the public interest when it comes to matters of urban spaces.

In brief, the most usual problems or frictions concerning the relationship between railways and cities were historically, and, to some extent, still are, the following:

- Among difficulties faced by railways, there are hazards affecting traffic (caused by deficiencies in enclosure, level crossings and the imprudent actions of many inhabitants), the lack of capacity of lines (insufficient track access to stations) and the inconveniences of running both passenger and goods services through the same station.

- Among those affecting cities, there is the border formed by rail corridors, the barrier effect in the shape of a lack of crossing points, as well as the presence of level crossings and poorly designed over-

passes and underpasses, and degradation of environmental quality due to inappropriate and poorly maintained enclosing structures, dirt, accumulations of material, fumes, noise and vibration.

In conclusion, the general interest, properly understood and unbiased, should have led railways to pay more attention to urban problems and cities to consider the needs and problems of railways, striving as far as possible to integrate these latter into the city. It has been a question not only of divergent viewpoints, but of responses to opposed interests and of differing and totally separated legal frameworks. The history of the interaction between these approaches is a tale of disagreements mingled with attempts at co-operation, in which the part played by the state has been crucial.

2. THREE HISTORICAL PERIODS IN THE INTERRELATIONSHIP BETWEEN RAILWAYS AND CITIES

There are very reliable general studies on the history of urban planning in Portugal (Pinheiro, 1990; Salgueiro, 1992, Balsas, 2006; Lobo, 1996 and 2011) and in Spain (Terán, 1978, 1999; Capel 1983; Guàrdia et al, 1995). There are also studies on the relationship between railways and cities, both in Portugal (Salgueiro, 1987; Alves, 2015; Pinheiro, 2003, 2008, 2019) and in Spain (Santos, 2007, 2008, 2013; Capel, 2011).

The very concept of an *interrelationship* obliges the approach to be two-way. This is unlike most of the work on railway history that relates to urban areas, in that it does not merely attempt to ascertain what the impact of railway construction was on cities. It also endeavours to analyse the specific railway and town-planning factors that may have intervened in the mutual relationships between railways and cities, which gave rise to varying historical scenarios of continuity and change in town-planning terms.

For the Iberian Peninsula in general, it may be asserted that the historical interrelationship between railways and cities passes through three stages or phases, defined both by the functioning and growth of railways, and by the functioning and growth of cities, in the form of permanence and of change. The first phase corresponds to the building and consolidation of railways during their early decades of existence, together with slight urban expansion. The second stage relates to the decades around the turn of the nineteenth century down to the middle of the twentieth

century, the heyday of the railway and of urban growth unaffected by municipal town planning. The third phase begins with the twilight of steam traction and coincides with the loss of the status as a universal means of transport by the railway, and with growth in the size and population of cities, but now with urban legislation and planning.

2.1. The first historical phase: beginnings and stabilization

The first phase can be envisaged as the period in the nineteenth century when railways were built, and their functioning became settled. It coincided with the earliest urban transformations arising from liberal revolutions, based fundamentally on the expropriation of Church properties hitherto held in mortmain. The cities of the Peninsula grew slowly in population, thanks to positive inward migration that compensated for what was often a negative natural increase. However, they barely grew. This was because control by new, middle-class proprietors brought about a period of urban densification, related to making the best use possible of the large pool of buildings that had been expropriated and auctioned.

The factors in the functionality of the railway that concerned the state and rail companies were usually the following:

- Predominance of the general interests connected with the railway over public interest linked to city extensions or other urban projects.

- The peripheral or tangential positioning of tracks and stations.

- Stations of mixed nature (passengers, goods, and workshops all on one site) and of appreciable size (due to foreseen future expansion, leading to low-density use).

- Relevance of the role and functional status of given stations on their lines. This concerns the category assigned to a station in terms of projects (third-rate, second-rate, first-rate, and uncategorized). It also relates to station functions in respect of overall operations (locomotive shed, workshops for rolling stock or permanent way material, shunting yards, loading bays and stores, offices).

- When housing requirements of employees and workers were considerable, quarters sprang up in which a significant number of railway servants resided.

Town-planning and urban policy factors that concerned city councils and local notables were normally the following:

- There was a noticeable impact on the status of the station as an outcome of whether there was agreement and collaboration, or disagreement and ignoring by the city council towards the rail company in respect of the arrival of the railway in a city.

- In those few cities where there was a project to expand the population, the extensions were in any case subordinated to railway routes. In other words, the logic of the state and the upper classes won out over local and middle-class logics. This, however, implied a long-term latent conflict in the most dynamic cities, where the railway constituted a barrier to expansion. Extension projects were drawn up, with few exceptions, keeping in mind the station's centrality and relevance as a node.

- In processes of urban change in existing city areas, the fact that the passenger building of the station was seen as a new focus of attraction in urban centrality led to the transformation of intermediate spaces (with the opening up new streets and urban projects involving demolition and replacement) to give material shape to the extension of the new centre.

- In growth on the edge of a city having nothing to do with centrality, it was understood that technical facilities and the tracks themselves were an urban limit for the city towards which working-class quarters or suburbs could spread.

2.2. The second historical phase: the apogee of railways and urban expansion

The second phase was a response to the combination of two different phenomena: on the one hand, the apogee of railways as a transport system, on the other, strong urban growth in demographic and geographic

terms. However, urban expansion occurred without municipal town planning or at best with plans that might or might not be fulfilled. It was mostly based on urban projects governed by municipal ordinances and involving new suburbs in the shape of the constitution of building lots and the springing up of shanty settlements on the outer edges of the city.

Factors arising from the railway changed little relative to the previous phase. Indeed, some of those mentioned here already began emerging earlier. They mostly refer to network consolidation and later mergers, in a context of extensive services, but also of railway crisis and obvious curbs on investment:

- The first electrifications and expansions of rail lines (double tracking), and of technical facilities in the light of functional difficulties and increased traffic. Some enlargements required repositioning because of a lack of space or external needs (such as new ports, added intersections, or marshalling yards).

- Mergers or take-overs of companies, but above all the creation of monopoly operators (RENFE in Spain in 1941; CP in Portugal in 1945) meant that some technical facilities acquired by the new integrated networks became redundant over the medium term. This demanded changes, more or less gradual, that adjusted the rankings of sheds and workshops, and repurposed stations, turning them sometimes into multi-use, sometimes into specialized, facilities.

- Stations were specialized only to the extent that the complexity of railways and of towns made it pressingly necessary, making them into passenger, goods, or technical stations. The first of these were more centrally sited, the others peripheral.

Town layout factors are decisive in understanding this phase, being generally far more impactful than railway factors. This is because disorderly urban growth, not properly planned but intentional, laid down guidelines that had strong long-term inertia:

- When city growth in the form of working-class districts got close to a rail line acting in its role as town limit, local authorities permitted urban expansion to the other side of the track. Even though

this lay inside the municipal bounds, it was considered to be the outskirts of the city, where municipal ordinances designed for the urban area might not be enforced. On the other side of the track, it was understood that there would be industrial, transport and storage activities, but also other possible uses, including residential. Urban growth was either unregulated or was governed by ineffective urban plans. The outcome was a predominance of a logic of piecemeal, sector-wise organization, with heterogeneous, sketchy projects and plans giving rise to urban discontinuity and fragmentation that highlighted the contradictions and discordances of an unequal city. Consequently, new residential districts sprang up in the decades around the turn of the century, without any provision of urban services, especially affecting the supply of drinking water and mains drainage. Apart from any densification of areas already in use, on the periphery various kinds of *workers' dwellings* came into existence. On the one hand, there was the dubiously legal splitting into building sites of farmland whose owners sold it off lot by lot so that the new owners could build their own makeshift homes in what were termed in Spain *núcleos de extrarradio* (outskirts settlements) and in Portugal, *correntezas* or *renques de casas térreas* (rows of one-storey houses) on the outskirts, or *vilas* (hamlets) when they had a more or less regular street layout. On the other, there were the pell-mell marginal occupations of unclaimed land by settlements of shacks and shanties, forming clandestine living areas. In this way, a long-term social profile of *the other side of the track* and further peripheral sectors in the city that were less accessible or of less worth became marked. When, decades later, public authorities promoted social housing or dwellings with some form of subsidy for the lower classes, the least valued periphery (especial beyond the rail track) was seen as an ideal location to turn into densely populated working-class districts.

- The springing up of inhabited areas on the other side of the track noticeably worsened the rail and urban question of crossings. There was the problem of lengthy closure times for level crossings, the problem that crossing points were the same in number as they had been at their origin in the nineteenth century, the problem of the poor

quality of what few flying or burrowing crossings had been built, and the long-term problem of the barrier effect of the railway on the city, acting in many cases as a social barrier.

- State regulation of working hours, moreover, forced major changes upon railway management of level crossings, as obligatory shift limits made costs rocket. Therefore, new state regulation emerged, even if hesitantly, regarding level crossings. This allowed a good number to be closed permanently, heightening the tracks' nature as a barrier, although giving rise to a clumsy and vacillating, but inevitable, policy of bridge or tunnel crossings.

2.3. The third historical phase: railway crisis and formal town planning

The second half of the twentieth century, and especially the third quarter, was a time of crisis for railways as they completely lost their role as the central pillar of the transport system and it was even questioned whether they had any function, except in commuter services around major cities. Railways lost prestige and transport customer share, as society became more motorized and road infrastructures were enhanced. In this context, town planning came into its own since it now had land-use legislation and effective planning tools. However, in a good few case it saw railways as merely a problem for a city.

From the mid twentieth century onwards, the factors involved that originated with railways were the following:

- Dieselization and electrification brought with them the gradual disappearance of steam traction between the 1930s and the 1970s. This led to a fair number of changes, among them new structures and reconfiguration of the maintenance and repair of rolling stock.

- The difficulties railways had in adapting to new forms of goods transport brought a need for a small number of large marshalling yards. Above all, a requirement arose to create new installations for parcel services and for container depots, as well as better connections to ports.

- The increasing complexity of railways and cities led to appreciable friction, although the greatest problems had to do with opposing interests and a lack of co-ordination between railway, port, and road policies.

- Toward the end of this phase, state rail enterprises gained a legal capacity to hold their own property. Unused spaces associated with the railway ceased to be in the public sector. They became the property, no longer of the state, but of the new denationalized rail businesses. These became urban agents, since they owned land and buildings, and sometimes even developers.

- Also, toward the end of this phase, railway policy took a new course from the 1980s onwards, with the change in image and direction that came with high-speed trains. There was a major stepping-up of commuter services and a beginning of a volatile, but strong and virtually unchallenged policy of installing high-speed lines, much more powerful in Spain.

Factors of city origin:

- Town planning now had available to it legislation on land use and on urban planning, management, and discipline. In Spain such matters were covered by the Law of 12 May 1956 and Royal Decree number 1346/1976 of 1976; in Portugal by Decree-Laws (roughly equating to Orders in Council) numbers 576/70 and 560/71. All these allowed greater public control of the urban characteristics of cities and of their growth.

- The first modern urban plans were approved. Town planning in general brought into question in some instances the very existence of a long-term presence of pre-existing lines where they crossed cities, envisaging their subordination to urban strategies.

- Over the short and medium term, town planning foresaw that because railways had extensive, sparsely occupied spaces it would be possible to transfer them out of rail use and dedicate them to other urban functions.

- Items of legislation for town-planning and for railways really began to mesh appropriately with one other only from the end of the twentieth century.

3. VARIOUS HISTORICAL ATTEMPTS TO RETHINK THE INTERRELATIONSHIP OF RAILWAYS AND CITIES

Railways imposed themselves upon the Spanish *proyectos de ensanche y urbanización* (projects for expansion and town-building) and the Portuguese *planos gerais de melhoramentos* (general plans for improvements) of cities throughout the nineteenth and early twentieth centuries. Cities were shaped by them, and there were often projects to provide an opening in the form of an avenue leading to the station, examples being found in Aveiro, Castelo Branco and Viana do Castelo in Portugal, or in Valladolid, Leon and Almeria in Spain.

In the decades around the turn of the nineteenth century, a number of high-profile rail structures were proposed, and to some extent constructed, in cities. On the one hand, there were the earliest multipurpose through stations, like Campanhã in Porto or San Bernardo in Seville. On the other, there were the first central stations. It was at this point that thought was given to the possibility of central stations in several major cities in the Peninsula. In 1891 the central station in Rossio was inaugurated, made feasible by a tunnel 2.6 kilometres long. In 1896, three tunnels with a combined length of 2.7 kilometres made it possible to have a central passenger terminal in Porto with lines running to the through station at Campanhã, the other terminus at São Bento not being inaugurated until 1916. In 1915 a central station central for Lisbon was planned at Cais do Sodré. In 1917 there was a proposal for the construction in Madrid of an underground passenger link between the Atocha and Príncipe Pío stations, with a central through station. In 1919 a new line from the French frontier to Algeciras via Madrid was proposed, which would require new through station in Madrid, and in 1928 an underground connection was suggested between Atocha and the direct line from Madrid to Burgos then under construction, also with a central through station. In 1928, Forestier similarly proposed a central station in his project for prolonging the Avenida da Liberdade associated with a new *Plano Geral de Melhoramentos* for Lisbon. In 1930, Zuazo and Jansen put forward for the *Plan de Extensión* for Madrid a prolongation of the Paseo de la Cas-

tellana with a north-south rail connection running underneath it and a station on land becoming available because of the transfer elsewhere of the Hippodrome.

In a second stage, between the 1920s and the 1950s, there were some slight advances in urban and railway matters. There was more modern town planning, if often based on wishful thinking. There were studies and projects relating to railways in cities, which in the outcome remained no more than proposals.

- On the one hand, there was legislation on town planning in Spain, the Royal Decree of 14 July 1924 which governed town-building projects variously termed *planes de ensanche*, *planes de extensión*, *anteproyectos de urbanización*, *planes generales de alineaciones* and *planes de reforma interior*. In Portugal, there was Decree-Law number 24802, of 21 December 1934, regulating *planos gerais de urbanização* (general plans for town development). These plans, like their predecessors, also sometimes proposed actions relating to railways that in the end had no practical consequences, such as central stations or rail connections. Examples of such cases were the plans for Olhão in 1944, for Lisbon in 1948, or for Palencia in 1957.

- On the other hand, some government preoccupation arose about handling the issue of rail networks in cities, giving rise to commissions and studies. In Portugal, an Order of 1928 set up a commission to study stations and rail connections in Lisbon and another Order dating from 1930 created a similar commission for Oporto. In Spain, a 1932 Decree established a *rail links* commission for Madrid, two further Decrees did the same for Bilbao and Barcelona in 1933, and yet another from 1934 covered Zaragoza. All these technical commissions were charged with solving railway problems while simultaneously attempting to provide satisfaction for urban issues. Each of these railway link projects had in principle the idea of arranging for a terminus station shared by all the companies involved, or in some cases a central passenger through station available for use by all companies, by means of a link line plan and the unification of services. The complexity in railway terms was considerable, since apart from the difficulty of arranging for link lines or connections between routes, there was also the matter of electrifications and the desire to

> open local commuter services. The complications at an urban level were also a weighty factor, with the numerous level crossings, pending urban conflicts and local ambitions to take over any rail lands that might possibly be declared surplus to requirements. It was not merely the problem of achieving consensus solutions, there was an even thornier difficulty in respect of the distribution of costs among the different bodies involved. In Portugal, the *Plano Geral da Rede Ferroviária do Continente* (General Plan for the Mainland Railway Network) of 1930 laid emphasis on rail connections with the sixteen most important commercial ports in the country, to some extent disregarding the question of rail links in cities.

The 1920s and 1930s also saw a worsening of the problem of level crossings. This was an outcome of the legal reforms to working hours after the International Labour Organization Conventions on Hours of Work of 1919 and on Weekly Rest of 1921. Organizing shifts for crossing guards became too burdensome for the companies, and this led them to reclassify all their level crossings with a view to closing many, replacing crossing guards with signals, or over the medium to long-term substituting overpass or underpass crossings. Some of the thousands of level crossings in existence gradually took on the status of serious problems as they were increasingly used, while state intervention was minimal, except in the case of the most important national highways. It was only from the 1960s onwards that this matter was really systematized and regulated, in Spain by the Decree of 20 September 1962, Decree 2422/78, Royal Decree 1211/1990, and Ministerial Orders on 1 December 1994, 30 March 1995 and 1 April 1998; in Portugal by Decree-Law number 39780 of 21 August 1954, Decree-Law number 156/81 and Decree-Law number 568/99. These pieces of legislation aimed at ensuring safety and gradually replacing level crossings with underpasses or overpasses. The seriousness of the problem slowly decreased in intensity, but the difficulty has always been there and still is.

Between the 1940s and 1960s, work was done in Spain on the topic of *Enlaces Ferroviarios* (Rail Links) within urban areas: an attempt to accommodate rail and urban interests in integrated projects. By the end of this period around a score of cities had been studied in this connection. Indeed, a Ministerial Order of 1944 decreed the constitution of a *Junta de Estudios de Enlaces Ferroviarios* (Board for the Study of Rail Links), which proposed general plans for such connections in cities until it was

dissolved in 1969. These were plans that took a fresh look at the rail system at the urban scale. However, agreement between the parties involved mostly proved well-nigh impossible, normally because of opposing views from city councils and from the train operator RENFE (the disagreements in Valencia, Cordova and Seville were particularly rumbustious). Things became even more complicated when their interventions in this work from port authorities, chambers of commerce, the National Road Authority, or others, striking examples being Coruña, Vigo and Bilbao. Some of the few plans for links that did proceed were the fruit of agreements between institutions, such as those in Alicante and Huelva. For the greater part, though, they either came to nothing or were imposed in piecemeal fashion through ministerial or government decisions taken in the light of the debates that occurred, as happened in Madrid, Barcelona, Seville, Bilbao, and Vigo. Projects for links strove to optimize the rail system, but to some extent in subordination to town-planning interests, so that they were designed to have the smallest possible impact on town plans. Attempts were made to specialize stations and even tracks, while some new passenger stations were projected, as may be seen by a 1970 publication from RENFE, *Los enlaces ferroviarios*.

In the 1970s these *Enlaces Ferroviarios* projects were continued by RENFE under the name *Plan de Enlaces y Redes Arteriales Ferroviarias* [Plan for Links and Arterial Rail Networks], but now sector by sector with specific consultation and with a certain degree of ministerial control. In the mid-1970s the expression used was just *arterial rail networks*, and this name continued in use for around twenty years more, even though in the 1990s the matter became a ministerial competence. The less than fortunate choice of name was no more than the result of an infelicitous copying of the concept of *arterial network* that had been applied to access roads and bypasses, and to the relationships between networks of cross-country highways and of streets within cities. The projects for arterial rail networks drawn up by RENFE responded to the purposes of rail rationalization. However, they did not override town planning, unlike what did happen with the plans for arterial networks of roads and highways, and they always lacked a legal basis and normal state funding. For this reason, very little progress was made.

The new democratic regimes that were set up in Portugal and Spain in the 1970s also brought considerable changes when it came to town planning. These were not so much matters of land-use standards and

planning as modifications in institutions and major interests. They were combined with pressures from democratic town councils to introduce urban planning that would aim at social and spatial equity and equilibrium, this requiring that greater attention to be paid to the more modest districts. Social demands began to find a local channel in the form of urban plans. Rail infrastructures were often seen in this context as a problem. Hence, many town plans from those years envisaged deep-seated changes in relation to the railway.

4. CONCLUSIONS: THE LONG-TERM FORMING OF THE IDEA OF RAILWAYS AS PROBLEMS

In their initial phase, the state's logic about railways, as an outcome of their colossal role in land communications, was almost always imposed in preference to any local logic. During a second phase, as cities grew, urban problems in relation to the tracks settled in as a feature, while simultaneously town-planning concerns regarding central stations, specialized stations and Rail Links became prominent.

To the extent that an infrastructure delivers a major service to a population, its inherent problems are understood to be compensated for by the utility it provides. General opinion about the public service offered depends on its quantity and quality as much as upon its social usefulness. There are great differences between lines with several hundreds of trains daily and those with a dozen or so, nor is a track for long-distance trains the same as a commuter line, nor should a route with stops and services be equated to a line that merely passes through. Thus, in an era in which the car had become king and in areas where the use of trains was already limited to a small minority, if it had not been practically marginalized, social appreciation of railways came to be very slight, so that all that was left was the view of them as problems. A bypass road can cause as many problems as a railway in town-planning and environmental terms, or, indeed, more. However, railways have always borne two symbolic burdens. On the one hand, there was their urban role as a physical, and frequently also a social, barrier, with striking differences highlighted between one side and the other of the tracks in respect of uses, socio-economic status, urban fittings, and the like. On the other, they had often lost functionality and hence any positive regard by the population.

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