

Inventing ‘infrastructure’: tracing the etymological blueprint of an omnipresent metaphor

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Abstract

‘Infrastructure’ is an omnipresent term in everyday English language and social theories. More than a word, it encapsulates a sociotechnical imaginary that has percolated in science, technology, politics, arts and humanities. Yet, our understanding of the history of this spatial and technological metaphor is patchy, based on repeated chronological mistakes and conceptual misunderstandings. To put it bluntly: we do not know how the word came to be. This article proposes to critically challenge the concept of infrastructure by establishing its etymological history. It traces how the word appeared in nineteenth century France and its association to engineering, architecture and archaeology; how it was transformed by socialist circles in the 1890s; how it then became the spatial metaphor of a modernist political project in the first half of the twentieth century; and eventually entered the English language at the end of the 1940s.

Keywords: infrastructure; sociotechnical imaginaries; France; metaphor; Saint-Simonianism; materialism

‘Original forms of thoughts introduce themselves: their history is the only form of exegesis they can bear, and their destiny the only form of critique.’¹ Michel Foucault, ‘Introduction’ in Ludwig Binswanger *Le Rêve et l’Existence* (1955 my translation)

‘Infrastructure’ is a powerful, omnipresent word. A technical jargon apparently borrowed from development economics, the *Oxford Dictionary* defines it as ‘The basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise.’ Comedian John Oliver (2015) adds wittingly that ‘infrastructure [is] basically anything that can be destroyed in an action movie.’

‘Infrastructure’ is a popular expression because it is evocative: it encapsulates modernity—the association of capital, statal project, and technology. Arguably, we collectively share a networked imaginary where our social and economic structures rest on a series of interdependent systems that enable them to function: the roads and rail tracks that bring us to work in the morning, the internet and mobile networks that allow us to watch Netflix on our laptops, our power-grids and water pipes.

‘Infrastructure’ has morphed to become sociotechnical metonymy. This metonymic might is why the Morandi Bridge collapsing in Genoa was not only the tragic downfall of a bridge but also that of an Italian national myth (Mattioli, 2019).

¹ All texts from French are my own translations. The same applies to the scarce Italian references that I use. In my translations, I have privileged faithfulness to style, and I have done my best to stick to the original punctuation, capitalisation, formatting and emphasis. Original citation: ‘Les formes originales de pensée s’introduisent elles-mêmes : leur histoire est la seule forme d’exégèse qu’elles supportent et leur destin, la seule forme de critique.’

This metonymic might is why the screenwriters for Hollywood ‘blockbuster’² movies never miss a chance to burn down roads, bridges, dams, levies, airports, power-grids (Keane, 2006). Infrastructures are symbols and supports of social imagination. They are myths that act as signs (Barthes, 1957).

Today’s critical approach to infrastructure in social theories has its intellectual roots in the literature of the 1980s-1990s: in science technology and society studies (Bijker, Hughes, & Pinch, 1987; Castells, 1989, 1996; Latour, 1991, 1992; Latour & Hermant, 1998), in the question of ‘artefacts as politics’ (Winner, 1980) and in the study of ‘information infrastructure’ (Bowker, 1994; Bowker & Star, 1999; Bud-Frierman, 1994; Edwards, 1998; Neumann & Star, 1996; Star, 1999; Star & Ruhleder, 1996). In a parallel journey that took place in architecture critique on one hand, history of architecture, engineering and technology on the other, the concern for infrastructure arose from a focus on the engineer as designer and urbanist (Banham, 1988; Bucciarelli, 1994; Picon, 1992a, 1992b). In the disciplines concerned with ‘space’, the concept of infrastructure gained momentum in the 2000s-2010s as scholars critiqued the ‘modern infrastructure ideal’, the failures of ‘black-boxed’ networks, and the ‘symbolic power’ of infrastructure (Coutard, 1999; Graham & Marvin, 2001; Kaika & Swyngedouw, 2000). Academics also analysed infrastructure in relation to ‘social imagination’ (Picon, 2007, 2018) and read it as ‘poetics’ (Larkin, 2013). An ‘anthropology of infrastructure’ has focused on the relation to human experience and social practice, and even on

² The *Oxford Dictionary* also teaches us ‘blockbuster’ is a term the English language inherited from WWII. A blockbuster is a bomb so powerful it can raze a whole neighbourhood to the ground.

‘people as infrastructure’ (Hall, King, & Finlay, 2017; Simone, 2004) by ‘foreground[ing] the urban backstage to reveal the sociality of roads, pipes, cables, broadband, code and classification and the enrolments of the sociotechnical systems that they are part of’ (Amin, 2014, p. 139). This literature has mostly, but not solely, focused its research on the Global South, looking for instance at sanitation, negotiated access to infrastructure, and mechanisms to cope with the lack or absence of infrastructure (Amin, 2014; Björkman, 2015; Gandy, 2014; Maringanti & Jonnalagadda, 2015; Renu, McFarlane, & Graham, 2014; Silver, 2014; Simone, 2015; Trovalla & Trovalla, 2015).

As an anecdotal yet revealing evidence of the momentum it gained in English-speaking social sciences over the last two decades, one can observe the number of occurrences of the word ‘infrastructure’ in the programmes of the American Association of Geographers’ (AAG) annual meetings—arguably the largest gathering of geographers and other social scientists interested in space: it increased from 7 mentions in 2001 to 162 in 2019 (American Association of Geographers, 2001, 2019). A concept that had barely emerged two decades ago is now omnipresent.

And yet, we barely know how the word came to be. We do not know how it was born. We barely know when. We have no critical understanding as to *why* it emerged. We live in an ‘infrastructural age’ (Steele & Legacy, 2017) but there is no comprehensive research on the word’s etymological, cultural and critical journey(s). The most ambitious contribution on this topic is Ashley Carse’s keyword essay on infrastructure (Carse, 2017), inspired by Raymond Williams (1976). Carse’s research offers an invaluable input into our understanding of ‘infrastructure’, proposing an intellectual and etymological introduction to the concept, taking his reader from its origins to present-day social theories. ‘Infrastructure’, writes Carse after Uwe Pörksen’s concept (Pörksen,

1995), ‘might be characterized as a *plastic word* that has been stripped of its former specialized meaning and can now fit nearly any circumstance. Seen in this way, the term’s vagueness is not a weakness, but central to its utility in a wide variety of projects.’ (Carse, 2017, p. 28 my emphasis) But Carse’s essay only touches on the word’s emergence in 1880s France, focusing mainly on its introduction to the English lexicon from the 1950s onwards, without establishing with precision when, how and why the word came to be.

In this essay grounded in social theories, I aim at building on previous works—such as Carse’s keyword paper—to enrich an overlooked debate on the concept and the very word of ‘infrastructure’ in order to learn what its origins and journey into English could teach us about our critical understanding of modernity. I will do so by explaining how the word appeared in nineteenth century France as obscure jargon at the crossroad of finance and engineering; how socialist circles elevated it to a metaphor at the turn of the century; and how it morphed once again to become a successful concept in the first half of the twentieth century before entering English in the wake of World War II (WWII). To do so, this paper will explore etymology, semantics and translation in French and English, with short detours in Italian and German. Using digitised corpora of texts, namely the Google Books database³ and the digital platform of the Bibliothèque Nationale de France (France’s National Library),⁴ it will review a large selection of occurrences of ‘infrastructure’ that appeared from the 1850s until the 1960s

³ Google Books is available at <https://books.google.com/>. In October 2019, Google declared they had recorded 40 million books in 400 languages. See Google (2019).

⁴ The Bibliothèque Nationale de France holds France’s legal deposit. As of February 2020, its digital library, Gallica, held 6 million scanned documents. See Gallica (n.d.).

in the French language. It will cross-reference these occurrences with contemporary texts on engineering, social sciences, policy and politics with a focus on Marxist thought. At the core of this paper is the hypothesis that ‘infrastructure’ became the rich concept we understand today from the odd meeting of socialism, railway expansion, engineering and capitalism.

'infɹəstrʌktʃə: a calque word from French to English

Fourteen letters and nine consonants. The word’s pronunciation, in English especially, is so difficult that the Internet offers countless video tutorials explaining how to correctly go about enunciating 'infɹəstrʌktʃə. (Accent’s Way English with Hadar, 2017; Collins A-Z, 2017; Superholly, 2018) Despite these hurdles, the complexity of its pronunciation is inversely proportional to the word’s ubiquity.

‘Infrastructure’ is a *calque* from French. According to the *Oxford Dictionary of English Grammar* a calque, or loan translation, is ‘An expression adopted by one language from another in a more or less literally translated form.’ (2014) It belongs to a long list of words, that includes technical terms, borrowed from French and brought into the English lexicon in the early twentieth century—such as ‘limousine’, ‘fuselage’, ‘supersonic’ (Schultz, 2012). Infrastructure does not have the ancient history of apparent synonyms like ‘network’ (sixteenth century in English, fifteenth century for the French *réseau*). Nor was it invented to name a new technological invention such as the computer: *ordinateur* in French but often a calque word in other languages, e.g. *computadora* in Spanish, *computer* in Dutch and German, *компьютер* (‘komp’yúter’) in Russian.

As a calque, ‘infrastructure’ exists in pretty much the same form and same meaning in an endless list of languages across different families, most especially Indo-

European. A few examples (with no ambition for exhaustivity): *Infrastruktur* (German), *infraestructura* (Spanish), *infrastruttura* (Italian), *infrastructuur* (Dutch), but also *инфраструктура* ('infrastruktura', Russian). And of course, *infrastructure* in French.

At the outset, one can emit three hypotheses when considering this similarity across different languages. (a) That 'infrastructure' is a recent word ; (b) that 'infrastructure' is a technical term that was transmitted across languages via technical and specialist literature; (c) that it was adopted extremely quickly (decades, if not years) by these different languages and via very specific semantic channels (e.g. an industry, a political network, a trade—which indeed takes us back to the second hypothesis).

Figures 1 and 2 illustrate the popularity of 'infrastructure' (and its translations listed above) in German, French, Italian and English from 1800 until 2000. The data is extracted from Google Books database and represent trends in the use of a given word or expression across time in a given language.⁵ Figure 1 represents the data from 1800 to 2000, Figure 2 focuses on a period from 1800 to 1950.⁶ Before the 1880s, the word is quasi invisible across these languages. The scattered surges observable before that

⁵ On the relevance of Google Books database and digitised text corpora, see Sparavigna and Marazzato (2015); Michel et al. (2011).

⁶ The data was extracted in August 2019 and reviewed in April 2020. The data was extracted from Google Books NGram Viewer (<https://books.google.com/ngrams>). The search performed was case-sensitive and with a smoothing of '0'. The terms searched were 'infrastructure' from the corpus English (2012), 'infrastructure' from the corpus French (2012), 'infrastruttura' from the corpus Italian (2012) and 'Infrastruktur' from the corpus German (2012). The data was then extracted following the method presented in Filter (2017). The softwares Numbers version 10.0 (6748) and Adobe Illustrator 24.0.3 were used to clean and visualise the data in a diagram.

decade are mainly anomalies: for instance, the spike in German in the 1870s is due to one occurrence in a 1873 book. Looking closely, it appears the book was published in 1973, and not 1873: a simple database error. The term ‘*infrastructure*’ clearly takes off from the 1880s onwards in French. Its progression and popularity remain fairly modest—though much more used in French than in any other languages—until the 1940s where the data reveal a steady and quick progression throughout the 1940s, 50s and 60s. The German tongue appears to adopt ‘*Infrastruktur*’ in the 1950s whilst the English language makes it its own from the 1960s onwards.

Google Books data offers an interesting insight into the journey of ‘*infrastructure*’ and its variants across these different languages. Yet, the demonstration has its shortcomings, the most important one being that it does not reveal the *meaning* of *infrastructure* across time and tongues.

It is usually assumed ‘*infrastructure*’ enters the English language in 1927. Several reference dictionaries such as the *Oxford English Dictionary* mention that date and so do most authors who have traced the etymology of the word. As Carse explains, this is a first mistake (Carse, 2017, p. 29). ‘*Infrastructure*’ is used in English-language publications dating back to at least 1879, referring to railway projects in France and Spanish-speaking countries. Yet, throughout the nineteenth century and first half of the twentieth century, the term remains extremely rare in English. It is rare even amongst the specialised literature dedicated to railway, and it is but inexistent in general English. This absence is confirmed by the Google Books data presented earlier, and by searches in the Library of Congress and the British Library that return anomalies or no results. Most importantly, its meaning and its use are circumscribed to administrative law and civil engineering, far from its present-day definition.

According to Carse, ‘infrastructure’ only entered a general English dictionary in 1963 (the *Webster’s Seventh New Collegiate Dictionary*), seventy-seven years after its first feature in a French reference dictionary (Carse, 2017, p. 33; for the first entry in a French dictionary, see Littré & Devic, 1886). Also, its meaning had started a metamorphosis from a very precise word used by engineers and financiers, to the rich, equivocal and ubiquitous concept it has become today. It is the journey of this intellectual transformation that this paper will now study, for this journey has so much to tell about how we built the modern sociotechnical imaginaries that animate us today.

First stop: railway and capitalism in 19th century France

The birth of ‘infrastructure’ took place in two steps. The concept came first, the word only second. On 11 June 1842, King Louis Philippe of France signed a bill of law to stimulate the expansion of railway across the country and indeed Europe. France was lagging well behind the United Kingdom, whose railway industry was thriving, emboldened by the Railway Mania (Robb, 1992; Davies, 2015; for the bill of law see Royaume de France, 1842).

The bill delivered what we would call today a strategic design for the expansion of railway across France, listing out the connections to be built in the coming years. The star-shaped design with Paris in its centre, known as ‘étoile de Legrand’, still organises France’s railway network today.

More than the expression of a spatial project, the bill also looked at addressing what was then perceived as the biggest handicap for French railway expansion: money, or lack thereof. The bill did so by devising an interesting double dichotomy, above/below and private/public, here to stimulate the financing and building of new railway lines. Indeed, the bill decreed that the State and local authorities would bear the

following costs: land acquisition, levelling, erection of bridges and opening of tunnels. On the other hand, private operators were to pay for the installation of railway tracks, the cost of exploitation and maintenance, the purchase and repair of rolling stocks. In a nutshell: the cost of what sat *below* the railway tracks was to be borne by the ‘public sector’ (please forgive this anachronism), the tracks and what sat *above* was the domain of private actors.

The law of 1842 was but the tip of a steamy iceberg. Since the 1820s and the successful coupling of railway and steam technologies—the premise of a revolution in rail transport—the financing, modes of exploitation, maintenance of railway lines had led to heated debates amongst intellectuals, politicians and industrialists (see for instance Cronier, 1847; Proudhon, 1845; Chevalier, 1852a). The development of railway brought fundamental economic and political challenges—which to a certain extent remain debated today—on profitability, the possibility of balancing the cost of construction and the cost of exploitation, but also on the statute of railway workers, their rights and duties, etc. At the core of this complex discussion was the issue of *if* and *how* should the State intervene.

As commentators started to understand the revolutionary impact of modern railway on humanity’s relationship to space and time, debates became all the more ardent. ‘A modern philosopher has said *The golden age that some blind tradition had located in the past is indeed ahead of us*’⁷ writes prominent intellectual and political figure Michel Chevalier (1806-1879) in his economy class at Collège de France in

⁷ Original citation: ‘Un philosophe moderne a dit : *L’âge d’or qu’une aveugle tradition avait mis dans le passé est devant nous.*

1852, quoting Henri de Saint-Simon without directly mentioning his name. On the socio-spatial impact of railway, he adds:

The European will have an estate in New Zealand or Australia, the same way 200 years ago a French lord had land in Provence and an English baron a castle in Scotland. Two friends, parting in Paris, will set their next meeting in Calcutta or Mexico, without finding this the least extraordinary. [...] From Rome to Edinburgh, we will be neighbours. [...] And the wise will understand that instead of being shrunk and belittled, our planet will then be fecundated.⁸ (Chevalier, 1852b, pp. 13–14)

To fully grasp the historical context, it is also crucial to bear in mind that this technological invention and the debates on its development and implementation took place within an ebullient ‘long’ 19th century: between 1800 and 1870, France would go through seven different political regimes (namely three republics, two empires, two monarchies). Countless political-cum-philosophical movements, sects and factions emerged and fought—metaphorically and often physically. Amongst them, the immensely influential followers of Saint-Simon.

Saint-Simonianism was a complex intellectual movement born in the first half of the 19th century. Named after Henri Vouvroy de Saint-Simon (1760-1825), its core

⁸ Original citation: ‘L’Européen aura une propriété dans la Nouvelle-Zélande ou l’Australie aussi naturellement qu’un seigneur de la cour de France avait, il y a 200 ans, une terre en Provence ou un baron anglais un château en Ecosse. Deux amis, en se séparant à Paris, se donneront rendez-vous à Calcutta ou Mexico, sans que cela paraisse extraordinaire. [...] De Rome à Édimbourg, on voisinera. [...] Mais le sage pensera qu’au lieu d’avoir été rapetissée et ravalée, notre planète aura été fécondée.’

ideology rested on the belief that technological progress would change society for the better, bringing happiness, emancipation and freedom. Saint-Simon's thought is commonly identified as a form of utopian socialism with its intellectual foundations in 18th century French materialist philosophy. After Saint-Simon's death, the movement stemmed into different sects—including an influential church led by Prosper Enfantin (1796-1864)—that promoted varied readings of Saint-Simon's thought. Karl Marx (1818-1883) and Friedrich Engels (1820-1895) considered Saint-Simon as one of the most influential intellectuals of socialism (see for instance Engels, 1908, pp. 56–64). Yet, somehow confusingly (from our contemporary point of view), the Count of Saint-Simon was also the flagship thinker for proponents of free-trade and capitalism. In various forms, and borne by miscellaneous stakeholders, Saint-Simon's ideas were significantly present in 19th century Europe and especially France, most especially amongst its elites (engineers, economists, intellectuals, capitalists), those that were not yet called *technocrats*.

Amongst these foremost figures of Saint-Simonianism were Emile (1800-1875) and Isaac Pereire (1806-1880). The Brothers Pereire were then some of the most powerful bankers in Europe and key actors in the railway industry, in France and abroad (Vajda, 2008; Davies, 2015). In an 1857 epic competition between Europe's most powerful bankers and politicians, the syndicate they led won the mandate to found Russia's main railway company. For historian Alfred Rieber, in typical Saint-Simonian fashion, the Pereires' ambition was not all about money.

Correspondence from the private banking archives of the Pereire and Hottinguer firms make clear that [...] the French bankers' motives were not to make a quick killing on international money market [...]. As Isaac Pereire wrote to his brother in

July 1856: ‘We are going to develop a virgin territory whose hinterland, to some degree unexplored, contains enormous natural resources. It is only necessary to link up the productive centres with the ports of the country in order to extract products which will spare Europe from (any) scarcity.’ Railroads would bring Russia into the mainstream of European civilization. (Rieber, 1973, p. 380)

In classic materialist Saint-Simonian fashion, the Brothers Pereire had linked capital, technological achievement and the progress of humankind. There was a political and civilizational project embedded in financing and eventually laying the tracks of European railways.

The legal document signed between Alexandre II of Russia and the consortium led by the Brothers Pereire, that marked the foundation of the Great Company of Russian Railways in January 1857 used for the first time the term *infrastructure* and the dualism *infrastructure/superstructure*. This is the first ever mention of *infrastructure* I could find in French and it espouses the definition established in 1842. The second article of this Russian railway company states that:

Art. 2

The concession for the railway from St Petersburg to Warsaw includes the land, the levelling and the bridges and tunnels [*ouvrages d’art*]⁹, the *infrastructure* and the *superstructure* of the railway tracks with their associated products such as the buildings and stations, loading and unloading bays, constructions at venues of arrival and departure, surveillance booths, rolling stocks, providing of fuel and

⁹ *Travaux d’art*, literally translated as ‘works of art’ is a very difficult term to translate faithfully in English. It describes all engineering feats in the building of roads, railways, etc. It mainly refers to bridges and tunnels.

other materials, mobile and immobile machines, locomotive, carriages, tools, in such a quantity and in such a state that they will be ready for the opening of the railway connection without further delay.¹⁰ (*Grande société des chemins de fer russes. Documents officiels*, 1858, p. 11— my emphasis)

One notices here that the Pereire consortium fully replaced the Imperial Government in the provision of both infrastructure *and* superstructure. The same year,¹¹ a newspaper used for the first time the word ‘infrastructure’ to report the creation of the Russian Railway Company (Janets, 1857).

This dualism between what is below the railway and funded by the State, and what sits above and financed by private actors established in the law of 1842 now had acquired names of their own: *infrastructure* and *superstructure*. Rarely used and never applied to railway before, ‘superstructure’ is a term that had existed since the 17th century. In French and in English, it describes the superfluous element of a building, a play, a book and is used by Voltaire in 1764 for instance. On the other hand, I have

¹⁰ Original citation: ‘La concession pour ce qui concerne le chemin de Saint-Pétersbourg à Varsovie comprend les terrains, les terrassements et les ouvrages d’art, l’infrastructure et la superstructure de la voie de fer avec leurs dépendances immobilières et mobilières, telles que bâtiments des stations, places de chargement et déchargement, constructions aux lieux d’arrivée et de départ, maisons de gardes et de surveillance, avec leur matériel et mobilier, approvisionnement de combustible et autres matériaux, machines fixes et mobiles, locomotives, wagons, outillage en telle quantité et tel état qu’ils se trouveront à l’époque de la remise du chemin de fer à la Compagnie et sans en rien distraire.’

¹¹ The official document quoted above is published in 1858 but written and signed in January 1857.

found no evidence that ‘infrastructure’ existed, at all, and in any form, before this mention in 1857.

This discovery brings two fundamental questions that I have not been able to answer for now: amongst the redactors of this contract, who coined this term? And why? There is also a small possibility that the term came from Russian. At this stage of the demonstration, it is also interesting to note that, the opposition infrastructure/superstructure does not come from engineering *per se*, but from its financing. Infrastructure is the invention of financiers invested by an industrialist utopia, not that of engineers.

Within a few years, the word blossomed. By the 1870s, it had become a staple vocabulary to describe the nexus State/capital/engineering. Most commonly described as a term of civil engineering, it would have been more accurate to refer to infrastructure as pertaining to financing and administrative law. I have also studied the syllabi and students’ notes of the School of Bridges and Roads—France’s principal school for engineers and civil servants in charge of designing and delivering railways—and could not find any mention of ‘infrastructure’ until the late 19th century. Again, this absence tends to confirm the term was not one initially cherished by engineers, but one carried on by administrative law, economics and finance.

Infrastructure entered the *Littré* dictionary in an 1886 *supplément* to the reference glossary whose first volume had been published in 1863. The publication front cover mentions that the 1886 supplementary volume to the dictionary ‘Holds a

great number of terms of the arts, science, agriculture etc. and all kind of neologisms illustrated with examples.’¹² *Infrastructure* is defined as:

Term of civil engineering. Name given to the land, the levelling work and highway structure [*travaux d’art*] of a railroad.¹³ (Littré & Devic, 1886, p. 200)

Subsequently, a *Dictionnaire Législatif et Réglementaire des Chemins de Fer* [Legal and Reglementary Dictionary of Railways] published in 1887 gives a more exhaustive definition whilst also clearly introducing the complementary notion of *superstructure*.

1° infrastructure

Land purchase;

Levelling work;

Bridges;

Railway line guard’s house;

Level crossing, paving, fences.

2° superstructure

Ballast, support, railway tracks;

Track installation;

Fences of all kind [...];

Buildings of all nature for exploitation; stations, workshops, etc;

¹² Original citation: ‘Supplément renfermant un grand nombre de termes d’art, de science, d’agriculture, etc. et de néologismes de tous genres appuyés d’exemples.’

¹³ Original citation: ‘Terme de génie civil. Nom donné aux terrains, aux terrassements et aux travaux d’art d’une voie ferrée.’

Telegraph, signals, mileposting..., etc.¹⁴ (Palaa, 1887, p. 741)

Within a few years, the term *infrastructure* had also started to appear in publications related to architecture and archaeology—then considered a single discipline (Alonzo, 2018, pp. 103–107). It was used in a literal and non-metaphorical way to describe the foundation or buried structure, man-made or natural, of an edifice, a building, or any structure like a cave, or a monument (e.g. Société languedocienne de géographie, 1890, p. 131; *Revue archéologique*, 1893). Novelist Jules Verne, one of the ‘Father of Science Fiction’, also used the term in the same way, in *Le Château des Carpathes* (1892) and *L’Île à hélices* (1895).

The journey of ‘infrastructure’ could have stopped there: a useful yet highly specialised term whose relevance was circumscribed to engineers, architects, civil servants and investors. Yet, in the late 1890s, the jargon tinged with Saint-Simonianism escaped its fate to reach a whole new audience.

Take a left turn: historical materialism and socialist literature transform ‘infrastructure’

In 1859, Karl Marx published *Zur Kritik der Politischen Ökonomie* (Marx, 1859).

Today, most commentators agree that, with the notable exception of the preface

¹⁴ Original citation: ‘1° *Infrastructure*. Acquisitions de terrains ; Terrassements ; Ouvrages d’art ; Maisons de gardes et de cantonniers ; Passages à niveau, pavages, barrières. 2° *Superstructure*. Ballast, supports, traverses, rails ; Pose de la voie ; Clôtures de toute espèce [...] ; Constructions de toute nature se rattachant à l’exploitation ; bâtiments de gares, ateliers, etc. ; Télégraphe, signaux, poteaux kilométriques..., etc .’

dedicated to historical materialism, this opus is a minor work mostly because all of the research presented in 1859 was reworked, rewritten, enriched and eventually published from 1867 until 1894 in Marx's magnum opus *Das Kapital* (Marx, 1867, 1885, 1894). In Europe, Marx's reputation as a leading political and intellectual figure had grown, slowly yet steadily, as translations of his work were released (Marx, 1872, 1879, 1887; The Capital was published in 1872 in Russian and French, in 1879 in Italian, in 1887 in English. — Resis, 1970). In France, the German thinker was initially commented amongst economists before truly emerging posthumously as a foremost intellectual in the 1890s. From 1895, his reputation grew beyond economics. Then, French intelligentsia and especially the new discipline of sociology, became mainly interested in Marx's conception of history (Cahen, 1994, 2011).

Marx's understanding of *historical materialism* is presented in a clear, short and compelling argument in the preface of his 1859 book. In a few words, it is the idea that an economic and technological *base* or *foundation*, shapes the politics and ideology of a *superstructure*. It clearly traces a relationship between technological or material elements and social consciousness. In Karl Marx's words:

The general conclusion at which I arrived and which, once reached, became the guiding principle of my studies can be summarized as follows. In the social production which men carry on they enter into definite relations that are indispensable and independent of their will; these *relations of production* [*Produktionsverhältnisse*] correspond to a definite stage of development of their material powers of production. The sum total of these relations of production constitutes the economic *structure* [*Struktur*] of society—the *real foundation* [*die reale Basis*], on which rise legal and political *superstructures* [*Überbau*] and to which correspond definite forms of social consciousness. (Marx, 1904, p. 11 — my emphasis)

There are several key terms in Nahum Isaac Stone's (1873-1966) first English translation of this text that I have highlighted and put next to the original version in German: most especially '*Struktur*', '*reale Basis*', and '*Überbau*'. They are key terms to bear in mind.

When the second edition of *Zur Kritik der Politischen Ökonomie* came out in German in 1897, the work of Marx was in high demand (Marx, 1897). Two translations in French based on the second edition would be published in 1899 and 1909 (Marx, 1899, 1909). None of them used the term of *infrastructure*. Yet from the late 1890s onwards and throughout most of the 20th century, the denomination *infrastructure* vs *superstructure* became a convention of French Marxist semantics (whilst English-speaking scholars would prefer the much more accurate base vs superstructure). From Henri Lefebvre (e.g., 1934) to Louis Althusser (e.g., 1965), all francophone students of Marx embraced the semantical canon of *infrastructure* and *superstructure*. Michel Foucault, in an interview with Paul Rabinow, explained how 'in our student days, people of my generation were brought up on these two forms of analysis—one in terms of the constituent subject, the other in terms of the economic, in the last instance, ideology and the play of superstructures and infrastructures' (Foucault, 1984, p. 65).

In their 1982 *Dictionnaire Critique du Marxisme*, Labica and Bensussan set the record straight: for the *infrastructure* entry they note it is 'unused' and 'rare': 'This word whose extension took place well after Marx and Engels, is not a concept of the

theory. See: Base.¹⁵ (Labica & Bensussan, 1982, p. 596) And they write in the definition of *base*:

One should not prefer *infrastructure* [to basis], following the economics tradition that has prevailed rapidly and durably and whose perceived reciprocity with that of superstructure leads one to lose that there is an internal homogeneity to the structure, between base and superstructure, that should not be limited to simple causality.¹⁶ (Labica & Bensussan, 1982, p. 93— original emphasis)

While no contemporary translation of Marx’s theory of historical materialism in French ever used the word *infrastructure* to translate the German *Basis*, French students of Marx—followers or contradictors—have, throughout the 20th century adopted *infrastructure* to discuss what would become one of the key concepts of one of the key theorists of this century. This term, infused with the utopian socialism of Saint-Simon, had metamorphosed dramatically to become a topos of Marxist literature. It is also worth noting that at the time, its literary value was almost immediately disputed—was Marx’s *infrastructure* to be considered literally or metaphorically? Back to this paper’s principal concern: if none of Marx’s translators ever used *infrastructure* as a translation for *Basis*, then who did? And what impact does it have on the construction of a

¹⁵ Original citation: ‘Ce mot dont l’extension est bien postérieure à Marx et Engels, n’est pas un concept de la théorie. *Voir* : Base.’

¹⁶ Original citation: ‘Il ne convient donc pas de préférer [à base], avec la tradition économiste qui prévaudra rapidement et durablement dans le marxisme, le terme d’*infrastructure* dont l’apparente réciprocité avec celui de superstructure fait perdre de vue qu’il y a une homogénéité interne à la structure, entre base et superstructure, qui ne se laisse pas réduire à la simple causalité.’

modernist performative metaphor where technological networks shape and support social groups?

The meaning of *infrastructure* changed abruptly in the 1890s. Over the course of two years and a handful of articles, all directly written or bearing the mark of one individual, the term *infrastructure* was transformed to reach a new purpose. As I mentioned earlier, the French intelligentsia's focus in the 1890s was mainly on Marx's theory of historical materialism. Yet, a key text was missing. The preface of *Zur Kritik der Politischen Ökonomie* was not available in French until its first translation published in 1899. The debate was fuelled by French commentators—for instance the 1895 lecture delivered by Jean Jaurès (1859-1914) with a response by Paul Lafargue (1842-1911) (Jaurès & Lafargue, 1895)—and what they knew of Marx and Engel's work (via translations, original texts in German, correspondence with Marx, Engels or their relatives, pamphlets, etc.). Across the Alps, historical materialism was all the rage in Italy where scholars of importance, such as Antonio Labriola (1843-1904) and Benedetto Croce (1866-1952) had published a series of books and articles on this topic. (E.g. Labriola, 1896a; Croce, 1898, 1900)

Socialist circles across Europe were well connected, even more so for Italy's and France's. When Labriola published *Del materialismo storico. Dilucidazione preliminare* with Loescher in Rome in 1896, the book was instantly read and commented in France, and a translation was ready within a few months (Labriola, 1896a, 1897). The book had a significant intellectual impact, and was read far and wide, well beyond the usual socialist coterie (Cahen, 2011). In the French translation of Labriola's book we find several occurrences of '*infra-structure*' (Labriola, 1897, p. 182) and '*infrastructure*' (Labriola, 1897, p. 172). One cannot help but notice the different

spellings. Typographical errors were not uncommon in the socialist literature at the time, published very quickly and with limited means. Yet, this irregularity would tend to reinforce the idea of a peculiar word whose spelling had not reached its final state. Furthermore, *infrastructure* was not used to actually translate the Italian *infrastruttura*, but instead *sottostrato*, more accurately translated as ‘substrate’. Therefore, the choice of Alfred Bonnet (1866-1933)—both publisher and translator—to go for *infrastructure* was not justified by the Italian text, instead he demonstrated some creative licence in the matter. A trail of evidence seems to demonstrate his licence had been inspired by his influential friend and colleague: Georges Sorel (1847-1922).

In 1897, Sorel was a leading personality of French Socialism and a peculiar figure in the French intellectual landscape. A self-taught theoretician and ‘erudite polymath’ (Sand, 1985) also mocked as a ‘queer thinker’ (Gianinazzi, 2007, p. 92), Georges Sorel had resigned from the Civil Service in 1892 and had emerged out of nowhere as an atypical figure of socialism. Sorel is especially interesting to us, because of his training and professional career. A graduate of the School of Bridges and Roads and École Polytechnique, Sorel spent most of his career as civil servant delivering and managing railways. Furthermore, his biographer Pierre Andreu (1909-1987), in an effort to understand how he acquired his acute understanding of socialism, went to look at the list of books he borrowed at the municipal library of Perpignan from 1884 until 1891, his last posting. He could not find any reference to socialism: only books on architecture and archaeology (Andreu, 1953, p. 43). At this point of the demonstration, we can therefore safely assume that Sorel was familiar with the term *infrastructure*, from his experience with railways, and his readings in architecture and archaeology—the only three disciplines where the term was used at the time.

By studying a series of writings Sorel published between 1895 and 1897, we can witness how he ‘metaphorised’ *infrastructure* and effortlessly brought it into socialist parlance, where it became a canon of Marxism and social sciences. We find *infrastructure* used by Sorel:

- (a) in a sequence of articles published in socialist journal *Le Devenir Social* (Sorel, 1896a, 1896b), including a critical review of Labriola’s book on historical materialism (Sorel, 1896c);
- (b) in a first excerpt of Labriola’s book published in the same periodical (Labriola, 1896b);
- (c) and last but certainly not least we find multiple occurrences of *infrastructure* in the foreword written by Sorel in December 1896 to the French translation of Labriola’s book translated and published by Bonnet (Sorel, 1897).

Yet is it probably the very first occurrence of *infrastructure* under the quill of Georges Sorel, in 1895, that I find the most enlightening. In a critical review titled ‘The Theories of Mr. Durkheim’, Sorel used *infrastructure* to describe the most profound sediments of social phenomena. And then in a footnote that seems to justify his use of *infrastructure* in such an atypical context, he writes:

Architecture provides a good illustration: the shapes of buildings, their ornaments, what is the most visible, constitute the elements on which your average thinker bases their thinking; — quite the opposite, history deals with modes of construction, technical processes, assemblage of materials. In archaeological

treatises produced by professors, the former point of view is the one that prevails.

Artists are more interested in the latter.¹⁷ (Sorel, 1895, p. 159)

In the following years, the architectural metaphor apparently coined by Sorel blossomed. Bonnet used it in his translation of Labriola, as we already saw. Then Charles Andler (1866-1933), who had met and befriended Sorel in 1897 following his work on Labriola's book, started using the word liberally—in several articles, conferences, classes, and translations such as the Communist Manifesto's, that he published in 1901 (Andler, 1897, 1901; Marx & Engels, 1901). Andler, a Germanist and Professor at Collège de France was then seen as one of the best specialists of Marx—though not a Marxist himself. Unlike many other students of Marx, including Sorel, Andler could read Marx's texts in their original version and had therefore a much wider access to Marx's writings.¹⁸

I have not found any other documents before Sorel's articles of 1895-1897 that used *infrastructure* in a metaphoric way. This fact, and the biographical elements presented earlier, comfort the hypothesis that Georges Sorel was the first to use *infrastructure* in such a way.

¹⁷ Original citation: 'L'architecture fournit un bon exemple : les formes des édifices, les ornements, ce qui est le plus apparent, constituent les éléments de raisonnement pour le vulgarisateur ; — au contraire, l'histoire s'occupe de la construction, des procédés techniques, des combinaisons de matériaux. Dans les traités d'archéologie faits par les professeurs, le premier point de vue domine encore. Les artistes se placent au second.'

¹⁸ On Sorel, Andler and the reception of Marx in 1890-1900s' France, see Andreu (1953), Sand (1985), Prochasson (2005), Gianinazzi (2007), Cahen (1994, 2011).

At the turn of the 19th century, thanks to the literary imagination of a railway engineer turned leading self-taught thinker of socialism, *infrastructure* quietly hijacked the debate on historical materialism and escaped its limited technical domains of railway engineering, architecture and archaeology. The metaphor initially pertained to Marxism, yet almost instantly slipped away and caught up with social sciences as a successful architectural spatial metaphor.

Infrastructure as metaphor in social sciences

In the early 20th century, from a figure of speech that could have remained restricted to socialist circles, ‘infrastructure’ once again expanded and percolated to other disciplines. The conceptual parable was so strong, so appealing, so accurate, that it ended up building a life of its own.

It is once again important to remind ourselves of the political and social context of the early 20th century. Next to political movements such as socialism which called for ‘social consciousness’, a number of ‘new’ social sciences were emerging: psychology, for instance, aimed at understanding the links between consciousness and subconsciousness; sociology, looked at broad trends to understand human beings as groups and what determined groups or individuals’ behaviours. The image of an ‘infrastructure’—may it be technological, political, moral, or a dormant consciousness—determining a ‘superstructure’, the visible aspect of a society, would have been highly striking, fashionable, modern: it tapped into the omnipresent technical imaginary of railway expansion, while illustrating an important intellectual trend at the turn of the century. *Infrastructure* was the *zeitgeist*.

Below are just three examples to illustrate this emancipation of *infrastructure* from Marxism and indeed railway engineering. Philosopher and sociologist Georges Palante (1862-1925) writes in 1901

Social economy is very close to enabled Psychology [...]. As it is nothing else but management of needs and vital interests that, in human nature, are the infrastructure of the superficial psychological development.¹⁹ (Palante, 1901, p. 55)

A second example: Alfred Fouillée (1838-1912), a philosopher whose concept of *idée-force* was very popular at the time. He writes in his 1903 book *A psychological sketch of European peoples* [Esquisse psychologique des Peuples Européens]:

One does most especially witness the social superstructure, the conscious direction of the group, the other sees most especially the social infrastructure, the subconscious pressure that goes from the bottom then up.²⁰ (Fouillée, 1903, p. 468)

And later:

¹⁹ Original citation: ‘L’Économie sociale touche de près à la Psychologie [...]. Car elle n’est autre chose qu’une gestion des besoins et des intérêts vitaux qui, dans la nature humaine, sont l’infrastructure de tout le développement psychologique supérieur.’

²⁰ Original citation: ‘L’un [le comtisme français] voit surtout la superstructure sociale, la direction consciente de l’ensemble, l’autre [le marxisme allemand] voit surtout l’infrastructure sociale, la pression inconsciente qui s’exerce de bas en haut.’

Two elements express, each in their own way, the character of a people: the study of its inferior and superior layers. The former is like the infrastructure of the national spirit; they represent the subconscious part [...].²¹ (Fouillée, 1903, p. 505)

Finally, another example from Jean Jaurès who writes in his 1911 classic, *L'Armée Nouvelle* [The New Army]:

Napoleon has certainly been the most prodigious worker in his time. Yet, he has fallen, despite his work and genius. All the Caesars of capital will end like him, less quickly than him, because their power rests on stronger foundations, on all the infrastructure of the social system, and their destiny is more directly linked than Napoléon's to a vast ensemble.²² (Jaurès, 1911, p. 483)

Critics or followers, Socialists, Marxists, or social scientists—these three intellectuals and others who used the term *infrastructure* in the first years of the 20th century were all aware of the discussion on historical materialism that had taken place just a few years before. They had read Sorel, Andler, Labriola and the books published

²¹ Original citation: 'Deux éléments servent, chacun pour sa part, à manifester et à apprécier le caractère d'un peuple : l'étude des couches inférieures et celle des couches supérieures. Les premières sont comme l'infrastructure du caractère national ; elles en représentent la partie presque inconsciente [...].'

²² Original citation: 'Napoléon a été sans doute le plus prodigieux travailleur de son temps. Il est tombé cependant malgré ton travail et malgré son génie. Tous les Césars du capital passeront comme lui, moins vite que lui, car leurs puissance repose sur de plus solides assises, sur toute l'infrastructure résistante d'une système social et leur destin est plus fortement lié que celui de Napoléon à tout un vaste ensemble.'

by Alfred Bonnet. Consciously or not, by their writing, they were bringing *infrastructure* to a new audience.

From the 1900s onwards, the use of *infrastructure* for its metaphorical value manifestly increased. The relationship to Marx or socialism was now tenuous. It even developed outside of social sciences. Take for instance this article on functional calculus by Maximilien Winter (1871-1935), a philosopher of mathematics, published in 1913. He concludes by writing about ‘the infrastructure of the Universe’ (Winter, 1913, p. 510). Or this 1912 unsigned article in a periodical dedicated to music: in a concert review, the critic talks of ‘literary infrastructure’ and later the ‘rhythmic infrastructure’ of the piece (‘Le Mois’, 1912, p. 61). Two examples, amongst many others, of the momentum gained by the idea of infrastructure.

The use of *infrastructure* was also quite distinctive in economics. In this 1910 report on Le Havre’s harbour, an engineer employed by Le Havre’s Chamber of Commerce writes

The equipment of France’s harbours. — In France, the commercial harbours, managed by maritime engineers, are created by the State.

The former is therefore in charge of building and maintaining the maritime buildings; said otherwise, it is the State that has to care for the harbours’ *infrastructure*.²³ (Jacquey, 1910, p. 67— original emphasis)

²³ Original citation: ‘**L’outillage de ports en France.** — En France, les ports de commerce, dont les ingénieurs des ports maritimes assurent la direction exclusive, sont créés par l’État.

Another example, a 1919 newspaper article, ‘The Colonial Post-War Programme’, written by Senator Lucien Hubert (1868-1938)

The task that I would call the economic ‘equipment’ of a colony is vastly more stretched than one imagines. The railway networks, the ports, the commercial navy constitute the ‘infrastructure’, so to speak: then remains the ‘suprastructure’, that has its importance. So that a colony can ‘live’ with its homeland [...].²⁴ (Hubert, 1919, p. 571)

All emphases in these two documents are original: for Le Havre’s engineer, the italics that highlight the word *infrastructure*, and in Hubert, the quotation marks surrounding ‘equipment’, ‘infrastructure’ and ‘*suprastructure*’ [sic]. The punctuation and typographical choices (and errors) clearly denote the novelty and/or atypical use of these words in this context.

By the 1930s, in French, *infrastructure* had taken off to reach a whole new semantic level. From the niche technical term limited to railway engineering, architecture and archaeology, it had blossomed. It was now more complex, used in different contexts, disciplines and by varied audiences. And it had quickly been adopted by a new transport technology: aviation. *Infrastructure* would have then described all ground equipment (airfields, airports, etc.). The same way it semantically supported the

Ce dernier est donc seul chargé de construire et d’entretenir les ouvrages maritimes ; en d’autres termes ; en d’autres termes, c’est lui qui a le souci de l’*infrastructure* des ports.’

²⁴ Original citation: ‘La tâche de ce que j’appellerai « l’équipement » économique d’une colonie est infiniment plus étendue qu’on ne l’imagine. Les réseaux ferrés, les ports, la marine de commerce constituent « l’infrastructure », si l’on veut ; reste encore la « suprastructure », qui a son importance. Pour qu’une colonie « vive » avec sa métropole [...].

spatial project associated with railway expansion in France and its colonies, ‘infrastructure’ now bore a similar role with the expansion of air travels. When looking at maps, for instance the ‘Air infrastructure of Indochina’ printed in 1939 (Fig. 3), one is struck by the metonymic power of this representation: the infrastructure here, is the sum of abstract lines between Saigon and Hanoi, an illustration of the colonial project, an illustration of its modernity (Service géographique de l’Indo-Chine, 1939).

It is through defence and aviation that ‘infrastructure’ eventually entered the English language. After WWII, the North Atlantic Treaty Organization (NATO) organised the defence of Europe (against the Soviet Union). A network of airfields was programmed to be built across Western Europe with the vast majority of them in France. The *New York Times* reports in 1951 that:

The French called this new network of air bases the ‘infrastructure’, meaning the *foundation* or *basis* for the Allies’ air power and the name has been adopted by the treaty organization. (‘French Push Work on Air Bases’, 1951— my emphasis)

Here the emphasis is mine, for the two synonyms echo the Marxist lexicon too well—the coincidence is quite ironic, if not disturbing. Meanwhile, the word ‘infrastructure’ is here presented as a novelty, brought in by the French. Several other news reports published in the *New York Times* in 1950-1951 (see for instance ‘Labor Upheld’, 1950; Krock, 1951a, 1951b) and secondary sources (North Atlantic Treaty Organization, 2001; Carse, 2017) confirm this hypothesis. In 1952, the *New York Times* writes that ‘the word “infrastructure”, a favourite bureaucratic morsel in the language of European defence’ is ‘baffling’ to Secretary of State Dean Acheson (1893-1971). He is quoted saying

One thing I can't explain to you is how these facilities came to be called by the name 'infrastructure.' But despite this heavy handicap, good progress was made on this issue, too. ('Use of "Infrastructure" Is Baffling to Acheson', 1952)

At the same time, the term kept gaining always more momentum as a metaphor in French. It seemed to be especially popular in policy and politics, and now went way beyond the issue of transport. In a 1959 article published by the French Gymnastic and Sport Federation's weekly publication, the expression 'sport infrastructure' is used (Berthelot, 1959). The same year, in the same publication, an article relays the petition of the Comité Pierre de Coubertin sent to the Assemblée Nationale whose first principle is

That we take the opportunity offered by the ongoing reform on education to [...] give to physical and sport education in open air the position that has been refused to it until now, and that is justified by its beneficial impact on youth's health, character and moral standards.

And one of the subsequent demands is:

1° Give to the Country the sport infrastructure it lacks: 'Stadia, swimming pools, sports hall' etc.²⁵ ('Le Sport et l'Assemblée National', 1959, p. 5)

²⁵ Original citation: 'Que l'on profite de la réforme de l'enseignement en cours pour [...] que l'on donne à l'éducation physique et sportive et de plein air la place qu'on lui a refusé jusqu'à présent, et que justifie son action bienfaisante sur la santé, le caractère et le comportement moral des jeunes [...] ; 1° Donner au Pays l'infrastructure sportive qui lui manque : « Stades, piscines, gymnases », etc.'

The expression ‘sport infrastructure’ would come as crystallisation of a relationship between material aspects of France’s sport equipment, and the health and moral standards of its youth. It linked the future of France to its network of sports facilities.

Conclusion

I set out to uncover the etymological and conceptual origins of ‘infrastructure’. From the evidence presented in this article, it seems that ‘infrastructure’ went through three semantic states. It appeared in the 1850s as a concept infused with Saint-Simonian ideal and materialist philosophy. Apparently coined by the entourage of the Brothers Pereire, it answered the bill of 1842 that aimed at stimulating the expansion of railway in France by having the State bearing the costs of all operations taking place ‘below’ ground—land acquisitions, levelling, building of tunnels and bridges. It was adopted by the domain of railway, its financiers, its investors and legislators. At the same time, it became used in architecture and archaeology to describe the structures of an edifice, or the elements of an archaeological site that lied below ground.

In the 1890s, retired engineer and leading socialist intellectual Georges Sorel transformed the term with much creative license and brought it into social sciences as a translation of Marx’s concept of ‘*reale Basis*’. The metaphorical or literal attributes that Marx attached to *Basis* was at that time already a debated issue. From the 1900s and throughout the first half of the twentieth century, in French mostly, *infrastructure* escaped the sole context of Marxist studies and socialism to become a fully-grown architectural metaphor used in literature, music, the arts, but also politics and economics. Materialist in its essence, linked to Saint-Simon, Marx, and others, the idea that a country’s economic and political system rests on a networked physical infrastructure crystallised then. It became durably anchored in a sociotechnical

imaginary that still animates us today. Metaphysically, it encapsulated the idea that a country's superstructure—its moral, ethics, social and legal system, its prosperity—were determined by physical networks, assemblage of equipment and technologies.

Once it entered the English lexicon in the 1950s, the parable of infrastructure thrived across different languages—English, German, Spanish, amongst others. The rise of development economics after WWII and their main institutions—the International Monetary Fund, World Bank, United Nations, all created in 1945—embraced the concept of infrastructure to push the idea that a country could reach 'development' by investing in fixed assets, physical networks and equipment. The correlation between the facilities of a country—the quality of its roads, the coverage of its phone network, the resilience of its electricity grid—and its prosperity, wealth, but also its standards of moral and ethics then became more transparent (Rist, 2014). One of the pinnacle of the stretched use of the term 'infrastructure' was arguably reached with Ronald Reagan's speech on the 'infrastructure of democracy', delivered at the UK House of Common in 1982 and which led to the creation of the National Endowment for Democracy in 1983 (Reagan, 1982). Money was democracy; democracy was money. Rankings, return on investment, CAPEX, evaluation, data, metricization of space and people—the infrastructural paradigm brought with it a cortege of jargon, tools and policy mechanisms: an infrastructural mindset (Easterling, 2014).

This paper is a call to critically question the transparency, obviousness, the ubiquity of 'infrastructure' in everyday language and social theories. By tracing its blueprint, this essay seeks to open intellectual doors, critical pipes, scholarly sockets in order to dissect the metaphor of infrastructure. The research axis it feeds in is necessarily multi- and trans-disciplinary, as it requires engaging with an extended time period, different languages and bodies of knowledge. In this paper, I have focused on

the etymological journey of ‘infrastructure’, and so many additional research avenues remain. I have, for instance, barely engaged with the colonial and postcolonial projects so deeply intertwined with the concept of infrastructure. What does today’s overwhelming popularity of this intrinsically modern concept tell us about a postmodern approach to space and social theories? How would a more direct engagement with semiotics, literature and philosophy (Derrida, 1967; Foucault, 1966; Karatani, 1995) in relation to the infrastructure parable enrich our approach in social theories? The idea of a spatial, or metaphysical dualism between what is below and above did not start with the concept of infrastructure—it links ancient religions to postmodern philosophies. Yet, infrastructure as an expression of modernity crystallised an imaginary, a relation between technology, space and economics that we seem incapable of challenging. I hope that by researching the etymological journey of this term, this article has contributed prying open the semantic black box to our infrastructural age.

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