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THE SCALE OF TWO CITIES: THE GEOGRAPHIES OF PARIS AND LONDON IN THE 1720S

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This essay considers an early eighteenth-century quarrel about the geographical dimensions of Paris and London. The dispute involved representatives of the Académie Royale des Sciences in Paris and the Royal Society in London. The three participants—Guillaume Delisle (1675–1726), Jean-Jacques Dortous de Mairan (1678–1771) and Peter Davall (?–1763)—were French, the first two resident in Paris, the third an exiled Huguenot based in London. From an initial, relatively trivial, confusion about trigonometrical calculations, this inconclusive debate ultimately embraced several wider questions about the nature of cities in classical antiquity and early eighteenth-century Europe, the changing meaning of urban life on the eve of the industrial age, the relationship between population size and urban space, and the relative economic, political and cultural vitality of Catholic absolutist France and Protestant Hanoverian England. Informed by rival claims promoted by Cartesians and Newtonians in London and Paris, the dispute also reflected a pre-existing tension within the Paris Academy about the remit of established and emerging scientific disciplines, specifically astronomy and geography. Subsequent cartographic representations of these two cities, including the Plan Turgot of Paris in the 1730s and the Rocque map of London in the 1740s, can be re-considered with reference to this now forgotten controversy.

Keywords: eighteenth-century urban mapping; Paris; London; Academy of Sciences; Royal Society

INTRODUCTION

On 11 April 1725, Guillaume Delisle, a renowned French cartographer and astronomer, delivered a lecture at one of the twice-weekly meetings of the Académie Royale des Sciences (henceforth Academy of Sciences) in the Palais du Louvre in central Paris.[1]

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1 The large literature on the Academy of Sciences, including the classic early studies, is reviewed in several recent publications, including E. Brian and C. Demeulenaere-Douyère (eds), *Histoire et mémoire de l'Académie des sciences: guide de recherches* (Éditions Tec&Doc, Paris, 1996); R. Halleux, J. McClellan, D. Berariu and G. Xhayet, *Les publications de l'Académie royale des sciences de Paris (1666–1793). Tome I: Description bibliographique; Tome II: Étude statistique* (Brepols, Turnhout, 2001); J. McClellan, 'Specialist control: the publications committee of the Académie royale des sciences (Paris) 1700–1793', *Trans. Am.*

The printed *mémoire* of this lecture, published two years later in the Academy's annual proceedings, is a pioneering statement of urban geography, an early attempt to consider cities as distinctive, measurable and dynamic environments whose geographical dimensions can be compared across time and space. Based on his own survey of Paris, similar evidence from London and a close reading of classical texts, Delisle concluded that Paris extended over a slightly larger area of the Earth's surface than London. He also claimed that Paris and London were far larger than any of the cities in the ancient world.[2]

Drawing on recent research on the intellectual and spatial histories of early modern cities, this essay re-considers Delisle's investigations and the ensuing dispute between prominent figures from the Academy of Sciences and the Royal Society. This controversy was implicated in a wider conflict within the Paris Academy between rival advocates of Cartesianism and Newtonianism, a dispute that also informed pre-existing tensions about the nature and extent of the established hegemonic science of astronomy and the emerging proto-science of geography. The essay concludes by assessing the impact of the Delisle controversy on subsequent cartographic representations of urban environments, specifically the Plan Turgot of Paris in the 1730s and the Rocque map of London in the 1740s.[3]

The dispute delineated

From the published *mémoire*, it is impossible to know how Delisle's lecture was organized, though the text implies that two printed maps of roughly the same 1:10 000 scale were displayed for the audience's edification, one showing Paris, the other London. The Paris map had been prepared almost a decade earlier by Delisle himself, '*principalement pour comparer la grandeur de cette Ville à celles des autres Villes du Monde anciennes et modernes*' (figure 1).[4] This map was based on a comprehensive topographic survey of the city's streets and squares carried out by Delisle and his younger brother Joseph-Nicolas, a fellow Academy astronomer, in the spring and early summer of 1716. The two men had hauled their unwieldly survey equipment to the uppermost vantage points of '*les endroits les plus éminents*' across the city, including the Observatory, the twin towers of Notre Dame cathedral, the Bastille and the city's main gateways.[5]

The resulting measurements formed part of the Academy's national survey of a meridian line stretching from beneath the dome of the Paris Observatory north to

Phil. Soc. **93** (3), 1–134 (2003); D. J. Sturdy, *Science and social status: the members of the Académie des sciences, 1666–1750* (The Boydell Press, Woodbridge, 1995).

2 G. Delisle, 'Examen et comparaison de la grandeur de Paris, de Londres, et de quelques autres villes du monde, anciennes & modernes', *Histoire de l'Académie royale des sciences* (hereafter *HARS*) **27**, M48–57 (1725, though published in 1727).

3 See, for example, B. De Munck and A. Romano (eds), *Knowledge and the early modern city: a history of entanglements* (Routledge, London, 2019); S. Van Damme, *Paris, capitale philosophique de la Fronde à la Révolution* (Odile Jacob, Paris, 2005); S. Van Damme (ed.), *Discipliner la ville: l'émergence des savoirs urbains (17e.–20e. siècle)*, Special Issue of *Revue d'Histoire des Sciences Humaines* **12**, 3–140 (2005).

4 'principally to compare the size of this Town with the sizes of other towns in the ancient and modern worlds'. Delisle, *op. cit.* (note 2), M50. Accents, spelling and capitalization in French quotations, here and below, are included as they appear in the original texts, regardless of modern usage.

5 'the most elevated places'. Delisle, *op. cit.* (note 2), M50. See also J. Boutier, 'Mesures et triangulation de l'espace urbain: le lever des plans de Paris à l'époque moderne (XVIe–XVIIIe siècles)', *Revue du Comité Français de Cartographie (Le Monde des Cartes)* **172**, 6–18 (2002), esp. 11–13.

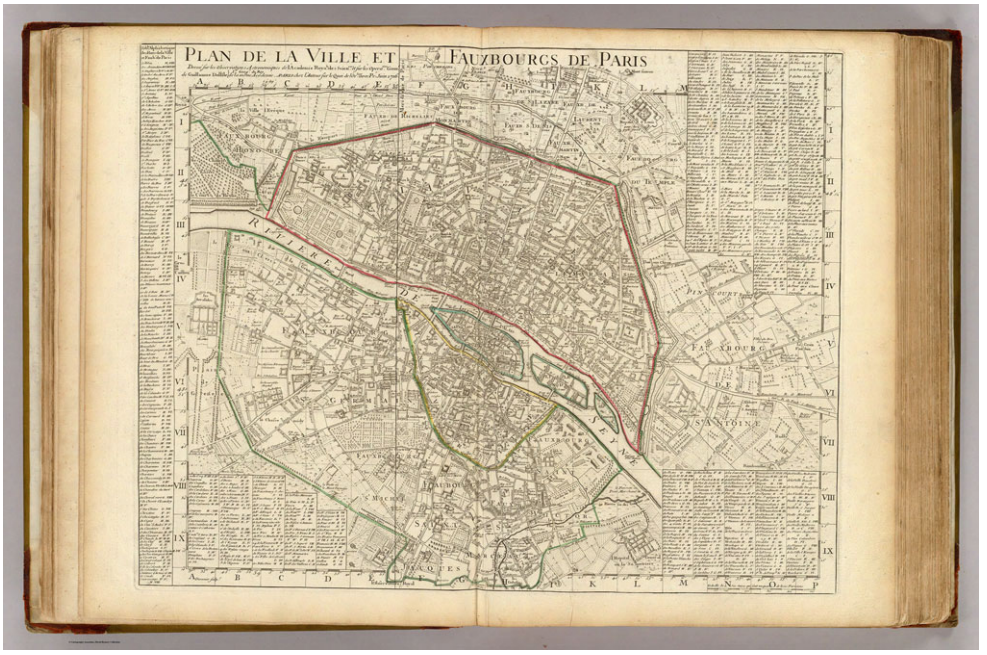

Figure 1. Guillaume Delisle, *Plan de la ville et fauxbourgs de Paris, dressé sur les observations astronomiques de l'Académie royale des sciences et sur les opérations geom[étrique]s de Guillaume Delisle de la même Académie* (chez l'Auteur sur le Quai de l'Orloge, Paris, June 1716). Source: David Rumsey Map Collection, List No. 4764.018, reproduced with permission. For the publication history of this map, and the libraries in which copies survive, see Boutier, *op. cit.* (note 60), pp. 224–225. This version of Delisle's 1716 map, 488 × 633 mm in size, is the second of two published in 1720, on both of which Delisle's status as *premier géographe du Roi*, awarded in 1718, has been inserted above the original title. The map's scale is given as '*500 toises qui font un quart de lieüe parisienne*', and the Paris meridian is clearly visible as a thicker black vertical line emerging from the Royal Observatory at the bottom of the map and bisecting the city, to the west of the Île de la Cité, and passing close to the Palais du Luxembourg and across the Palais du Louvre. Versions of this map feature in several editions of Delisle's cartography later assembled by Philippe Buache, including Guillaume Delisle, *Atlas de géographie* (chez l'auteur, Quai de l'Horloge, various dates), which contains more than 90 printed maps. The front and back covers of an early edition of this atlas are available on the David Rumsey Map Collection, with a publication date of 1731. A later volume is available in Cambridge University Library (Atlas.3.70.1), with no publication date and nothing in the catalogue, though most maps within, including the 1716 Paris map, include the words 'Ph. Buache. PGduR. de l'A.RdS. Gendre de l'Auteur, Avec Privilège du 30 avril 1745', which suggests a later printing, after Buache took full control of his mentor's business following Marie Delisle's death.

Dunkirk and south to Perpignan.[6] Repeatedly re-surveyed by Academy astronomers through the eighteenth century, the national meridian later served as the axis of a new and more accurate map of France, the *carte des principaux triangles*, completed in 1744.[7] Delisle's 1716 map of Paris, printed for the first time in 1720, was an

6 The initial results of the Academy's meridian survey were described in *De la grandeur et de la figure de la terre: suite des mémoires de Académie royale des sciences* (Imprimerie Royale, Paris, 1720), a 300-page supplement to the *HARS*, published in 1720, by Cassini II, who also reported his findings in a lecture on 12 November 1718, later published as J. Cassini, 'De la grandeur de la terre et de sa figure', *HARS* **20**, 245–256 (1718). This *mémoire* does not appear in the original edition of the 1718 *HARS*, printed in 1720, but only in a later 1741 printing.

7 The title of the 1:1 750 000 national map, completed in 1744, was *Nouvelle carte qui comprend les principaux triangles qui servent de fondement à la Description géométrique de la France. Levée par ordre du Roy par Messrs. Maraldi et Cassini de Thury, de*

Figure 2. Robert Morden and Philip Lea, *This Actuall Survey of London, Westminster & Southwark is humbly dedicated to Ye Ld Mayor and Court of Aldermen* (Sold by Philip Lea at the Atlas & Hercules in Cheapside and by Christopher Browne at the Globe the west end of St Paul's, London). Source: Beinecke Rare Book and Manuscript Library, Yale University, Call No. 1973 Folio 10, Orbis Record 8437928, Object ID 2046645, reproduced with permission.

opening instalment of this larger project and the first city plan orientated around the national meridian.[8]

In preparation for his 1725 lecture, Delisle altered his map of Paris by hand to show recent changes to the city's built environment, based on his own investigations. For an equivalent representation of London, he relied on a copy of Robert Morden and Philip Lea's 1700 plan of the city, also adjusted by hand using information about recent changes to the English capital provided by an unnamed Londoner, '*un homme exact & intelligent*', whose identity was never subsequently revealed but who also helped Delisle convert English to French units of measurement (figure 2).[9] The Morden and Lea map was not based on an

l'Académie royale des sciences. See J.-L. Arnaud, *La Carte de France: histoire et techniques* (Éditions Parenthèse, Paris, 2022); M. Pelletier, *Les cartes de Cassini: la science au service de l'état et des régions* (Éditions du CTHS, Paris, 2002); L. Lagarde, 'Historique du problème du méridien origine en France', *Revue d'Histoire des Sciences* **32**, 289–304 (1979); and J. W. Konvitz, 'The nation-state, Paris and cartography in eighteenth- and nineteenth-century France', *J. Hist. Geogr.* **16**, 3–16 (1990).

8 Delisle had long been interested in remapping Paris around a meridian line. See 'Lettre de M. Delisle au R. P* sur la longitude de Paris', *Journal des Savans*, 7 June 1700, 243–250. The meridian line is now marked in Paris by 135 'Arago medallions' inserted into the city's pavements by Dutch artist Jan Dibbets in 1994 in honour of the nineteenth-century astronomer and politician François Arago. See S. Paul, 'Plans et cartes de Paris au XVIIIe. Siècle: influence de la méridienne de l'Observatoire', *Acta Cartographica* **66**, 82–95 (1986).

9 'a precise & intelligent man'. Morden and Lea's map, originally published in 1690 at 65.5 × 103.0 cm, is entitled *This Actuall Survey of London, Westminster & Southwark is humbly dedicated to Ye Ld Mayor and Court of Aldermen*. See S. Tyacke, *London map-sellers 1660–1720: a collection of advertisements for maps placed in the London Gazette 1668–1719, with biographical notes on map sellers* (Map Collector Publications, Tring, 1978), pp. 120–122.

accurate triangulation survey of London, Delisle acknowledged, but was the best recent image of the city at a comparable scale to his own map of Paris.

These two annotated maps, neither of which could be reproduced in Delisle's published *mémoire*, revealed the very different morphologies of the two cities. Paris was still tightly enclosed at the time by circular boulevards that replaced the defensive *enceinte des fossés jaune*, erected in the 1630s by architect Jacques Lemercier. An impressive road network connected both sides of the Seine, criss-crossing the open parkland in the *faubourgs* Saints Germain, Michel, Jacques, Victor and Marcel. London, by contrast, was an elongated sprawl along the north bank of the Thames, with far less development south of the river.

An active Parisian could have walked between opposing points on the perimeter boulevards in less than an hour, the north–south journey facilitated by half a dozen bridges across the Seine. A similarly healthy Londoner would have required two hours to walk east to west across the city's farthest extent, from Lime Kiln Dock to St James's Palace. A north–south stroll, from Shoreditch along Bishops Gate Street, London Bridge (still the only crossing point on the Thames) and the built-up roads south of the river in Southwark, would have taken less than 30 minutes.

To calculate the spatial extent of the Parisian built environment, Delisle created a graticule of '*quarrés parfaits*' across his 1716 map. 'Perfect squares', in this context, are measures of areal extent based on the different ratios of latitude to longitude at different positions on the Earth's surface. On Delisle's map of Paris, 'perfect squares' were in fact rectangles enclosed by uneven meridian and parallel sides derived from the map's scale and a basic trigonometric calculation of the ratio of latitude to longitude for a location 48.5 degrees north of the equator, the single measure of latitude Delisle selected for the entire city. For this position on the Earth's surface, 'perfect squares' required each degree of latitude on the meridian line to be matched by 1.34 degrees of longitude on the parallel line, or as Delisle expressed this himself: '*comme sous le Parallele de Paris, 15 degrés de latitude en valent 20 de longitude*' (figure 3).

To calculate '*à quelle portion du Ciel les différentes parties de cette Ville répondent*', Delisle simply counted the number and proportions of 'perfect squares' covered by built-up areas on his modified 1716 map, tabulating the results to allow future adjustments based on new surveys of the city's expanding limits. According to Delisle's calculations, Paris encompassed 63 'perfect squares', which equated to 3 538 647 '*toises quarrés*'.[10]

To generate a comparable figure for London, Delisle drew a similar graticule of 'perfect squares' over his updated version of Morden and Lea's 1700 map. Although no details are provided in his *mémoire*, the implication is that the 'perfect squares' Delisle drew across the Morden and Lea map were adjusted to take into account London's more northerly latitude, also simplified into a single, though unspecified, measure for the entire city. Based on this consistent method, and using apparently comparable spatial units for London's different latitude, Delisle calculated that the English capital covered 60 'perfect squares', or 3 370 140 '*toises quarrés*'. Paris was one-twentieth larger than London, Delisle concluded, and if the parks and gardens of both cities were also included, the dimensions of Paris exceeded those of London by closer to one-sixth.[11]

10 'as under the parallel of Paris, 15 degrees of latitude equate to 20 of longitude'; 'what portion of the Heavens the different parts of this Town correspond'. Delisle, *op. cit.* (note 2), M51. The French '*toise*' (equivalent to six French '*pieds*') was based at this time on the '*toise de Châtelet*', an iron bar fixed into the wall of Grand Châtelet in central Paris, *ca* 1.949 metres in length. A '*toise quarré*' was, therefore, *ca* 3.799 square metres.

11 Delisle, *op. cit.* (note 2), M53.

Figure 3. Detail of the graticule divisions on Delisle's 1716 map of Paris, with 15 seconds of latitude on the meridian lines and 20 seconds of longitude on the parallel lines. Source: David Rumsey Map Collection, List No. 4764.018, reproduced with permission.

In the remainder of his *mémoire*, Delisle provided speculative observations on other early eighteenth-century cities, including Rome (which he claimed was far smaller than London), Constantinople (which he estimated to be roughly the same size as London), Cairo (for which he drew on the surveys of Jean-Mathieu de Chazelles, the first to measure the size and configuration of the Great Pyramids), Isfahan and several Chinese cities. This was followed by similar commentaries on the likely sizes of ancient cities, including Alexandria, Babylon, Ecbatana, Nineveh, Rome and Susa. In his discussion of ancient Rome, Delisle referred to contemporary descriptions by Dionysius of Halicarnassus and seventeenth-century commentaries by Isaac Vossius, the Dutch scholar and bibliophile, and Lucas Holstenius, the German Catholic humanist and Vatican librarian under Innocent X. He also made use of the *Carte dell'Agro Romano*, prepared in the late seventeenth century by Francesco Eschinardi, the Jesuit mathematician.[12] Delisle's digressions on ancient measures of distance and on the cities of Bologna and Modena were informed by sources as varied as Strabo and Ptolemy, the fourteenth-century Kurdish historian and geographer Abulfeda

12 F. Eschinardi, *Espositione della cartatopografica cingolana dell'agro romano, con la erudition antica, e moderna* (Domenico Ant. Ercole, in Parione, Rome, 1696). See also J. Maier, *Rome measured and imagined: early modern maps of the Eternal City* (University of Chicago Press, 2015).

and the calculations of Willebrord Snellius, Giovanni Battista Riccioli and Giovanni Domenico Cassini.[13]

Delisle's lecture was his last contribution to the Academy. Less than a year later, on 25 January 1726, the 51-year old map-maker collapsed and died from a heart attack on a Parisian street.[14] In a summary of the Academy's activities in 1725, published after the usual two-year delay, Bernard Le Bovier de Fontenelle, the permanent secretary, mentioned Delisle's lecture only in passing and hinted, in an otherwise affectionate *éloge* to his former colleague, that the *mémoire* of Delisle's final performance had been selected for publication not for its scientific value but as a posthumous tribute to a popular, recently deceased colleague.[15]

On 19 June 1728, a few months after Delisle's *mémoire* was published, William Rutty, an English physician and secretary at the Royal Society, received a letter at his London home in Salisbury Court from Peter Davall, with whom he was evidently acquainted.[16] Davall claimed to have 'accidentally met with a volume of the memoirs of the Royal Academy of Sciences at Paris' in which Delisle's *mémoire* was printed. 'I have made an extract of it', continued Davall, 'with some observations upon an error w^{ch} I think the author has been guilty of. And as there are many persons inquisitive into matters of this kind who do not understand French, I have taken the liberty to send it you enclos'd, that you may, if you think proper, communicate to your society.'[17]

Delisle's trigonometrical calculations were incorrect, insisted Davall, as standard tables of sines and cosines demonstrated. For a location with a mean latitude 48.5 degrees north of the equator, 'the Proportion of the Degrees of a Great Circle to those of the Parallel of Paris will by a Table of Sines be found to be as 1 to .6580326. Whereas according to Mr. de Lisle, that Proportion is only as 20 to 15, or 1 to .75'. 'Perfect squares' on a map of Paris divided by 15 seconds of latitude along the meridian lines should be matched by more than 22 seconds of longitude on the parallel lines, not 20 as Delisle stated. By counting imperfect 'perfect squares' that were slightly smaller than they should have been in order to calculate the city's spatial extent, Delisle had over-estimated the city's dimensions 'by near *one seventh*'. London was not the smaller of the two cities but in fact 'one fourteenth greater than Paris', based on a correct application of Delisle's own method.[18]

In his concluding remarks, Davall conceded that Delisle had raised an interesting question about the geographies of Paris and London that had wider implications. The question would only be satisfactorily resolved, however, when 'some able person' prepared an 'accurate survey & measurement of London, w^{ch} we have not, and which I think would be of general use'. Whoever embarked on 'a more exact Mensuration of London than any we yet have … cannot follow a better Method than that Mr. de Lisle has taken'.[19]

13 Delisle, *op. cit.* (note 2), M53–57. For comments on how classical authorities were themselves interested in comparative urban assessments, see L. Pfuntner, 'Death and birth in the urban landscape: Strabo on Troy and Rome', *Cl. Ant.* **36** (1), 33–51 (2017).

14 Anon. (B. Le Bovier de Fontenelle), 'Éloge de M. Delisle', *HARS* **28**, H75–84 (1726), p. 84.

15 *Ibid*. For more on the *éloges* to academicians, see C. B. Paul, *Science and immortality: the éloges of the Paris Academy of Sciences (1699–1791)* (University of California Press, Berkeley and Los Angeles, 1980).

16 The large literature on the Royal Society in this period has been effectively reviewed in recent works, notably A. Wragge-Morley, *Aesthetic science: representing nature in the Royal Society of London, 1650–1720* (University of Chicago Press, 2020).

17 Royal Society Archives [RSA], Davall Papers EL/D2/50-50a.

18 *Ibid*.

19 *Ibid*.

Davall's comments on Delisle's *mémoire*, published in the next issue of the *Philosophical Transactions of the Royal Society*, were received with consternation when the volume arrived at the Paris Academy.[20] One of France's leading mathematicians, Jean-Jacques Dortous de Mairan, took it upon himself to investigate the matter further. After visiting Delisle's workshop to review his manuscript maps and papers, Mairan wrote a lengthy defence of his former colleague, published in the 1730 volume of the Academy's proceedings.[21]

Delisle had died six months before his lecture notes were sent to the printers in August 1726, explained Mairan, and the published text was neither proofread nor edited.[22] Several errors had survived from Delisle's handwritten lecture notes, including the statement that his 'perfect squares' were enclosed by parallels of 15 seconds and meridians of 20 seconds. While this was the simplified ratio used on the printed version of Delisle's 1716 map, Mairan acknowledged, for his 1725 lecture a more accurate graticule of 'perfect squares' had been calculated and inscribed by hand on the adjusted version of this map. The 'perfect squares' on this graticule were correctly delineated with meridian sides divided by 15 seconds of latitude and parallel sides divided by *ca* 22 seconds of longitude.

Delisle's calculations and conclusions were correct, insisted Mairan, because '*après avoir examiné son mémoire, & le plan dont il s'agit, il me paroît évident que sa méprise ne tombe que sur son énoncé, & non sur ses opérations, ou sur les conséquences qu'il en a tirées … [L]'erreur reprochée à M. Delisle n'est que dans l'exposé de sa méthode, & nullement dans la méthode même, ni dans les résultats*'.[23] It was the Academy's own procedures that were at fault here, implied Mairan, for allowing an unchecked manuscript, by a recently deceased colleague, to be published with no editorial oversight.

Davall was being deliberately provocative, Mairan implied, as he had adjusted Delisle's calculations for Paris but assumed the estimate of London's size to be correct, even though no details about the latter calculations were included in the published *mémoire*. If Delisle had committed the error Davall had noted in his Paris calculations, he would surely have made a similar mistake in estimating London's dimensions, at a more northerly latitude,

20 P. Davall, 'Some reflections on Mr. de Lisle's Comparison of the Magnitude of Paris with London and several other Cities, printed in the Memoirs of the Royal Academy of Sciences at Paris for the Year 1725. Communicated in a Letter to Dr. Rutty, Secretary to the Royal Society, by Peter Davall, of the Middle Temple, Esq.', *Phil. Trans. R. Soc.* **35**, 432–436 (1727–1728) (hereafter *PTRS*). Copies of the *HARS* and the *PTRS* circulated quite widely in London and Paris, even before the Royal Society and the Paris Academy entered into a reciprocal arrangement to exchange publications from 1749–1750. See J. McClellan, *Science reorganized: scientific societies in the eighteenth century* (Columbia University Press, New York, 1985), p. 113; and G. S. Rousseau and D. Haycock, 'Voices calling for reform: the Royal Society in the mid-eighteenth century—Martin Folkes, John Hill and William Stukeley', *Hist. Sci.* **37**, 377–406 (1999), p. 390. For more on the relationship between the Academy and the Royal Society in this period, see P. Brioist, 'The Royal Society and the Académie des Sciences in the first half of the eighteenth century', in *Anglo-French attitudes: comparisons and transfers between English and French intellectuals since the eighteenth century* (ed. C. Charle, J. Vincent and J. Winter), pp. 63–77 (Manchester University Press, 2007); and, for an exemplary study of an earlier exchange, see A. M. Roos and V. D. Boantza, 'Mineral waters across the Channel: matter theory and natural history from Samuel Duclos's minerallogenesis to Martin Lister's chymical magnetism, *ca* 1666–1686', *Notes Rec. R. Soc.* **69**, 373–394 (2015).

21 J.-J. Dortous de Mairan, 'Remarques sur un écrit de M. Davall, qui se trouve dans les Transactions philosophiques de la Société royale de Londres, no. 402, an 1728, touchant la comparaison qu'à fait M. Delisle, de la grandeur de Paris avec celle de Londres, dans les mémoires de l'Académie royale des sciences, an 1725', *HARS* **32**, M562–574 (1730). On Mairan, see J.-M. Faidit, *Mairan et les premières theories de l'aurore boréale* (Les Presses du Midi, Toulon, 2016); S. Le Gars, 'Dortous de Mairan et la théorie des aurores polaires: trajectoire et circulation d'une idée, de 1733 à 1933', *Revue d'Histoire des Sciences* **68** (2), 311–333 (2015).

22 Mairan, *HARS*, *op. cit.* (note 21), M568.

23 'after having examined his memoir, & the map in question, it seems to me obvious that his mistake resides only in his form of expression, & not in his work or in the conclusions he has drawn … [The] error of which Mr Delisle is accused lies solely in the explanation of his method, & not in the method itself, nor in the results'. *Ibid.*, M563, M566.

based on the 'perfect squares' drawn across his modified version of the Morden and Lea map. A consistent error in both calculations would have led Delisle to over-estimate the size of London to an even greater extent than Davall claimed he had over-estimated the dimensions of Paris. But the graticule on Delisle's modified Morden and Lea map, which Mairan had also examined, revealed accurately calculated 'perfect squares' for London's latitude. Delisle's calculations were therefore correct and consistent for both cities.[24]

Delisle's honour had been unfairly impugned, concluded Mairan, as Davall's criticisms were '[*r*]*ien de moins que de faire opérer ce sçavant Géographe d'une maniere toute differente de celle qu'il dit qu'il a fait, & la plus extravagante du monde*'.[25] It was '*moralement impossible*' for Delisle to have committed such a basic error, insisted Mairan, for his maps of Paris and London proved that his calculations were correct.[26]

The dispute explained

A closer inter-textual reading of these three texts, alongside related published and unpublished documents, suggests there was more at stake than a juvenile Anglo-French quarrel about the dimensions of Europe's two largest cities. The three protagonists in this dispute—Delisle, Davall and Mairan—were each pursuing personal agendas that had little to do with the trivial matter under consideration. Their interventions were connected to wider intellectual and political tensions in which the Academy of Sciences and the Royal Society were directly implicated, though it seems unlikely they were aware of each other's complex motives.

Delisle deciphered

From a cluttered *atelier* on the Quai de l'Horloge, inherited from his father Claude, Delisle published hundreds of printed maps through the opening years of the eighteenth century.[27] Claude Delisle had taught history at the French royal court, and Guillaume followed in his father's footsteps when he was appointed as the royal household's geography tutor in 1702. Delisle's geography lessons, illustrated with specially prepared maps, proved extremely popular with the young Louis XV, who succeeded his great grandfather, Louis XIV, at the tender age of five in 1715. As a reward for his services, the *Maison du Roi* granted Delisle the title *premier géographe du Roi* in 1718 to distinguish him from the handful of *géographes ordinaires du Roi* who supplied maps, globes and other geographical materials for the royal library.[28]

24 *Ibid.*, M571. Neither of the adjusted maps Delisle used for his 1725 lecture seem to have survived.

25 'nothing less than an extravagant attempt to claim the learned geographer conducted himself in a manner quite different from he claimed'. *Ibid.*, M572.

26 *Ibid.*, M567.

27 See N.-M. Dawson, *L'Atelier Delisle: l'Amérique du nord sur la table à dessin* (Septentrion Sillery, Quebec, 2000) and, on map-making in eighteenth-century Paris, see M. Sponberg Pedley, *The commerce of cartography: making and marketing maps in eighteenth-century France and England* (University of Chicago Press, 2005). See also M. Heffernan, 'Geography and the Paris Academy of Sciences: politics and patronage in early 18th century France', *Trans. Inst. Br. Geogr.* **39**, 62–74 (2014); and Heffernan, 'A paper city: on history, maps, and map collections in 18th and 19th century Paris', *Imago Mundi* **66** (Suppl.), 5–20 (2014), esp. pp. 6–9.

28 According to Michel Antoine, Delisle's maps played '*un rôle carrefour*' in the young King's education. See M. Antoine, *Louis XV* (Fayard, Paris, 1989), p. 74. On Delisle's career at court, see M. Heffernan, 'Courtly geography: nature, authority, and civility in early eighteenth-century France', in *Envisioning landscapes, making worlds: geography and the humanities* (ed. S. Daniels, D. DeLyser, J. N. Entrikin and D. Richardson), pp. 94–105 (Routledge, London, 2011).

Shortly after his appointment as royal tutor, Delisle was elected to the Academy of Sciences as an *élève*, the lowest of the three academician ranks. He worked as diligently as his commercial interests allowed within the Academy's team of astronomers, directed initially by Giovanni Domenico Cassini (Cassini I) and later by his son Jacques (Cassini II). In July 1718, after his designation as *premier géographe du Roi*, Delisle was promoted to *associé* level, the second Academy rank below the senior *pensionnaire* status.[29]

By the time of his 1725 lecture, Delisle was a frustrated man. Despite his reputation as one of France's most celebrated map-makers, and notwithstanding the affection and prestige he enjoyed at court, Delisle was convinced his scientific credentials had been overlooked by his fellow academicians. The problem arose because of the Academy's reluctance to modify or extend the disciplinary structures that had defined its activities and publications for the preceding 25 years. In contrast to the Royal Society, which steadfastly refused categorization, the Academy was organized into six primary subjects, three mathematical (astronomy, geometry and mechanics) and three physical (anatomy, botany and chemistry), each represented by academicians of different levels of seniority. These Cartesian distinctions were enshrined in reforms drawn up in 1699 by Abbé Jean-Paul Bignon, Louis XIV's librarian and the Academy's president at the time.[30]

Delisle's 1725 lecture was not an exercise in '*pure curiosité*', as he claimed, but part of a campaign he had waged for several years to convince the Academy to recognize geography as a distinctive and legitimate science, separate from astronomy.[31] This campaign reflected Delisle's genuine belief in the legitimacy of geography's scientific credentials, but was also motivated by his growing sense of personal and professional indignation at the Academy's unwillingness to grant him *pensionnaire* status. Promotion to this level was unlikely, Delisle reasoned, while he remained a member of Cassini II's team of astronomers, and so long as geography, the subject with which he was associated, was viewed as a derivative, second-order science.[32]

Delisle's frustrations were probably justified, as some senior academicians viewed geography with haughty condescension. Fontenelle considered the subject an artisan practice, useful in preparing and publishing politically significant and aesthetically pleasing maps, but entirely dependent on astronomers and mathematicians for the all-important scientific rigour and empirical data on which these maps were based. Fontenelle could not resist mocking Delisle's time-consuming labours with navigation log-books and travel accounts even in the *éloge* he penned about his former colleague: '*Quelle ennuyeuse, & fatigante discussion! Il faut être bien né Géographe pour s'y engager.*'[33]

29 Sturdy, *op. cit.* (note 1), pp. 205–208.

30 M.-J. Tits-Dieuaide, 'Les savants, le société et l'État: à propos du "renouvellement" de l'Académie Royale des Sciences (1699)', *Journal des Savants* **1**, 79–114 (1998). See also J. A. Clarke, 'Abbé Jean-Paul Bignon "moderator of the academies" and royal librarian', *French Hist. Stud.* **8**, 213–235 (1973). For a comparative analysis of the Royal Society, see R. Sorrenson, 'Towards a history of the Royal Society in the eighteenth century', *Notes Rec. R. Soc. Lond.* **50**, 29–46 (1996).

31 Delisle, *op. cit.* (note 2), M48.

32 On Delisle's attempts to recruit Bignon and others to support his cause, see Heffernan, 'Geography and the Paris Academy of Sciences', *op. cit.* (note 27), and Dawson, *op. cit.* (note 27). On other second-order Academy 'science', see A. Cohen, *Music at the French Royal Academy of Sciences: a study in the evolution of musical thought* (Princeton University Press, 1981), and E. Spary, *Eating the Enlightenment: food and the sciences in Paris 1670–1760* (University of Chicago Press, 2012). For a recent commentary on the role of astronomy in early-modern French science, see O. Rabinovitch, 'The "system of the world" and the scientific culture of early modern France', *Notes Rec. R. Soc.* **78** (1), 29–52 (2024).

33 'what a boring, & exhausting discussion! One would have to be a born geographer to engage in it'. Anon. (B. Le Bovier de Fontenelle), *op. cit.* (note 14), 77.

An intensifying controversy about the Paris meridian survey during the early 1720s provided Delisle with an opportunity to challenge the Academy's established order and advance his case for promotion. Cassini II's 1720 report on the Paris meridian concluded that a given measure of latitude in northern France covered a slightly shorter distance than the same measure in the south of the country. This implied the Earth was a spheroid elongated at the poles, a finding that contradicted the mathematical calculations of Isaac Newton and Christiaan Huygens, both of whom had previously concluded, based on different theories of gravitational attraction, that the Earth was flattened at the poles, a position Newton explained in detail in Book III of the third, 1726, edition of his *Philosophiæ Naturalis Principia Mathematica*.[34]

French opponents of Newtonian mathematics believed the Academy's meridian survey vindicated their Cartesian perspective. However, Newton's increasingly vocal supporters in the Academy, led by younger mathematicians such as Pierre-Louis Moreau de Maupertuis and Alexis Clairaut, doubted the accuracy of Cassini II's survey, and their scepticism was shared by some members of Cassini's own team of astronomers, notably Delisle's younger brother, Joseph-Nicolas.[35]

The two expeditions later sponsored by the Academy to survey meridian arcs in Lapland and Peru, near the North Pole and the Equator respectively, would eventually resolve the matter in favour of Newton.[36] In the meantime, however, Delisle could scarcely associate himself openly with Cassini II's Newtonian critics without casting doubt on the accuracy of his own 1716 map of Paris, prepared under the auspices of the Academy's meridian survey. As direct confrontation with Cassini II seemed unlikely to persuade conservative academicians, Delisle sought a delicate balance that involved celebrating the Academy's meridian survey as the scientific context in which he had prepared and

34 See J. L. Greenberg, 'Degrees of longitude and the Earth's shape: the diffusion of a scientific idea in Paris in the 1730s', *Ann. Sci.* **41**, 151–158 (1984), esp. pp. 152–153. On Newton's place in this controversy, see J. L. Greenberg, 'Isaac Newton and the problem of the Earth's shape', *Arch. Hist. Exact Sci.* **49**, 371–391 (1995); J. L. Greenberg, *The problem of the Earth's shape from Newton to Clairaut: the rise of mathematical science in eighteenth-century Paris and the fall of 'normal' science* (Cambridge University Press, 1995); I. Passeron, 'La form de la terre, est-elle une preuve de la vérité du système newtonien?', in *Terre à découvrir, terres à parcourir: exploration et connaissance du monde au XIIe.–XIX siècles* (ed. D. Lecoq and A. Chambard), pp. 129–145 (L'Harmattan, Paris, 1998); and, for the larger context, J. B. Shank, *The Newton wars and the beginning of the French Enlightenment* (University of Chicago Press, 2008) and S. Débarbat, 'Newton, Halley et l'Observatoire de Paris', *Revue d'Histoires des Sciences* **39**, 127–154 (1986).

35 Delisle's campaign may have influenced Maupertuis's feud with Cassini II, as the mathematician drew a distinction between astronomy and geography and allied himself with the latter. See, for example, P.-L. Moreau de Maupertuis, 'Sur la figure de la terre et sur les moyens que l'astronomie et la géographie fournissent pour la déterminer', *HARS* **35**, M153–164 (1733); and P.-L. Moreau de Maupertuis, *Éléments de Géographie* (Martin, Coignard et Guerin, Paris, 1742). Joseph-Nicolas Delisle, who was elected to the Academy in 1714 and to the Royal Society a decade later on the recommendation of Edmund Halley, may have accepted an invitation from the Russian Academy of Sciences to direct the new observatory in Saint Petersburg, received shortly before his older brother's 1725 lecture, in order to free himself from his professional loyalty to Cassini II. The younger Delisle spent *ca* 20 years in Russia and played an important role in the *Atlas Rossicus* (1745–1746), the first atlas of the Russian Empire. See J. Appleby, 'Mapping Russia: Farquharson, Delisle and the Royal Society', *Notes Rec. R. Soc. Lond.* **52** (2), 191–204 (2001); M.-A. Chabin, 'Moscovie ou Russie? Regard de Joseph-Nicolas Delisle et des savants français sur les états de Pierre le Grand', *Dix-Huitième Siècle* **28**, 43–56 (1996); M.-A. Chabin, 'L'astronome français Joseph-Nicolas Delisle à la cour de Russie dans la première moitié du XVIIIe siècle', in *L'influence française en Russie au XVIIIe siècle* (ed. J.-P. Poussou, A. Mézin and Y. Perret-Gentil), pp. 503–520 (Presses de Paris-Sorbonne, Paris, 2014); E. G. Forbes, 'La correspondence astronomique entre Joseph-Nicolas Delisle et Tobias Mayer', *Revue d'Histoire des Sciences* **36** (2), 113–151 (1983); and L. Schulze, 'The Russification of the St Petersburg Academy of Sciences and Arts in the eighteenth century', *Br. J. Hist. Sci.* **18**, 305–335 (1985).

36 For the full story of these expeditions, including Maupertius's involvement in the Lapland survey, see M. Terrall, *The man who flattened the Earth: Maupertuis and the sciences of the Enlightenment* (University of Chicago Press, 2002). On the Peruvian mission, see N. Safier, *Measuring the New World: Enlightenment science and South America* (University of Chicago Press, 2008), and R. Whitaker, *The mapmaker's wife: a true tale of love, murder and survival in the Amazon* (Bantam Books, London, 2005).

analysed his new and more accurate map of Paris, while simultaneously promoting an alternative division of labour within the Academy that would allow the preparation and interpretation of maps to become the natural preserve of geography rather than astronomy. Properly surveyed maps, even of a single city, were more than aesthetically attractive by-products of other scientific inquiries, implied Delisle. Modern, scientifically surveyed maps required a new visual and spatial language, and geography, the new science of mapped space, was now able to answer fundamental questions of relevance to natural philosophy, history and political economy.[37]

As his teaching at court had demonstrated, maps enlivened, visualized and explained historical events and narratives, re-affirming the traditional view of geography as 'the eye of history'.[38] By outlining a comparative historical geography of the world's great cities, Delisle sought to intervene in the on-going '*querelle*' between the 'ancients' and the 'moderns', the former convinced that the modern world could do no more than emulate the achievements of the ancients, the latter no less certain that modern science had long surpassed its classical forebears. Like most of his fellow academicians, Delisle was firmly on the side of the moderns, and his conclusion that Paris, London and other eighteenth-century cities were far larger than even the greatest citadels of the Roman Empire seemed to confirm the superiority of the modern age.[39]

In addition to this historical argument, Delisle sought to promote the relevance of geography to political economy. In contrast to William Petty and British proponents of 'political arithmetic', who assumed urban growth should be measured solely by reference to population, Delisle's analysis implied that the built environment provided even more revealing evidence of a city's economic, political and cultural significance.[40] In *Two essays in political arithmetick, concerning the people, housing, hospitals, &c. of London and Paris* (1686), Petty had claimed that '*London* hath more People and Housing than the Cities of *Paris* and *Rouen* put together, and is also more considerable in several other respects', a conclusion based on his analyses of the London bills of mortality and related documents from other European cities.[41]

This confident assertion prompted a vigorous late seventeenth- and early eighteenth-century debate about the best way to measure and compare the populations of European cities.[42] The resulting investigations by British empiricists such as John Graunt, Gregory King and William Maitland, and their European counterparts Willem Kersseboom and

37 Delisle, *op. cit.* (note 2), M48.

38 Heffernan, *op. cit.* (note 28).

39 J. Dejean, *Ancients against Moderns: culture wars and the making of a fin-de-siècle* (University of Chicago Press, 1997); M. Fumaroli, *La querelle des anciens et modernes* (Gallimard, Paris, 2001). On the origins of urban history in this period, see R. Sweet, *The writing of urban histories in eighteenth-century England* (Clarendon Press, Oxford, 1997).

40 T. McCormick, *William Petty and the ambitions of political arithmetic* (Oxford University Press, 2009). On Petty's views on the relationship between population and territory, see A. J. Henry, 'William Petty, the Down Survey, population and territory in the seventeenth century', *Territory, Politics, Governance* **2** (2), 218–237 (2014).

41 Italics in the original. See C. H. Hull (ed.), *The economic writings of William Petty* (Cambridge University Press, 1899), vol. II, pp. 452–479, 502–514 and 515–521. The *Two Essays* were written in English but originally published in French translation as *Deux essays d'arithmetique politique, touchant les villes de Londres et de Paris* (chés B. G., London, 1686). The English version was printed in London the following year by 'J. Floyd', though some of the text had previously appeared in W. Petty, 'An extract of two essays in political arithmetick concerning the comparative magnitudes, &c. of London and Paris', *PTRS* **16** (183), 152 (1686). For Petty's other comparative comments from this period, see his *Essay in political arithmetick concerning the growth of the City of London* (1682) and *Observations upon the cities of London and Rome* (1687).

42 J. Dupâquier, 'Londres ou Paris? Un grand débat dans le petit monde des arithméticiens politiques (1662–1759)', *Population* **1–2**, 311–326 (1998).

Johan Peter Süssmilch, confirmed beyond reasonable doubt that London's early eighteenth-century population of *ca* 500 000 was larger than that of Paris, and growing more rapidly than any other European city.[43]

Unable to challenge this consensus, Delisle sought to shift the focus of inquiry about the nature of cities from population to space. By asserting the importance of urban space, Delisle hoped to promote geography's credentials as the science of spatial measurement and inquiry, at all scales from the local to the global. He also sought to demonstrate geography's practical utility in facilitating the effective policing and fiscal administration of rapidly expanding towns and cities. If this intellectual manoeuvre served to reinforce the cultural pre-eminence of Paris in the European urban hierarchy, so much the better.

London's population may have been expanding at an unprecedented rate, Delisle acknowledged, but Paris was still Europe's leading city based on the secure foundations of its built form, the scale and grandeur of which remained unequalled. Delisle's 1725 lecture can be read, therefore, as a spirited attempt to re-define the cultural and civilizational significance of cities by reference to directly measurable built environments rather than populations whose size could only be estimated from documents created for other purposes.[44]

Davall deconstructed

If Delisle's *mémoire* was informed by a complex hidden agenda, the same was true of Davall's critical response. Despite his Anglicized forename, Peter Davall was every bit as French as Delisle. Pierre Davall, as he was still known to his many French-speaking friends, was an ambitious young Middle Temple lawyer, prominent in the Huguenot community that settled in London to escape religious persecution in France following the Revocation of the Edict of Nantes in 1685.[45] It is unclear when Davall arrived in London, but his education in the English capital was apparently overseen by two fellow Huguenots, the journalist Pierre des Maizeaux, best known as editor and translator of the Huguenot philosopher Pierre Bayle, and the mathematician Abraham de Moivre, renowned for his work on probability theory.[46]

43 On the British empiricists, see J. Dodgson, 'Gregory King and the economic structure of early modern England: an input–output table for 1688', *Econ. Hist. Rev.* **66** (4), 993–1016 (2013); A. Hald, *History of probability and statistics and their applications before 1750* (Wiley, London, 1990), pp. 81–115; Richard Stone, *Some British empiricists and the social sciences, 1650–1900* (Cambridge University Press, 1997), pp. 3–115; J. A. Taylor, *British empiricism and early modern political economy: Gregory King's 1696 estimation of national wealth and population* (Praeger, Westport, CT, 2005). The classic statement on London's unprecedented growth is E. A. Wrigley, 'A simple model of London's importance in changing English society and economy 1650–1750', *P&P* **37**, 44–70 (1967).

44 For a related discussion, see F. de Dainville, 'Grandeur et population des villes au XVIIIe. siècle', in *La cartographie reflet de l'histoire: recueil d'articles présentés par Michel Mollat du Jourdin avec le concours de Lucie Lagarde, Marie-Antoinette Vannereau et Numa Broc*, pp. 131–152 (Éditions Slatkine, Paris, Geneva, 1986). The relationship between population and space in early modern governance was examined by Michel Foucault in his lectures at the Collège de France in 1977–1978. See M. Foucault, *Security, territory, population: lectures at the Collège de France 1977–1978* (ed. Michel Senellart, transl. Graham Burchell) (Palgrave, London, 2009), esp. pp. 1–29.

45 French-born Huguenots may have accounted for 5% of London's population at the end of the seventeenth century. See R. Gwynn, 'The number of Huguenot immigrants in England in the late seventeenth century', *J. Hist. Geogr.* **9**, 384–395 (1983).

46 On des Maizeaux, see J. Almagor, *Pierre Des Maizeaux (1673–1745): journalist and English correspondent for Franco–Dutch periodicals, 1700–1720: with an inventory of his correspondence and papers at the British Library (Add. MSS 4281–4289)* (APA-Holland University Press, Amsterdam, 1989); H. Bots, 'Pierre Des Maizeaux, a great cultural intermediary', in *The internationalization of intellectual exchange in a globalizing Europe, 1636–1780* (ed. R. Mankin), pp. 55–74 (Bucknell University Press, Lewisburg, PA, 2018); and E. Grist, 'Pierre Des Maizeaux and the Royal Society', in *Cultural transfers: France and Britain in the long eighteenth century* (ed. A. Thomson, S. Burrows and E. Dziembowski, with S. Audidière), pp. 33–42 (Voltaire Foundation/SVEC, Oxford, 2010). On de Moivre, whose best-known work was *The doctrine of chances, or a method of calculating the*

De Moivre and des Maizeaux were Fellows of the Royal Society, elected in 1697 and 1720 respectively, and influential in the free-thinking, often republican clientele of the London coffee-houses favoured by Huguenots: the Rainbow, close to St Martin-in-the-Fields church and several French bookshops; the Grecian on Devereux Street; and Old Slaughter's on St Martin's Lane.[47] In a letter to des Maizeaux dated June 1706, Davall revealed his familiarity with these gathering places, his connections to fellow Huguenots, such as Peter de Magneville, Peter (Pierre) Coste, Michel de La Roche, Francis Fauguière and Isaac Guion, and his intellectual and social debt to des Maizeaux, whose temporary absence from London he lamented: '*depuis vostre depart il me semble que tout languit. Plus de cabaret; plus de joie; plus de ces conversations dégagées de tous préjugez ou nous nous abandonnions quelquefois Lorsque vous estiez parmi nous. Nostre petite Société a perdu en vous le lien qui nous unissoit, et jusqu'òu que vous reveniez je la regarde comme dissipée et comme rompüe*'.[48]

The fact that Davall encountered Delisle's *mémoire* only a few months after its publication confirms that London's tight-knit Huguenot community was fully aware of the latest scientific developments in Paris. There is no evidence of direct communication between Delisle and Davall, though the latter would have known of the former's death as Fontenelle's *éloge* was printed in the same *HARS* volume as the 1725 *mémoire*. In his covering letter to Rutty, Davall referred to 'a conversation we had some days ago about the greatness of London with respect to Paris', implying the two men had anticipated Delisle's analysis.[49] This may have been a coincidence, to be sure, but it is possible that Davall knew of Delisle's *mémoire* in advance and, while awaiting full details, had raised the topic with Rutty. It is not entirely inconceivable that the '*homme exact & intelligent*' mentioned in Delisle's *mémoire*, the source of information on London's changing geography, was a Huguenot based in the English capital known to both Delisle and Davall.

Like most Huguenots, Davall revered Newton and was most likely sceptical of Cassini II's claim that the Academy's meridian survey had undermined the English mathematician's predictions about the size and shape of the earth.[50] As Delisle's analysis seemed, on first inspection, to be a loyal attempt to demonstrate how the meridian survey revealed the spatial pre-eminence of Paris over London, Davall's criticisms were almost certainly intended to raise further doubts about the accuracy of the Academy's meridian project.

By defending his adopted city's status as Europe's greatest capital, regardless of how this superiority was measured, Davall was also implying that London's less pleasing configuration

probability of events in play (1718), see the technically impressive work of D. R. Bellhouse and his collaborators, especially his *Abraham de Moivre: setting the stage for classical probability and its application* (CRC Press, Bota Raton, FL, 2011); I. Scheidner, 'Abraham de Moivre, *The doctrine of chances* (1718, 1738, 1756)', in *Landmark writings in Western mathematics 1640–1940* (ed. I. Grattan-Guinness), pp. 105–120 (Elsevier, Amsterdam, 2005); and Hald, *op cit.* (note 43), pp. 397–548.

47 R. Hammersley, 'The "real Whig"–Huguenot network and the English republican tradition', in Thomson *et al.*, *op cit.* (note 46), pp. 19–32; R. Hammersley, *The English republican tradition and eighteenth-century France: between the ancients and the moderns* (Manchester University Press, 2010), pp. 33–52; and S. Harvey and E. Grist, 'The Rainbow coffee house and the exchange of ideas in early 18th century England', in *The religious culture of the Huguenots* (ed. A. Dunan-Page), pp. 163–172 (Ashgate, Aldershot, 2006).

48 'since your departure it seems to me that everything has languished. No entertainment, no joy, no conversations free from prejudice into which we abandoned ourselves when you were amongst us. Our little Society has lost in you the link that united us, and until you return I regard it as dissipated and broken'. Pierre Davall to Pierre Des Maizeaux, 8 June 1706, British Library Add. MS 4283, fol. 37. Davall's date of birth is sometimes given as 1695, but as this letter could scarcely have been written by an 11-year-old boy, an earlier date seems likely.

49 RSA, Davall Papers EL/D2/50–50a.

50 J.-F. Baillon, 'Early eighteenth-century Newtonianism: the Huguenot contribution', *Stud. Hist. Phil. Sci.* **35**, 533–548 (2004).

reflected the modern commercial and political forces that had shaped its development as the world's most important centre of maritime trade. The implication seemed obvious: the geography of Paris suggested military considerations and a dynastic, absolutist authority; the geography of London revealed a population growth far in excess of other European cities precisely because refugees from religious and political persecution were welcomed in the English capital, alongside countless British migrants who flocked to the city in search of economic, social and intellectual improvement.

Mairan's motives

So what of Mairan's spirited rejection of Davall's criticisms? Why did this emollient savant, who later served as the Academy's scrupulously diplomatic permanent secretary in the 1740s, write at length and in such impassioned terms when a simple explanation and erratum would have quickly resolved the matter?[51] And why did Mairan raise the stakes by ignoring Davall's conciliatory conclusion and insisting that his criticisms were a personal attack on Delisle's integrity?

There is no evidence that Mairan knew Davall was an exiled French Huguenot—nor is it obvious how that knowledge would have influenced his response that rested, ultimately, on a gentlemanly appeal to trust his word of honour that he had consulted the relevant papers and maps and satisfied himself that Delisle had acted in good faith—but Mairan's motives were probably as complex and subtle as those of Delisle and Davall. Ostensibly directed at Davall, and by implication at the Newtonian Royal Society, Mairan's defence of Delisle's lecture and *mémoire* was also, and perhaps primarily, intended to convince his fellow academicians that his former colleague's campaign to establish a new Academy position in geography remained a legitimate and necessary objective.

Delisle's campaign had been pursued since his death by his widow Marie, who had lobbied Mairan and other academicians, including Bignon, newly restored as Academy president, and the Comte de Maurepas, the Academy's vice-president and secretary to the *Maison du Roi*, on behalf of Delisle's long-serving assistant and *protégé*, Philippe Buache.[52] The 30-year-old Buache was ideally placed to revive the Delisle family business, Marie insisted, and thereby preserve a map-making facility of national and international cultural and political significance.

Buache should be invited to replace Delisle as geography tutor at court, Marie reasoned, preferably with an enhanced pension. Once that position was secured, she reasoned, Buache would be able to realize her husband's long-standing ambition by seeking election to the Academy as its first officially recognized geographer. To ensure Buache's permanent commitment to this cause, Marie arranged for him to marry her teenage daughter Charlotte, a union approved by the *Maison du Roi*.[53]

Mairan knew Buache from his investigations in Delisle's workshop, and was sympathetic to Marie's campaign. Other senior academicians were also convinced, including Bignon, Maurepas and the naturalist René-Antoine Ferchault Réaumur. The Newtonian mathematicians

51 For Mairan's biography, see E. McNiven Hine, *Jean-Jacques Dortous de Mairan and the Geneva connection: scientific networking in the eighteenth century* (Voltaire Foundation/SVEC, Oxford, 1996).

52 There is an extensive literature on Buache, but see N. Broc, 'Un géographe dans son siècle: Philippe Buache (1700–1773)', *Dix-Huitième Siècle* **3**, 223–235; L. Lagarde, 'Philippe Buache, 1700–1773', *Geographers Bio-Bibliogr. Stud.* **9**, 21–27.

53 See Heffernan, 'Geography and the Paris Academy of Sciences', *op. cit.* (note 27), and for more on the unofficial role of women inside and outside the Academy, see M. Terrall, 'Gendered spaces, gendered audiences: inside and outside the Paris Academy of Sciences', *Configurations* **3**, 207–232 (1995).

Maupertuis and Clairaut were also supportive, sensing an opportunity to diminish Cassini II's dominance. Cassini II was adamantly opposed, however, and nominated his cousin, the Academy astronomer Giacomo Filippo Maraldi, as Delisle's replacement at court in the spring of 1726.[54] Once the prolific Maraldi assumed Delisle's responsibilities, within and beyond the Academy, Marie's spirited campaign stalled.

When Maraldi died in December 1729, aged 64, the possibility of Buache succeeding Delisle was revived. After additional lobbying, Buache was finally elected as the Academy's first geographer in June 1730, having inherited Delisle's business and succeeded to Maraldi's position at court.[55] By defending Delisle's methods and conclusions from what he claimed was unwarranted English criticism, and by emphasizing the Academy's own editorial failings, Mairan sought to draw attention to Delisle's overlooked scientific contributions and offer welcoming support to Buache as Delisle's successor in a reformed Academy as a geographer rather than as an astronomer. In his concluding sentence, Mairan looked forward to Buache resolving the dispute as Davall had proposed: '*le public n'y perdra rien, si M. Buach se determine, comme il le sait espérer, à mesurer lui-même, tant sur les Mémoires de M. Delisle, que sur de nouvelles pieces, l'étendue de Paris & de Londres, & à justifier par-là d'une manière encore plus directe, & plus détaillée que je n'ai fait, le fameux Géographe que tout le monde sçavant regrette, en demeurant riche du fruit de ses travaux*.'[56]

Mairan was in some respects an unlikely supporter of Delisle's campaign. Often regarded as a die-hard Cartesian, he was a natural ally of Cassini II, and his defence of Delisle's meridian-based survey of Paris could easily be interpreted in these terms.[57] However, the historian Ellen McNiven Hine has recently demonstrated that Mairan was more convinced by Newtonian mathematics than previously acknowledged. Mairan's primary objective, McNiven Hine argues, was an unlikely compromise between Cartesians and Newtonians within the Academy, a form of 'Cartonianism' that involved public displays of loyalty to Cassini II and the Academy's Cartesians with an increasingly confident and assertive promotion of Newtonian perspectives. This was the same tightrope on which Delisle had sought to tread, and Mairan's willingness to support Buache's candidature as Delisle's replacement in a different disciplinary category was consistent with this objective.[58]

Cartographic consequences

This long-forgotten dispute had direct consequences for the subsequent cartographic representations of Paris and London in the 1730s and 1740s. Delisle's surveys of Paris

54 Archives Nationales de France O^1 69, fols 184–185. Maraldi received a 1000 livre annual pension, but only as a '*géographe ordinaire du Roi*', a title awarded on 11 May 1726.

55 Anon. (J.-P. Grandjean de Fouchy), 'Éloge de M. Buache', *HARS* **75**, H135–150 (1772).

56 'the public will lose nothing, if Mr Buache so determines, for it is to be hoped that he himself knows how to measure, based on the memoirs of Mr Delisle or on new evidence, the dimensions of Paris & London, & in so doing can justify in a manner still more direct, & and more detailed than I have done here, the reputation of the famous Geographer that the entire scholarly world mourns while remaining rich in the fruits of his labours'. Mairan, *op. cit.* (note 21), M574.

57 On Mairan's Cartesianism, see F. Baskevitch, 'La propagation du son chez Dortous de Mairan (1737): des particules d'air de différentes élasticités', *Revue d'Histoire des Sciences* **68** (2), 335–358 (2015).

58 E. McNiven Hine, 'Dortous de Mairan, the "Cartonian"', *Stud. Volt. Eight. Cent.* **266**, 163–179 (1989). See also H. Guerlac, 'The Newtonianism of Dortous de Mairan', in *Essays in the Age of Enlightenment in honor of Ira O. Wade* (ed. J. Macary), pp. 131–141 (Droz, Geneva 1977), and O. Bruneau and I. Passeron, 'Introduction—des lions et des étoiles: Dortous de Mairan, un physician distingué', *Revue d'Histoire des Sciences* **68** (2), 259–279 (2015).

were extended after his death by several map-makers, including Abbé Jean Delagrive, a Lazarist Catholic priest, who produced a series of maps of the city and its environs, orientated around the meridian line, beginning with *Nouveau Plan de Paris et ses faubourgs dressé sur la Méridienne de l'Observatoire et levé géométriquement*, published in 1728, the first city plan to be sold by public subscription.[59] The Plan Roussel, prepared in 1730 by a map-maker about whom virtually nothing is known save the date of his death in 1733, was another detailed update of Delisle's 1716 map, also orientated along the Paris meridian.[60]

The best-known map of Paris in this period was, however, the Plan Turgot, named after Michel-Étienne Turgot, the city's *prévot des marchards*, who commissioned a new survey of the city in the early 1730s.[61] The stunning result—a bird's-eye portrait viewed from an oblique, isometric perspective to the north-west—was an elaborate promotional exercise.[62] The survey was carried out by Louis Bretez, an architectural draughtsman and professor of perspective in the Académie Royale de Peinture et de Sculpture, who measured and sketched every nook and corner of the city's built environment from 1734 to 1736, armed with official papers giving him access to private courtyards and buildings. Bretez's drawings were engraved onto 20 brass plates (still preserved in the Louvre) by Claude Lucas, the principal engraver of the Academy of Sciences, and his assistant Antoine Coquart. Copies of the expensively bound 1 : 400 scale atlas, completed in 1738 and published the following year, were presented to Louis XV, prominent dignitaries in France and several foreign heads of state, including the Emperor of China.[63]

There is no evidence that Turgot or Bretez were aware of the controversy surrounding Delisle's 1725 *mémoire*. Bretez's spectacular representation was in many respects a continuation of an earlier, less obviously scientific form of urban mapping in which the grandeur of churches, buildings and squares was emphasized rather than the triangulated spaces surveyed by Delisle and other modern cartographers for their modern ichnographic maps.[64] And yet Delisle's claim that a city's character is defined by its spaces rather than

59 J. Boutier, *Les plans de Paris des origines (1493) à la fin du XVIII^e siècle: étude, carto-bibliographie et catalogue collectif* (Bibliothèque nationale de France, Paris, 2007), pp. 226–228. Delagrive subsequently produced a nine-plate map, *Environs de Paris levés géométriquement*, published between 1730 to 1742, which began as an ambitious cadastral survey that was incomplete at the time of his death in 1757'. See Boutier, *op. cit.* (note 5), 12–15; and J. Boutier, 'Une tentative de relevé cadastral de Paris: le plan de l'Abbé Delagrive, 1735–1757, in *Les Plans de Paris du XVIe au XVIIIe siècles: actes du colloque du 14 juin 1994*, *Cahiers du CREPIF* **50** (1995), 107–120.

60 Boutier, *op. cit.* (note 59), pp. 228–230. The fuller title of the Plan Roussel is *Paris, ses fauxbourgs et ses environs où se trouve le detail des villages, châteaux, grand chemins pavez et autres, des hauteurs, bois, vignes, terres et prez, levez géométriquement* (chez Jaillot, Paris, 1731).

61 Turgot also commissioned Buache to study the city's vulnerability to flooding, leading to a long-term project reported, with innovative maps and bar charts, in Academy *mémoires* and other publications. See P. Buache, 'Observations sur l'étendue et la hauteur de l'inondation du mois de décembre 1740', *HARS* 43, M335–337 (1741); P. Buache, 'Exposé d'un plan hydrographique de la ville de Paris', *HARS* **44**, M371–378 (1742). See also I. Backouche, *Trace du fleuve: la Seine et Paris (1750–1850)* (Éditions de l'EHESS, 2000); and R. K. Smeltzer, 'One for the history books: an early time-line bar graph', *CHANCE* **23** (2), 54–56 (2010).

62 The Plan Turgot is widely available online. See, for example, the zoomable version in the David Rumsey Map Collection (https://www.davidrumsey.com/luna/servlet/view/search?sort=Pub_List_No_InitialSort%2CPub_Date%2CPub_List_No%2CSeries_No&q=Plan+Turgot&annotSearch=).

63 J. Boutier, Les plans de Paris, *op. cit.* (note 59), p. 252. The full title is: *Plan de Paris, commencé l'année 1734 dessiné et gravé sous les ordres de Messire Michel Etienne Turgot, achevé de graver en 1739 par Louis Bretez, gravé par Claude Lucas, et écrit par Aubin*.

64 For an excellent summary of this shift, see H. Ballon and D. Friedman, 'Portraying the city in early modern Europe: measurement, representation and planning', in *The history of cartography. Vol. 3, part 1: cartography in the European Renaissance* (ed. D. Woodward), pp. 680–704 (University of Chicago Press, 2007).

its inhabitants was in other respects re-affirmed by Bretez's dramatic portrait of the Parisian built environment. As Davall noted, once London was accurately mapped using Delisle's methods, it would no longer be possible to claim that Paris was geographically the more expansive of the two cities. In these circumstances, perhaps it was better to create an era-defining image of Parisian space that did not allow direct scientific comparison with other cities. By accepting Delisle's spatial interpretation of urban vitality while abandoning his comparative scientific method, the Plan Turgot was perhaps his most impressive legacy.

The impact of the Delisle–Davall–Mairan debate on the subsequent mapping of London is easier to identify. The origins of John Rocque's great survey and map of London, published in 24 sheets in 1746–1747, can be traced directly to Davall's suggestion that London's spatial pre-eminence would only be conclusively proven by an accurately surveyed map of the English capital, based on techniques Delisle used for his 1716 map of Paris.[65] Sir Hans Sloane, who succeeded to the presidency of the Royal Society on Newton's death in 1727, corresponded regularly with Bignon at the Paris Academy, to which he was elected an associate member in 1709, and was an avid reader of the *HARS*.[66] Aware of the controversy generated by Delisle's 1725 *mémoire*, Sloane supported Davall's call for a new survey and map of London.

Little was achieved until March 1738, when the idea was revived by George Vertue, an engraver at the Society of Antiquaries of London, and two fellow antiquaries, William Oldys and Joseph Ames. Vertue was subsequently replaced on the project by John Pine, a prominent freemason involved in the creation of London's Grand Lodge in 1717, for which he served as principal engraver and later as George II's Chief Engraver of the Seals. Pine recruited Rocque, like Davall a previously obscure London-based Huguenot, to undertake the topographic survey, despite the limited cartographic experience Rocque had acquired as a surveyor of English rural estates.[67]

With support from officials in the London Guildhall, Pine and Rocque approached the Royal Society, where they were warmly received by vice-president Martin Folkes, the free-thinking antiquary, astronomer and mathematician, who was on good terms with Davall.[68]

65 Rocque's map, the fuller title of which is *A Plan of the Cities of London and Westminster, and Borough of Southwark; with the Contiguous Buildings; From an Actual Survey taken by John Rocque, Land-Surveyor and Engraved by John Pine. Bluemantle Pursuivant at Arms, and Chief Engraver of Seals, &c. To His Majesty*, is also widely available online. See the zoomable version on the David Rumsey Map Collection (https://www.davidrumsey.com/luna/servlet/workspace/handleMediaPlayer?lunaMediaId=RUMSEY~8~1~287864~90045096). The complicated publication history of the Rocque map—there were two separate versions, the second a 16-sheet map covering a larger area—is explained in J. Montague, 'New light on John Rocque: his career as artist-engraver and his great city maps of London (1746) and Dublin (1756)', *Imago Mundi* **74**, 31–64 (2022), note 2, p. 54. See also: R. Hyde, 'The making of John Rocque's map', in *The A to Z of Georgian London*, pp. v–viii (Harry Margary in association with the Guildhall Library of London, Lympe Castle, Kent, 1981); R. Hyde, 'Portraying London mid-century: John Rocque and the brothers Buck', in *London 1753* (ed. S. O'Connell with R. Porter, C. Fox and R. Hyde), pp. 28–38 (British Museum, London, 2003); and the extended discussion on the Locating London's Past (https://www.locatinglondon.org/) (2011) website, provided by the Institute of Historical Research's Centre for Metropolitan History.

66 Sloane was the Royal Society's principal secretary from 1693 and edited the *PTRS* until 1712. See J. Jacquot, 'Sir Hans Sloane and French men of science', *Notes Rec. R. Soc. Lond.* **10**, 85–98 (1953); I. B. Cohen, 'Isaac Newton, Hans Sloane and the Académie Royale des Sciences', in *Mélanges Alexandre Koyré: L'aventure de la science*, pp. 61–116 (Hermann, Paris, 1964); J. A. Clarke, 'Sir Hans Sloane and Abbé Jean-Paul Bignon: notes on collection building in the eighteenth century', *Library Q.* **50**, 475–482 (1980); and more generally J. Delbrougo, *Collecting the world: the life and curiosity of Hans Sloane* (Penguin, London, 2018).

67 Pine, a close friend of William Hogarth, was famous, among other things, for his frontispiece to Daniel Defoe's *Robinson Crusoe* (1719). See D. Blewett, 'The iconic Crusoe: illustrations and images of Robinson Crusoe', in *The Cambridge companion to Robinson Crusoe* (ed. J. Richetti), pp. 159–190 (Cambridge University Press, 2018).

68 On Folkes, who was also a student of de Moivre, see the superb biography by A. M. Roos, *Martin Folkes (1690–1754): Newtonian, antiquary, connoisseur* (Oxford University Press, 2021), which notes, *inter multa alia*, that Folkes nominated Davall, by

Folkes and Davall provided enthusiastic testimonials in support of the project's manifesto, on 17 May 1740 and on 24 July 1742 respectively, and the scheme eventually attracted 246 subscribers, each paying three guineas.[69]

In an excellent recent article, architectural historian John Montague has highlighted the previously unacknowledged importance of Davall and Folkes in Rocque's survey of London. The two men were, in effect, the 'unofficial monitors of the project', according to Montague. Davall, in particular, adopted a 'supervisory and almost didactic role', partly because he did not consider Rocque to be a suitably qualified 'cartographer in the French mould'.[70]

Davall's importance for the Rocque survey of London, revealed by his initial recommendation in his criticisms of Delisle and through his direct involvement in the project, did not go unnoticed in the Royal Society, into whose fellowship he was elected in October 1740. His nomination certificate, signed in March 1739 by an impressive list of astronomers, mathematicians, antiquaries and lawyers, referred to his 'Curious remarks publisht in the Philosophical Transactions upon Monsieur De Lisle's comparison of London and Paris'.[71] Davall, later associated with the 'Hardwicke' circle of Whig aristocrats, played an important role managing the Royal Society's finances and investments as secretary from 1747 to 1759 and vice-president from 1759 to 1762.[72]

Conclusion

The controversy surrounding Guillaume Delisle's 1725 *mémoire* on the geographies of London, Paris and other great cities, past and present, highlights some of the themes in early-modern debates about urban life on the eve of the industrial age. Despite its flaws, Delisle's *mémoire* was an important early attempt at a comparative historical geography of urban form in which cities were considered as dynamic spaces, shaped by changing economic, social and political conditions. In developing this thesis, Delisle made use of new cartographic techniques to map urban space with hitherto unimagined accuracy and with reference to an external, scientifically surveyed national space.

Delisle's *mémoire*, Davall's criticisms and Mairan's defence can be considered with reference to the more substantial disputes between Cartesians and Newtonians into which both the Academy of Sciences and the Royal Society were drawn. This context suggests the controversy surrounding Delisle's claims was more complex and multi-faceted than is initially apparent. The three protagonists in this dispute were pursuing distinctive personal

then secretary of the Royal Society, as executor of his estate and awarded him a generous bequest of £100 and a silver watch in his will.

69 Hyde, 'The making of John Rocque's map', *op. cit.* (note 65), p. vi.

70 Montague, *op. cit.* (note 65), esp. pp. 35–36. See also J. Montague, 'L'étranger deux fois: John Rocque's "outsider" maps of London and Dublin', *Distance Looks Back: Proc. Soc. Archit. Hist., Australia and New Zealand* **36**, 273–286 (2020).

71 RSA EC/1740/07. The signatories included, alongside de Moivre and Folkes, James Burrows, Richard Graham, William Jones, John Machin, Francis Wollaston and Daniel Wray.

72 D. P. Miller, 'The "Hardwicke circle": the Whig supremacy and its demise in the 18th century Royal Society', *Notes Rec. R. Soc. Lond.* **52** (1), 73–91 (1998). Davall's contributions to the organization and finances of the Royal Society can be traced in RSA NA6803. For his correspondence with Thomas Birch, see British Library Add. MSS 4304, 4323, 4444, 4475. Davall prepared the astronomical tables for the 'Change of Style' reforms to the Gregorian calendar in 1752, available in the Church of England Record Centre, Lambeth Palace Library, MS 951/1, fols 19r–22v. See R. Poole, *Time's alteration: calendar reform in early modern England* (UCL Press, London, 1998), p. 115.

agendas that would not have been obvious to each other. Delisle's analysis was part of a campaign to promote disciplinary re-alignment within the Academy and recognize the new science of geography he claimed to represent. Davall's criticisms of Delisle reflected his Huguenot political and religious beliefs and a deep-seated suspicion of any claims about the pre-eminence of Paris over his adopted city of London, whose supremacy would be confirmed, he insisted, by a modern scientific survey. Mairan's defence of Delisle's methods reflected a desire to protect the Paris Academy's scientific reputation while seeking an accommodation between rival Cartesian and Newtonian perspectives. This inconclusive and long-forgotten quarrel had tangible consequences for subsequent urban mapping surveys, including those culminating in the two most celebrated urban representations of the period—the Turgot plan of Paris in the late 1730s and the Rocque map of London in the 1740s.

Data accessibility

This article has no additional data.

Declaration of AI use

We have not used AI-assisted technologies in creating this article.