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Air Conditioning Jahangir: The 1622 English Great Design, Climate, and the Nature of Global Projects

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ABSTRACT: An exploration of an unfulfilled 1622 English global project offers an anthropology of early modern global economic thought. The design included the air conditioning of the Mughal court, piracy, and a submarine treasure-hunting industry. A seemingly Orientalist or colonial attempt to Anglicize India, the design, in fact, aimed to globalize England by drawing on new views concerning the malleability of climate. Later colonialism cannot explain the culture of early seventeenth-century projecting in general and great designs in particular. However, the latter shaped relations of knowledge and power, which continued to operate in later Orientalism and colonialism.

How to Consider a Great Design

In 1622, King James I (1566–1625), Prince Charles (1600–1649), and a few of their courtiers drew up a design for expanding English power and honor across Asia and beyond. In 1617, James had received a letter from Mughal Emperor Jahangir (1569–1627) requesting “all sorts of rarities and rich goods fit for my palace.”¹ The remarkable plan the Crown devised in response is now detailed in a document in the Colonial Record Office (see the below appendix). James resolved to send Jahangir the gift of air conditioning his palace. Meanwhile, other Indian princes of the region would be tempted into English trade and friendship through gifts of automata and other rarities.

1. James Harvey Robinson, ed., *Readings in European History*, vol. 2: *From the Opening of the Protestant Revolt to the Present Day* (Boston: Ginn and Co., 1904–06), pp. 333–335.

A list of thirty English goods would be traded, promising a three-to-one profit. This trade and technological diplomacy would pave the way for a so-called great design: a five-point plan, including the invasion of Sumatra, Siam, and Acheen, piracy on Chinese, Spanish, and Portuguese ships, and a new pearl-diving and treasure-hunting industry. The latter would be carried out using the submarine and weight-lifting engine newly invented by Dutch-born Cornelis Drebbel (1572–1633). Of all the projects included within the great design, the submarine and engine inspired the greatest “hopes and probabilities” and was expected “not only to returne a present profit, but an annual & everlasting treasure to his Majesty & his Successors for ever.”² James issued a commission for this voyage extending not only to the court of Jahangir, but also to “other Princes or States, People, Citties, Islands, Continents and Places whatsoever already discovered or not discovered” within the vast swath of the globe stretching from the tip of Africa eastward to the tip of America.³

The 1622 English *great design* was one of a number of so-called great, glorious, or grand designs of the period; it was referred to in period documents as a “great designe” and “great attempt.”⁴ Like the English plan to disrupt Spanish and Portuguese trade in Asia, during 1623–24 the Dutch West India Company developed a great design (*groot desseyen*) to conquer the Portuguese South American mercantile empire and control the slave trade. This great design, although put into execution, failed. It, nevertheless, has received some scholarly attention, suggesting as it does new Dutch imperial views of space.⁵

2. Colonial Record Office 77, 34 (renumbered as 60) (UK National Archives, Kew). Special thanks to Rupali Mishra for this reference. See the appendix for a transcription. Negotiations with the East India Company concerning the design are discussed in W. Noël Sainsbury, ed., *Calendar of State Papers Colonial, East India, China and Japan*, vol. 4: 1622–24 (London: Longman et al., 1878), lxiii–lxv, and *English East India Company Court Minutes*, bk. 5, pp. 404–406, 409, 469–470 (British Library, Asia and Pacific Collections, B7, London). All dates are given from the original documents and therefore are in the old style.

3. State Papers (UK National Archives, Kew), 14/141/362. Reprinted in Robert Sanderson, ed., *Foedera, Conventiones, Literae, et Cujuscunque Generis Acta Publica, inter Reges Angliae, et Alios quosvis Imperatores, Reges, Pontifices, Principes, vel Communitates*, vol. 12 (London: Churchill, 1717), pp. 407–410.

4. Colonial Record Office 77, 34 (above, n. 2).

5. Henk den Heijer, *De Geschiedenis van de WIC* (Zutphen: Walburg, 1994); Anne Doedens and Henk Looijesteijn, eds., *Op jacht naar Spaans zilver. Het scheepsjournaal van Willem van Brederode* (Hilversum: Uitgeverij Verloren, 2008); Janny Venema, *Kiliaen van Rensselaer (1586–1643): Designing a New World* (Hilversum: Uitgeverij Verloren, 2010), pp. 187–189. For a cultural geography of space and new global ambitions suggested by the “*groot desseyen*,” see Benjamin Schmidt, “The Dutch Atlantic: From Provincialism to

By contrast, the 1622 English plan has neither been studied nor analyzed as a great design.

The very unfulfillment of such plans, as in the Dutch case, offers reason to pay them attention. If the best-laid plans of upstart, small polities like England and the United Provinces failed, they make the ambitions of later, successful projects the more remarkable. Unfulfilled projects can help us reimagine how later realities appeared at the time when they too were merely projected.⁶ We might find later global interventions, such as the triangular trade established in the 1640s, morally heinous, but hindsight has perhaps also made them seem more practical. Such successfully implemented global interventions can come to appear overdetermined in retrospect. The great design returns us to an early seventeenth-century horizon of possibility, and it is a surprising, even seemingly intractable one. Air conditioning? Piracy? A permanent submarine industry? This does not sound like a plan that the English Crown would seriously have entertained—yet it did. The history of unfulfilled global projects offers a view on what might have been; in so doing, it allows us to re-examine the project as a form of global reasoning that later fulfilled realities have rendered inscrutable.

The particular technology deployed here, air conditioning, permits us to relate the global projects of great designs to the recent eco-critical turn of cultural studies. Historians and literary scholars alike have recently asked how phenomena seen previously from political, confessional, economic, or cultural viewpoints might be re-analyzed in light of climatic history.⁷

Later history immediately suggests a colonial or Orientalist perspective on the 1622 great design. Edward Said saw the project as a quintessential Orientalist genre, allowing Europeans to project their own intertwined knowledge and power outward over an Other, without ever truly accessing alien realities. At the heart of the Orientalist project, according to Said, lay the idea of King James's courtier Francis Bacon that "Knowledge is power."⁸ Locality and science are also often broached from the perspective of colonial science, including

Globalism," in *Atlantic History: A Critical Appraisal*, ed. J. P. Greene and P. D. Morgan (Oxford: Oxford University Press, 2009), pp. 163–190.

6. Michiel van Groesen, "Lessons Learned: The Second Dutch Conquest of Brazil and the Memory of the First," *Colonial Latin American Review* 20:2 (2011): 167–193.

7. Geoffrey Parker has recently forcefully argued for the role of climate change within seventeenth-century disruptions, in *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century* (New Haven, CT: Yale University Press, 2013).

8. Edward Said, *Orientalism* (New York: Vintage Books, 1979), pp. 27–36, 88–89, 169.

a presumed desire for accumulation of natural resources *inward* and a technology transfer *outward*.⁹ In light of Orientalism and post-colonialism, an ambitious plan to air condition the Mughal court appears to be a typical projection of knowledge/power abroad and Anglicization of the periphery, as eighteenth-century studies of air conditioning in India suggest.¹⁰

This later viewpoint does not apply to 1622, however, given the extremely weak political position of King James in comparison with Emperor Jahangir.¹¹ James did not have power to project in 1622, which makes the ambition of the great design the more puzzling. Furthermore, rather than an Anglicizing technology, air conditioning was *already* an Indian art: the various palaces of Jahangir and his family in several cities were outfitted with a sophisticated system of cooling fountains and channels.¹² Although the chemical cooling of water mixed with broken saltpeter has been described as Drebbel's invention in modern historiography, saltpeter had, in fact, already been used to cool water for centuries in India. An account of the reign of Akbar, Jahangir's father, offered a recipe for the technique, and we thus know more about the Indian method than Drebbel's.¹³

9. David Wade Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge," *Osiris*, 2nd series, 15 ("Nature and Empire: Science and the Colonial Enterprise") (2000): 221–240; Ahsan Jan Qaisar, *The Indian Response to European Technology and Culture (A.D. 1498–1707)* (Delhi: Oxford University Press, 1982); Zaheer Baber, *The Science of Empire: Scientific Knowledge, Civilization, and Colonial Rule in India* (Albany: SUNY Press, 1996).

10. Rajani Sudan, "Chilling Allahabad: Climate Control and the Production of Anglicized Weather in Early Modern India," *Journal for Early Modern Cultural Studies* 8:2 (2008): 56–73.

11. Robert Markley, "Riches, Power, Trade, and Religion: The Far East and the English Imagination, 1600–1720," *Renaissance Studies* 17 (2003): 494–516, and "Gulliver and the Japanese: The Limits of the Postcolonial Past," *Modern Language Quarterly* 65:3 (2004): 457–479; Richard Barbour, *Before Orientalism: London's Theatre of the East, 1576–1626* (Cambridge: Cambridge University Press, 2003).

12. Catherine Ella Blanchard Asher, *Architecture of Mughal India* (Cambridge: Cambridge University Press, 1992).

13. Abū al-Fazl ibn Mubārāk, *Ain I Akbari*, trans. H. Blochmann (ca.1590; reprint, Calcutta: Baptist Mission Press, 1873), pp. 55–56; Joseph Needham, *Science and Civilisation in China*, vol. 3 (Cambridge: Cambridge University Press, 1976), pp. 225–226; Thomas Schachtman, *Absolute Zero and the Conquest of Cold* (Boston: Houghton Mifflin, 1999), p. 17 (which refers to cooling by evaporation in India, but not the use of saltpeter); Brenda J. Buchanan, ed., "Saltpetre: A Commodity of Empire," in *Gunpowder, Explosives, and the State: A Technological History* (Aldershot, UK: Ashgate, 2006), pp. 67–90, quote on p. 86; Vijaha Jahant Deshpande, "History of Chemistry and Alchemy in India from Pre-historic to Pre-modern Times," in *History of Indian Science, Technology and Culture, AD 1000–1800*, ed. Abdur Rahman (Oxford: Oxford University Press, 1998), pp. 19–170.

Englishmen were aware that this was not their invention—Bacon would report on it in a work of 1623.¹⁴ The great design is far more difficult to understand than a postcolonial perspective would at first suggest; James's decision to give Jahangir an Indian art will not be so easily explained or dismissed as an Anglicization of India.

Setting aside for the moment later colonial history, how then should we approach the great design? A variety of possible perspectives suggest themselves; for instance, the great design is a thrilling source from the perspective of the history of technology. It is not every day that one encounters the world's first submarine in the Colonial Record Office. While the documents do not offer schematics or other precise details, they cast the early inventions of Drebbel in an entirely new light. The weight-lifting engine mentioned in the design had not even been known previously as one of Drebbel's inventions. Both the submarine and the artificial air conditioning are now well-known, but the context of their potential deployment by the state is not. We have no details from Drebbel concerning how either of these worked, but the effects of both were publicly observed in the early 1620s: the former through a successful trip from London to Greenwich witnessed by James and hundreds of observers, and the latter through a cooling of "the great Hall at Westminster" that forced the king and all the lords to run from the room in the middle of the summer.¹⁵ In the context of the great design, these two events, which might previously have appeared to be a courtly entertainment, now take on the character of a public test of inventions useful to the Crown.

Drebbel, however, never went to Asia and has not been previously linked to English interventions in the region. The great design can be easily mined for details concerning his career, but how can his career help us understand the great design? Perhaps his inventions

14. Francis Bacon noted many East Indian medicines, including betel, "Indian leaf," and the ambergris used by an apothecary in "Calecut"; he then also described how saltpetre was used for refrigeration in hot countries. See Bacon, "Historia Vitae et Mortis," in *Opera* (London: Haviland, 1623), p. 230. "Sed, ut accepi, in Regionibus calidioribus, ubi Nix non cadit, fit Conglaciatio à Nitro solo; Sed hoc mihi compertum non est."

15. On the air conditioning, see Cornelis van der Woude, *Kronijcke van Alcmæer* (Alkmaar: Breken-geest, 1645), p. 116. For the submarine, see Constantijn Huygens, *Mijn Jeugd*, trans. C. L. Heesakkers (Amsterdam: Querido, 1987), p. 129; and Rosalie Colie, "Cornelis Drebbel and Salomon de Caus: Two Jacobean Models for Salomon's House," *Huntington Library Quarterly* 18:4 (1954): 245–269, quote on 257. For Drebbel's biography, see Frans Maurits Jaeger, *Cornelis Drebbel en zijne tijdgenooten* (Groningen: Noordhoff, 1922); and Vera Keller, "Cornelis Drebbel (1572–1633): Fame and the Making of Modernity" (Ph.D. diss., Princeton University, 2008).

are merely a contingent addition to and a historiographic distraction from a plan whose main concerns lay in the diplomatic history of the region.

The diplomatic history of the region also, however, only takes us so far. It is very unclear how a simple gift-giving expedition came to include the invasion of three lands, widespread piracy, and the foundation of a submarine treasure-hunting industry. Perhaps the economic history of the Indian Ocean region offers the most comprehensive explanation. The 1622 great design intersected with King James's attempt to revive the English falling wool trade, particularly in competition with the Dutch, who had newly established their trading outpost in Batavia in 1619. Between 1620–22, however, both the Dutch and English were cut off from trading in Aceh (Acheen), a strategically important mercantile center.¹⁶ The Dutch East India and English East India companies were increasingly coming into tension in the region. James had grown frustrated with his inability to broker a truce between the two companies.¹⁷ Tension grew even before the 1623 Amboina massacre of English East India employees by the Dutch company occurred (which would prove a sore point in Anglo–Dutch relations for the rest of the century). The 1622 great design offered a plan for Crown-controlled trade in the region that would obviate the difficulties the king experienced with the English East India Company.

This explanation perhaps gets us the farthest yet, but mysteries remain. The ambition of the Crown remains unexplained. If the experienced English East India merchants had failed to solve the problems of the region, why did the Crown believe it could? Furthermore, the great design expressed an attitude toward trade beyond the merely profit-driven—it involved honor. The design promised to restore “the venting of our English cloth there, and hereby to recover the (almost) lost honor of our nation, in all parts of India.” The king would send a “great shippe of countenance & burden” not only to carry sufficient merchandise, but also “to serve for honoring of the kings name.” James's commission granted his servants the power to trade in order to “further extend the Honor of Our Name and Kingdoms.”¹⁸ A priori, honor and profit might seem to conflict.

16. Anthony Reid, *An Indonesian Frontier: Acehnese and Other Histories of Sumatra* (Singapore: Singapore University Press, 2005), p. 102.

17. G. N. Clark and W. J. M. van Eysinga, *The Colonial Conferences between England and the Netherlands in 1613 and 1615* (Leiden: Brill, 1940).

18. State Papers (above, n. 3).

Royalty and nobility were not supposed to engage in ignoble trade, and whereas profit entailed gaining more than one gave, honor often demanded costly displays of magnanimity.

Neither solely technological, diplomatic, nor mercantile, the 1622 great design continually misdirects us, attracting our attention now here, now there, from a submarine voyage down the Thames, to the Mughal court, to international joint-stock-company disputes, to the king's honor. As a contingent assortment of various intriguing though seemingly competing projects, the great design as a whole dissolves as less than the sum of its parts. What tied it all together?

The nature of great designs themselves offers a holistic interpretation and a greater understanding of the logic that also motivated other, fulfilled global projects. A great or grand design, what is today called *grand strategy*, was in the seventeenth century a recognizable genre.¹⁹ Far from contingent assortments, great designs were carefully crafted; by design, these plans purposefully mixed what for us may be separate endeavors. A great design will therefore not be unfolded if approached haphazardly from the perspective of one or another modern discipline; rather, combining the entangled history of technology, the environment, and sociopolitical conceptions of power with an older style of anthropologically informed micro-history can help us understand early modern global strategies and the views of global space they suggest.

19. Currently, the best-known are a reputed grand design drawn up for Henry IV, which, however, has never been uncovered; the Dutch West India Company "*groot desseyen*" (discussed above); and Oliver Cromwell's "Western Design." See John T. O'Connor, "Politique et utopie au début du XVII^e siècle: Le Grand Dessein de Henri IV et de Sully," *XVII^e siècle* 174 (1992): 33–42; Karen Kupperman, "Errand to the Indies: Puritan Colonization from Providence Island through the Western Design," *William and Mary Quarterly* 45:1 (1988): 70–99; Carla Gardina Pestana, "English Character and the Fiasco of the Western Design," *Early American Studies* 3:1(2005): 1–31; Peter Paret, ed., *Makers of Modern Strategy* (Princeton, NJ: Princeton University Press, 1986); and Mark Mazower, *Governing the World: The Rise and Fall of an Idea, 1815 to the Present* (London: Penguin, 2012). No position paper outlining a grand strategy for powers like France, Spain, Russia, or the Ottoman Empire survives, however. See Geoffrey Parker, *The Grand Strategy of Philip II* (New Haven, CT: Yale University Press, 1998); John P. LeDonne, *The Grand Strategy of the Russian Empire, 1650–1831* (Oxford: Oxford University Press, 2004), p. 6; J. Michael Hayden, "Continuity in the France of Henry IV and Louis XIII: French Foreign Policy, 1598–1615," *Journal of Modern History* 45:1 (1973): 1–23; and Gabor Agoston, "Information, Ideology, and Limits of Imperial Policy: Ottoman Grand Strategy in the Context of Ottoman–Habsburg Rivalry," in *The Early Modern Ottomans: Remapping the Empire*, ed. V. H. Aksan and D. Goffman (Cambridge: Cambridge University Press, 2007), pp. 75–103.

Between Conversion and Competition

While a recognizable entity during the period, great designs were also evolving and contested. Great, grand, and glorious designs were not initially deployed simply for global-trading ventures: they signaled bold and wide-ranging strategies of attack aimed at seemingly insurmountable enemies. More particularly, the great designs of the early seventeenth century were often strategies developed by small Protestant polities for attack against global Catholic enemies, who were presumed to be operating according to their own great designs.²⁰ In 1621, with the rise to power of the belligerent Maurice of Nassau, Prince of Orange, the Dutch West India Company was founded, in part, as an instrument of war against Spain. The company's great design of 1623 was seen as part of its struggle with Spain.²¹ A 1628 contract between the Duke of Buckingham and Swedish King Gustavus Adolphus for the founding of a new Caribbean state that would disrupt Spanish shipping in the area referred to the plan as a "glorious design" ("*ce glorieux dessin*").²² The Prince of Orange, Fredrick Hendrick, after successfully capturing the southern Netherlandish city of S'Hertogenbosch from the Spanish, developed a 1644 "great design and enterprise" ("*grote desseynde ende entreprinse*") for conquering Flanders as a whole.²³ In turn, Catholic kingdoms suspected that "great plots" existed.²⁴

These bold plans signaled the ambition of small, upstart, northern principalities vis-à-vis the world's largest empires around the world. Both divine providence, as well as new political understandings of state powers, supported such ambitions. Intertwined confessional,

20. A 1630 report of the Council of State in The Hague refers to the means necessary to overthrow a Spanish "great enemy design in order to ensure free trade with our marine neighbors (. . . *en alle middelen aangewent, om soo een groot Vyandlijk desseign te breken en den vryen Koophandel, met onse Nabuuren ter Zee te verseekeren*).” See "Register van Holland en Westvriesland, van de jaaren 1627, 1628, 1629, en 1630," in *Resolutien vande Heeren staaten van Hollandt ende West-Vrieslandt* (The Hague, 1524–1780), p. 86.

21. Henk den Heijer, "The Dutch West India Company, 1621–1791," in *Riches from Atlantic Commerce: Dutch Transatlantic Trade and Shipping, 1585–1817*, ed. J. Postma and V. Enthoven (Leiden: Brill, 2003), pp. 77–112, esp. pp. 86–87.

22. Paul R. Sellin, "Michel le Blon and England III: Gustav II Adolf, Sir Walter Raleigh's Gold Mine, and the Perfidy of George Villiers, Duke of Buckingham," *Dutch Crossing* 23:1 (1999): 102–132 and *Treasure, Treason and the Tower: El Dorado and the Murder of Sir Walter Raleigh* (Farnham, UK: Ashgate Publishing, 2011), p. 9.

23. Gerhard Wilhelm Kernkamp, *De sleutels van de Sont. Het aandeel van de Republiek in den Deensch-Zweedschen oorlog van 1644–1645* (The Hague: M. Nijhoff, 1890), p. 179.

24. Peter T. Bradley, "The Portuguese Peril in Peru," *Bulletin of Spanish Studies* 79:5 (2002): 591–613.

mercantile, and political aims at first worked seamlessly together to justify a great design aimed at Catholic powers by Protestant ones.²⁵ Spreading outward, the great design sought, by bringing space under its control, to convert it. Such justifications grew more complicated, however, once global competition began to emerge *between* Protestant powers, such as the Dutch and the English. The 1622 great design, while still aimed against Spain and Portugal, teetered at a brink where the separation of political and mercantile aims from confessional ones grew difficult to ignore.

Furthermore, the 1622 great design did not attempt to convert foreign space. Economic ideas popular in the court of King James concerning the necessity of imitating and improving on foreign arts encouraged projects that, far from converting spaces into English ones, encouraged English spaces to grow transnational. Rather than seeking to convert Jahangir's space to an English one through a European invention of air conditioning, the great design, in fact, aimed to perfect a Mughal technique. The same projectors involved in this design also sought to transform English spaces through parallel techniques.

New views of climate as transformable through technology helped to finesse the diverging motivations of global projects. *Temperature* rather than *temperament* framed climates in quantitative rather than qualitative ways. Seventeenth-century tools of climate measurement and control, including thermometers, air conditioning, and self-regulating furnaces, suggested that these quantitatively described conditions could be analyzed and modified.²⁶ As projects purposefully mixed the local and the foreign, space could be made fungible.

Great Designs as Imperial Display

As a show of imperial power, the great design aimed to reach beyond the local. Great designs suggested forms of knowledge that might offer a universal means to understand and manipulate disparate global situations; they targeted underlying causes in the world that might connect a variety of seemingly scattered and disconnected epiphenomena. In great designs, knowledge was power, at a time

25. Victor Enthoven, "Early Dutch Expansion in the Atlantic Region, 1585–1621," in *Riches from Atlantic Commerce: Dutch Transatlantic Trade and Shipping, 1585–1817*, ed. J. Postma and V. Enthoven (Leiden: Brill, 2003), pp. 17–48.

26. On Drebbel's self-regulating ovens and their relationship to new languages of temperature, see below, as well as Vera Keller, "Re-entangling the Thermometer: Cornelis Drebbel's Description of his Self-regulating Oven, the Regiment of Fire, and the Early History of Temperature," *Nuncius, Journal of the Material and Visual History of Science* 28 (2013): 1–33.

when this idea was not widely shared in more scholarly settings.²⁷ Designers of global strategy appealed to the head of state's desire to hold in their hands a powerful key that might, in a single, linked intervention, lever their state into new positions of power around the globe, including at home.

The knowledge of nature and *techne* in the 1622 great design was not a contingent addition to it, but was insisted on. Such secrets of nature and art intersected with the secrets of empire, promising heads of state a privileged means to know and intervene within the world.²⁸ Outside observers, including one's own subjects, could witness a myriad of state interactions, but were left to wonder at the secret reasons of state that linked and motivated them.²⁹ King James prioritized his firm hold on the *arcana imperii* (secrets of empire), with the great design and its *techne* among them.³⁰ As Jessica Wolfe has argued, the mysterious mechanisms Drebbel fashioned to amaze spectators at the court were one means for James to display his hold on the *arcana imperii*: his subjects could see stupendous effects, but only James could understand root causes.³¹ Such displays were not disconnected from the unconstrained ways he sought to act around the world. James sought to be himself, like Drebbel's inventions, unlimited by nature. Hugo Grotius noted this while negotiating the perennial differences between the English and the Dutch East India companies, which would help inspire Grotius's theory of the freedom of the seas.³² While in London in 1613 for the negotiations, he visited Drebbel's most famous invention: the microcosmic perpetual-motion machine that James had installed in Eltham Palace. In a poem comparing James himself to the device, Grotius pointedly

27. Steven Shapin, "'A scholar and a gentleman': The Problematic Identity of the Scientific Practitioner in Early Modern England," *History of Science* 29 (1991): 279–327.

28. Vera Keller, "Mining Tacitus: Secrets of Empire, Nature, and Art in the Reason of State," *British Journal for the History of Science* 45:2 (2012): 189–212.

29. Eva Horn, "Logics of Political Secrecy," *Theory, Culture & Society* 28:7–8 (2011): 103–122.

30. Ernst H. Kantorowicz, "Mysteries of State: An Absolutist Concept and Its Late Mediaeval Origins," *Harvard Theological Review* 48 (1955): 65–91; Alan T. Bradford, "Stuart Absolutism and the 'Utility' of Tacitus," *Huntington Library Quarterly* 46 (1983): 127–155; Debora K. Shuger, *Habits of Thought in the English Renaissance: Religion, Politics, and the Dominant Culture* (Berkeley: University of California Press, 1990), pp. 155–156.

31. Jessica Wolfe, *Humanism, Machinery, and Renaissance Literature* (New York: Cambridge University Press, 2004), p. 66.

32. Martine Julia van Ittersum, *Profit and Principle: Hugo Grotius, Natural Rights Theories and the Rise of Dutch Power in the East Indies, 1595–1615* (Leiden: Brill, 2006).

alluded to the king's claims to unconstrained powers. The perpetual-motion machine overrode the natural laws that limited activity within the sublunar realm of the four elements. "[W]hat Nature hath those Laws transgrest, / Giving to earth a work that ne're will rest?" queried Grotius. "Though 'tis most strange, yet (great King) 'tis not new; / This Work was seen and found before in You."³³

The secrecy surrounding Drebbel has often been identified with him, rather than with the courtly setting in which he operated. An eighteenth-century enterprise to distinguish between philosophers and charlatans pinned upon Drebbel the reputation of an imposter purposefully mystifying the public.³⁴ However, the decision to publicize the inner workings of inventions was not Drebbel's to make. Furthermore, technological claims to override elemental constraints were connected to philosophical views concerning the nature of the elements themselves. Drebbel, while keeping the details of his inventions secret, made his philosophical views known by publishing *A Short Treatise on the Nature of the Elements and How They Cause Wind, Rain, Thunder, and Lightning and How They Might Be Used*.³⁵ He claimed access to underlying universal, natural causes that could be used by humans to expand their powers.

Secrets of nature were not an accidental addition to the great design, but part of a logic seeking privileged knowledge and under-cover power. The submarine most obviously allowed this, but in a more subtle fashion so also did the other inventions when seen from the viewpoint of contemporary natural theories. Air conditioning, submarine navigation, and weight-lifting engines promised to obviate the constraints that the nature of the elements (here, air, water, and earth) imposed on humans.

33. Hugo Grotius, *Poemata Omnia* (Leiden: Vogel, 1645), p. 270. "Sed quod nunc Natura suis è legibus exit / Dans terris semper quod moveatur opus? / Mira quidem res est sed non nova (maxime Regum) / Hoc fieri docuit mens tua posse prius. . . . Ut tua mens ergò motûs coelestis Imago: / Machina sic haec est mentis Imago tuae" (trans. Henry Vaughan), qtd. in Thomas Powell, *Humane Industrie or, A history of most manual arts* (London: Henry Herringman, 1661), p. 22.

34. J. C. Adelung, "Cornelis van Drebbel, ein Charlatan," in *Geschichte Der Menschlichen Narrheit*, vol. 2 (Leipzig: Weygand, 1786), pp. 125–150. For recent views of Drebbel's secrecy, see Matteo Valleriani, *Galileo Engineer* (Dordrecht: Springer, 2010), p. 162.

35. Cornelis Drebbel, *Ein kurtzer Tractat von der Natur der Elementen Und wie sie den Windt/Regen blitz und Donner verursachen und wozu sie nutzen* (Leiden: Haestens, 1608). On Drebbel as a philosopher, see Vera Keller, "How to Become a Seventeenth-Century Natural Philosopher: The Case of Cornelis Drebbel," in *Silent Messengers: The Circulation of Material Objects of Knowledge in the Early Modern Low Countries*, ed. S. Dupré and C. Lüthy (Berlin: LIT Verlag, 2011), pp. 125–151.

The great design was, like Drebbel's microcosmic perpetual motion, an imperial array. It showed numerous surface effects while keeping its counsel hidden; it offered a swaggering, impenetrable façade in the bravado, extent, and inscrutability of its aims; its privileged access to knowledge promised both profits and was, in and of itself, a means to showcase James's power.

Early modern heads of state like King James attempted to remove constraints on their power not only around the world, but also at home. They shifted secret knowledge from traditionally privileged corporations, such as the guilds or mysteries, to their own Crown-protected patentees or projectors. *Projects* are a very familiar word today, and one of the central means in which we all claim a proprietary form of knowledge, ability, or means of intervention within the world. In the early seventeenth century, projects were still new and controversial and the term *projector* was one of abuse.³⁶ Projectors were reviled as the tools of an overreaching state that sought to remove traditional powers from various privileged social corporations. Often foreigners like Drebbel, projectors were cut out of entrenched local power and thus dependent on the royal patents and patronage that allowed them to override guild protections; they claimed their projects as their own intellectual property.³⁷

Projectors earned their moniker when they operated outside the parameters of other socially sanctioned professional identities, such as guild member, physician, cleric, and professor. With no constraints on the range of their activities, they intervened at the pleasure of the king in any arena that might benefit themselves and, they claimed, the Crown. Particular projects of the period might include such disparate interventions as a domestic silk industry, controlling the rate of exchange of coin, improving chimneys, creating a new river to bring clean water to London, and New World colonies (with patents applying to inventions and colonies alike). Just as they mixed activities, projectors also mixed social statuses. A projector might be a great lord or a humble inventor; or, as was the case in the court of King

36. Joan Thirsk, *Economic Policy and Projects: The Development of a Consumer Society in Early Modern England* (Oxford: Oxford University Press, 1978), pp. 1–2.

37. For recent studies of projects, see Koji Yamamoto, "Distrust and Innovation: Reconstructing the Culture of 'Projector' in Seventeenth-century England" (Ph.D. diss., York University, 2010) and "Piety, Profit and Public Service in the Financial Revolution," *English Historical Review* 126 (2011): 806–834; Jason Peacey, "Print, Publicity, and Popularity: The Projecting of Sir Balthazar Gerbier, 1642–1662," *Journal of British Studies* 51:2 (2012): 284–307; and Vera Keller, "The 'framing of a new world': Sir Balthazar Gerbier's Project for Establishing a New State in America, ca. 1649," *William and Mary Quarterly* 70:1 (2013): 147–176.

James, newly feudal patron/client relationships could cascade down from the Crown to royal favorites, and from the favorites to the various artists, soldiers, engineers, and other workmen they patronized.

Great designs offered a means for the Crown to reassert itself within these patron/client relationships, since great designs were situated above particular projects. While the projector was defined by the very disparateness of his (and it was generally *his*) activities, great designs were defined by the way they related disparate projects together. If projects extracted action from corporate control and allowed it free, entrepreneurial range, great designs reintegrated those projects and projectors into new configurations.

These new configurations did not, however, re-create a local professional guild; rather, they mixed a variety of forms of expertise, social groups, and local knowledge, yet in a way that did not endow this new configuration with shared knowledge. While the guild enforced a shared body of knowledge to which every member was initiated, the great design, by contrast, brought together a seemingly disparate range of activities, yet attempted to preserve the knowledge of their ultimate links within the Crown's secrets of empire. The actors involved, however, might prove unwilling to give their secrets up to such over-arching plans: for example, the submarine was considered the most promising part of the great design, "provided his Majestys engines made by Cornelius Dribble prove true, & *may be had*" (emphasis added).

Rather than a monolithic projection of English power outwards, therefore, the great design crackled with tensions both domestic and foreign. Contests for power and honor proliferated between James and Jahangir, between the Crown and its projectors, between the projectors and other privileged corporations (such as the English East India Company), and between the English and Dutch East India companies. Jahangir's seemingly simple request for a gift from King James opened up for James these threats to his honor and power, which the great design was crafted to resolve.

Why Air Conditioning? Perfecting the Foreign

Now that we have peered into the secret mechanisms motivating the great design, we can gaze out again along its various facets and attempt to understand how James saw them as connected. The 1622 great design had its origins in a 1617 letter from Jahangir requesting a gift from England. Why did a request for a gift become such an expansive global project? That Jahangir bothered to write at all to James, the ruler of a tiny island nation, was significant: his request was more of a challenge than, at first, it might appear because diplo-

matic gifts were always difficult to select, as one did not want to give the impression of paying tribute to a more powerful suzerain.³⁸

James's previous gifts to Jahangir failed dismally. As a representative of the English East India Company reported, a gift of dogs was "only well liked," while one of "crystal cabinets [was] disgraced and made ridiculous on purpose." Jahangir claimed that the cabinets were glass and called them "very mean and ordinary." He had his artisans re-upholster an English coach in Indian textiles; he was also offended by a painting of Venus and a satyr, as it seemed to him to represent "a scorn of Asiatics." Meanwhile, Jahangir treated the English dogs with exaggerated deference, allowing them "four attendants . . . who by turns two and two together carried them up and down . . . and the other two went by them, fanning the flies from off them; and the King caused a pair of silver tongs to be made on purpose that with them, when he pleased, he might feed those dogs with his own hand." He asked for more dogs and "a horse of the greatest size."³⁹

What was it about the English dogs? Unlike other rulers in the region, Jahangir did not request English arts or technology, but continually snubbed them. Contrast this with the king of Siam's requests for "some curious pictures of men and women; a picture of the people and habits of all countries; and a picture of all wild beasts, which a fair map may sufficiently express; a curious perspective glass, fair and good; a fair and neat case of pistols; an English watch; six yards of fine scarlet; scarlet baize so much as will cover his white Olifant . . . with any other novelties."⁴⁰ The king of Persia requested, in additions to mastiffs and spaniels, scarlet cloth, guns, and the art of printing.⁴¹

The Mughal disdain for English art was part of a purposeful cultural competition. Mughal artists continually improved on European art.⁴² In particular, one of Jahangir's artists, Bichitr, transformed a

38. Natasha Eaton, "Between Mimesis and Alterity: Art, Gift, and Diplomacy in Colonial India, 1770–1800," *Comparative Studies in Society and History* 46:4 (2004): 816–844, esp. p. 818.

39. Edward Terry, *A Voyage to East-India* (London: Martin, 1655), p. 149.

40. Sainsbury, ed., *Calendar of State Papers Colonial* (above, n. 2), p. 111.

41. *Ibid.*, p. 377.

42. Timon Screech, "'Pictures (The Most Part Bawdy)': The Anglo-Japanese Painting Trade in the Early 1600s," *Art Bulletin* 87:1 (2005): 50–72, esp. p. 55; Milo Cleveland Beach, "The Mughal Painter Abu'l Hasan and Some English Sources for His Style," *Journal of the Walters Art Gallery* 38 (1980): 6–33, esp. p. 12; Robert Skelton, "Imperial Symbolism in Mughal Painting," in *Content and Context of Visual Arts in the Islamic*

portrait of King James, presented to Jahangir in 1615, from a display of James's royal power to a servile tribute (fig. 1). Although the portrait of James in Jahangir's collection has not been traced, the official royal portrait produced by the John de Critz studio remained similar throughout James's reign. Based on Bichitr's painting, the portrait sent to Jahangir probably very closely resembled the Sutherland portrait of James by the de Critz studio: James stands on a Turkish carpet next to an hour-glass-shaped X-frame chair, while gold-tooled leather wallpaper radiates behind him. In Bichitr's portrait (ca.1620–25), Jahangir sits on an actual hour-glass (symbolizing the length of his reign) set upon a European mannerist carpet, while a gold-tooled aureole shines as an actual halo around his head. Jahangir favors a humble Sufi sheikh, while ignoring both the Ottoman sultan and King James, whose portrait is meticulously copied from de Critz's work. In other versions of this theme, Jahangir disdained the ancient Roman emperor.⁴³

Jahangir prided himself on his immense collections of *naturalia* and *artificialia* from around the globe. A knowledgeable art collector, he may even have owned an engraving by none other than Drebbel.⁴⁴ Jahangir did not despise English art in favor of dogs because he found dogs more relatable; rather, his request for peculiarly English rarities was a strategy that both he and James understood.⁴⁵ It put

World, ed. P. Soucek (College Park: Pennsylvania State University Press, 1988), pp. 177–187; Barbara Fuchs, *Mimesis and Empire: The New World, Islam, and European Identities* (Cambridge: Cambridge University Press, 2001); Su Fang Ng, "Global Renaissance: Alexander the Great and Early Modern Classicism from the British Isles to the Malay Archipelago," *Comparative Literature* (special issue, "The Idea of Europe") 58:4 (2006): 293–312.

43. For the Sutherland portrait, see Kevin Sharpe, *Remapping Early Modern England: The Culture of Seventeenth-Century Politics* (Cambridge: University of Cambridge Press, 2000), p. 203. For other versions of the theme, see Abu'l Hasan, *Jahangir Receiving Sheikh Sa'di in Audience* (ca.1615), Freer Art Gallery, where Jahangir enthroned is attended by a figure in antique dress described in an inscription as "The Emperor of Rome [Rum] in ancient times." See also Richard Ettinghausen, "The Emperor's Choice," in *De Artibus Opuscula—Essays in Honor of Erwin Panofsky*, ed. M. Meiss (New York: New York University Press, 1961), pp. 98–120.

44. Milo Cleveland Beach argues this on the basis of a Mughal drawing in "The Gulshan Album and Its European Sources," *Bulletin of the Museum of Fine Arts* 63:332 (1965): 63–91. The drawing is now in the Victoria and Albert Museum (IS.259-1952). See also Beach, "European Painting and Mughal Miniatures," in *Intercultural Encounters in Mughal Miniatures*, ed. K. A. Ahmed (Lahore: National College of Arts, 1995), pp. 29–32.

45. Compare the idea that the Stuart and Mughal courts were "incommensurable"; see Sanjay Subrahmanyam, "Frank Submissions: The Company and the Mughals between



Figure 1. *Jahangir preferring a Sufi sheikh to kings*. Painting by Bichitr (ca.1620–25).
(Source: Freer Gallery of Art, Smithsonian Institution, Washington, D.C., purchase F1942.
15a.)

James in the position of the exotic Other, to be collected and added to Jahangir's universal menagerie. Jahangir (literally, "world-seizer"), like his European contemporaries, deployed his collecting in order to make claims to universal empire, particularly vis-à-vis Safavid Persian, Ottoman Turkish, and European powers.⁴⁶ Just as he lavished attention on the New World turkey in his collection, which he called the "wonder of the world," he spoiled the English dog to demonstrate his imperial mastery.⁴⁷

James did not want to be seen as a pet dog or Bichitr's plaything; it did not help that his rival in East India, Prince Maurice of Orange, had given James a live cassowary from Java, illustrating superior Dutch access to the region.⁴⁸ When James claimed that he would give Jahangir "satisfacion" in response to Jahangir's request for English rarities, it referred, at least partially, to the satisfaction of honor. Sending a specifically English gift, as Jahangir had requested, would hardly make a statement in a cultural environment long skilled at emulative rivalry;⁴⁹ instead, James engaged in the same competitive *mimesis* as did other early English gift-givers in India.⁵⁰ Rather than sending an English animal or even an English artwork, he selected an English improvement on an Indian art. Air conditioning was singularly *not* an English art; heating, particularly during the Little Ice Age, was a far more desirable power in James's northern lands. James had his court engineer, Drebbel, improve on an Indian art, just as Jahangir's artist Bichitr had improved on James's own portrait. Rather than attempting to make India English, James tried to show just how Indian he could be.

James's honor was at stake not only in his (and his dogs') treatment at Jahangir's hands: the draining of trade away from England

Sir Thomas Roe and Sir William Norris," in *The Worlds of the East India Company*, ed. H. V. Bowen, Margarett Lincoln, and Nigel Rigby (Woodbridge, UK: Boydell Press, 2002), pp. 69–96.

46. Corinne Lefèvre, "Recovering a Missing Voice from Mughal India: The Imperial Discourse of Jahangir (R. 1605–1627) in his Memoirs," *Journal of the Economic and Social History of the Orient* 50:4 (2007): 452–489.

47. W. M. Thackston, ed., *The Jahangirnama: Memoirs of Jahangir, Emperor of India* (New York: Oxford University Press, 1999).

48. William Harvey enjoyed anatomizing its egg; see Harvey, *Anatomical Exercitations Concerning the Generation of Living Creatures* (London: Pulleyn, 1653), pp. 25–27.

49. Richard Barbour, "Power and Distant Display: Early English 'Ambassadors' in Moghul India," *Huntington Library Quarterly* 61:3–4 (1998): 343–368, esp. p. 363.

50. Alison Games, *The Web of Empire: English Cosmopolitans in an Age of Expansion, 1560–1660* (Oxford: Oxford University Press, 2008), pp. 88, 110.

also touched his reputation. The solution to both lay in new ideas concerning the ability of arts to transmigrate around the world, overriding previous ideas that related arts to peoples and climes. According to what has been called a Hippocratic division of the world into climes and peoples, specific natural objects and specific arts fall in one region only, although desired in others. In a letter that Queen Elizabeth I sent to the king of Aceh in 1600, she called this a providential dispersal of goods around the world that maintained friendship between lands via mutual exchange.⁵¹ According to this view, the resources of each land remained stable, and trade merely exchanged them. Neither climes nor resources were constrained in this way, however, according to philosophers active in James's court, such as Drebbel; powers could be shifted purposefully from one polity to the next.⁵²

In an era newly stressing the transmigration of the arts and still emphasizing *mimesis* or competitive rivalry as a form of imperial contest, James did not aim for technology transfer outwards, but technology imports.⁵³ He did not wish to send English know-how abroad, but rather hoped to import both raw materials and arts from other lands, and to increase the manufactures in his own land.

Global Analysis, Secretive Counsel, and New State Structures

Imitating and surpassing the foreign offered a means to increase both profit and honor. The English, however, were utterly unable to achieve this in their Southeast Asian trade; they could not sell English woolens there, and, in fact, it was Indian calicos that were all the rage at home.⁵⁴ Thus, the English East India Company had to export bullion rather than manufactured goods abroad, purchasing calicos that they resold at home and in other markets.

On 20 October 1622, James formed a special commission to investigate why the international sale of English woolens had fallen. These committee members were to examine in particular "whether the East

51. Markley, "Riches, Power, Trade, and Religion" (above, n. 11), p. 498.

52. Compare Robert Markley, who has noted that Hippocratic conceptions of climate were still operative among Englishmen in India in the late seventeenth century; see Markley, "'A Putridness in the Air': Monsoons and Mortality in Seventeenth-Century Bombay," *Journal for Early Modern Cultural Studies* 10:2 (2010): 105–125.

53. Linda Levy Peck, *Consuming Splendor: Society and Culture in Seventeenth-Century England* (Cambridge: Cambridge University Press, 2005), esp. chap. 2: "'We may as well be silke-masters as sheepe-masters': Transferring Technology in Seventeenth-Century England."

54. Beverly Lemire and Giorgio Riello, "East & West: Textiles and Fashion in Early Modern Europe," *Journal of Social History* 41:4 (2008): 887–916.

India Company . . . trade which is specious in show may really be made profitable to the public, without exhausting the treasure of the kingdom." This was the very first committee that James ordered to examine issues of trade, thus establishing a standing committee of trade, a practice that his successor Charles I would further extend to include plantations.⁵⁵ The committee included several subcommittees, pitting differing views of the global flow of resources against one another. From these debates in late 1622 emerged theoretical accounts of global wealth that have been variously called "the birth of mercantilism" and a "Kuhnian paradigm shift" in economic thought.⁵⁶ These developments in theorizing about what we now know as the *world economy* were not distinct then, however, from the Crown's practices of global reasoning in great design.

In order to lever the Crown into a new position of power both at home and abroad, it needed to reason continually about the global flows of trade. Different climates were not set and linked to different trades that could providentially fit the world's pieces together as a mosaic of mutual exchange; rather, human intervention might cause the arts to transmigrate or metamorphose at any time, making the entire world always subject to change: an English art could become Dutch, an Indian art could become English. Events in one part of the world had far-reaching effects in another, and even the local woolen industry could not be separated from the Indian trade. James attempted to intervene in India not because he wanted to extend his power over the subaltern, but because if one followed the global trail of goods, one would find that, via the East India Company, India was draining England of its resources. This flow needed to be plugged and, if possible, reversed. Special committees were the vehicles through which this would be accomplished.

James aspired to take direct control of English activities in the eastern hemisphere by linking his projectors very closely to the Crown and its new institutions of counsel. The Crown and its advisors would

55. Sanderson, ed., *Foedera*, (above, n. 3), 415C; M. Andrews, "British Committees, Commissions, and Councils of Trade and Plantations, 1622–1675," in Johns Hopkins University Studies in Historical and Political Science, vol. 26: *Administrative and Political History* (Baltimore: Johns Hopkins University Press, 1908), pp. 1–135. On previous practices of turning to mercantile advisors, see Eric Ash, "A Note and a Caveat for the Merchant: Mercantile Advisors in Elizabethan England," *Sixteenth Century Journal* 33:1 (2002): 1–31.

56. Lars Magnusson, "The Birth of a Discourse of Mercantilism," in *Mercantilism: The Shaping of an Economic Language* (New York: Routledge, 1994), pp. 60–93; Joyce Appleby, *Economic Thought and Ideology in Seventeenth-Century England* (Princeton, NJ: Princeton University Press, 1978), p. 41.

determine precisely what goods would be bought and sold. In his commission for the 1622 voyage, his servants were commanded “to doe and put in practise all and singuler the Premisses” directed either by the king himself or by at least six members of his privy council. They were encouraged to import into his majesty’s dominions “Gould Silver Pearles Bullion Jewells Novelties or other Commodities as they shall think fit and convenient.” The “List or Schedule” of goods that they might export would be determined by the council. Indeed, the text of the 1622 design specified a list of over thirty exports, with “Broadcloathes, kersyes & perpetuaries”—that is, English cloth—topping it.⁵⁷

The details of the great design were described as having already “byn particulerly delivered unto the right Honorable the Lord of Carlile,” who might enlarge on them. James’s Scottish favorite, James Hay (1590–1636), had just been created Earl of Carlisle on 12 September 1622.⁵⁸ Carlisle, an already experienced ambassador, enjoyed great expertise in international affairs and was also himself a projector and patentee;⁵⁹ he participated in new and important state structures, including the recently expanded privy council and a new, more select standing committee for foreign affairs, which would become the cabinet.⁶⁰ The list of designs that Carlisle presented thus represents well-considered policies formed within new and rapidly evolving structures of secretive counsel for foreign affairs.

The English East India Company’s Opposition

Armed with state secrets, James believed that he could succeed where the English East India Company had failed. The design pointed out that winning a profit in the Indian trade was “a thing commonly & formerlie done.” Furthermore, James possessed privileged tools of unconstrained action, including ingenious inventions, ambitious projectors, new forms of global reasoning, and new state structures, which the company did not.

57. Colonial Record Office 77, 34 (above, n. 2).

58. Mary Anne Everett Green, ed., *Calendar of State Papers, Domestic Series, of the Reign of James I, 1603–1625*, vol. 3: 1619–1623 (London: Longman et al., 1858), p. 446.

59. Roy Schreiber, “The First Carlisle: Sir James Hay, First Earl of Carlisle as Courtier, Diplomat and Entrepreneur, 1580–1636,” *Transactions of the American Philosophical Society* 74:7 (1984): 1–202.

60. Edward Raymond Turner, *The Privy Council of England in the Seventeenth and Eighteenth Centuries, 1603–1784*, vol. 1 (Baltimore: Johns Hopkins University Press, 1927), pp. 73, 78, and *The Cabinet Council of England in the Seventeenth and Eighteenth Centuries, 1622–1784* (Baltimore: Johns Hopkins University Press, 1930), pp. 22–39; J. V. Lyle, *Acts of the Privy Council of England, 1619–1621*, vol. 37 (Nendeln: Krauss Reprint, 1974), p. 357.

The mores of the Crown and its projectors and servants conflicted with those of a corporation like the East India Company. Robert Brenner has described a generational conflict in international trade at this time between “the great City merchants behind the East India Company” on the one hand, and younger royal patentees and projectors on the other. The City merchants attempted to gain profits not by overriding constraints, but by setting them and thereby minimizing risk. They were not in the business of projecting nor of extending the honor of the king’s name, nor did they seek to transform conditions in the areas where they traded. As a result, the East India Company “consistently refused to allow it to involve itself in colonizing or plantation ventures of any kind,” unlike the Dutch joint-stock companies.⁶¹ In contrast, royal-backed projectors or patentees took out patents for colonies, arts, and inventions, spinning an interconnected web of empire around the globe by interfering in both the East Indian trade and New World plantations. In 1621–22 the “aristocratic colonizing group” and the “City merchant elite” briefly joined forces to take over the Virginia Company and reorder it. By the 1640s, however, the aristocratic interlopers replaced the older, company-backed plantation settlement in the New World.⁶²

The royal projectors who devised the 1622 great design came head to head with the East India Company. The company would not even consider their plan as a great design, referring to it vaguely as “the business.” It also continually broke apart the design’s various points, objecting to the range of action described in the plan, and most of all to what the company singled out as “the prince his proiect for sending a shipp and a flatt bottom boate into the Indies with Inventions for the Mogull to fish for pearls, and to weigh such wracke as have bene sunk in the Indian seas.” While the king’s servants presented the great design as a royal scheme not open to negotiation, the merchants never recognized, ontologically, the existence of a great design.

Heated discussions between the Crown and the company began on 29 April 1622 and continued for five months. William Heydon (1585–1627) and Endymion Porter (1587–1649) appeared before the East India Company to deliver messages from Prince Charles and

61. Robert Brenner, *Merchants and Revolution: Commercial Change, Political Conflict, and London’s Overseas Traders, 1550–1653* (Princeton, NJ: Princeton University Press, 1993), p. 106.

62. *Ibid.*, p. 270; Games, *The Web of Empire* (above, n. 50); Carla Gardina Pestana, *The English Atlantic in an Age of Revolution, 1640–1661* (Cambridge, MA: Harvard University Press, 2004).

King James.⁶³ Heydon and Porter informed the company that James had received a letter from “the greate Mogoll” requesting rarities from England.⁶⁴ The king was “determined to give him [Jahangir] the best satisfacion he can.” James thus planned to send “some Jewells of valew,” as well as “some Inventions and particularly with that of conveying water into their houses in such a manner as will be a greate cooling and refreshing in these extreame hotte Contries, and a benefit much desired by the Mogoll.”

The plan to refrigerate the court of Jahangir was James’s part of the plan. The company was also informed of the project of Prince Charles, who wished to use an engine invented by Drebbel that would lift up any weight in order to raise sunken treasure ships from the floor of the Indian Ocean. Drebbel could

at anie time give the Companie satisfacion by waie of a demonstracon that the Engine shall fetch upp anie waight and for the better sutch to find the places where these ritche wracks are, as also to fasten hold with the best advantag for weying them up, there is a boate devised to go under water, where men maie live and if need be a man may go forth and walke under water 20 or 30 yardes and use his armes to any kind of labour.⁶⁵

Heydon and Porter promised that the design would not “drawe the Companie into danger, for they are only to follow such Instruccions as his Majestie should give them.”

The governor of the company answered that he had already heard about the “business” from several sources, “first by the Lord Marques Buckingham [George Villiers] as from the king and afterwardes by the Prince.” The company was willing to deal with a few isolated projectors, but it was unwilling to entertain the scale of the design; the member said that “if it weare but a matter of presentes or the transporte of Engineers the Companie should be able to accommodate their passage in their next shippes.” Heydon and Porter responded “that they must go in shippes of their owne.” The idea that ships not under its control would be making an independent voyage to the East Indies alarmed the company. Heydon and Porter “answered that such as were to be sent were so well knowen to the king, and both he and the prince would become answerable for them.”

This assurance of personal royal responsibility proved cold comfort to the company, and Heydon and Porter began to lose patience

63. Sainsbury, ed., *Calendar of State Papers Colonial, and English East India Company Court Minutes* (both above, n. 2).

64. Robinson, ed., *Readings in European History* (above, n. 1), pp. 333–335.

65. *English East India Company Court Minutes* (above, n. 2), pp. 404–407.

as the company continued to stall. They emphasized that “his Majestie was resolved to send fourthwith neither was their coming to enquire anie thing of the Companie & touching the conveniencie of sending, but onely to acquaint them that it is the meere Act of his Majestie.” As the company continued to object, Heydon and Porter brusquely replied “that if they expected anie further sattisfacon, they must have it from the king, for their partes they could give no time of deliberacon.”

The governor informed Heydon and Porter that the company hesitated due to its experience with the second Earl of Warwick, who, supposedly commissioned to apprehend pirates, in fact preyed upon shipping.⁶⁶ He very nearly attacked the ship of the Mughal emperor's mother, only to be stopped at the last minute by ships of the East India Company.⁶⁷ The company objected most of all, however, to the prince's project of the submarine. “The Prince can have no assurance of the successe” of the endeavor, it protested.⁶⁸ For months, the prince dug in his heels. On 29 June, the governor reported on “the prince his proiect. . . notwithstanding all obiections and opposicon the Company could make to the Contrarie, yet the prince insisted upon his resolucon.”⁶⁹

At last, five months after Heydon and Porter originally approached the company, James signed a commission on 14 September for Heydon and Charles Glenham (1576–1626) (rather than Porter) to make the voyage. The prince's servants were described as “singulerlie furnished with . . . laudable industrious and hopefull meanes for acquiring of Riches and Treasure both at Sea and Land . . . without giving just Offence to any, by recoverie of wrecked Treasure Pearle and other Riches in the Seas, and by divers other ingenious Arts Inventions Workes and Manufactures.” Prince Charles strenuously advocated for this project, with the inventions described by James as “peticulerly recommended unto us by the Favor and Affection of our said deerlie beloved Son the Prince.”⁷⁰

Malleable Climates and the Transnationalism of Great Designs

The great design was not the way that the East India Company did business. The seemingly disparate and alarmingly quixotic epi-

66. *Ibid.*, pp. 406–407.

67. W. Frank Craven, “The Earl of Warwick, a Speculator in Piracy,” *Hispanic American Historical Review* 10:4 (1930): 457–479.

68. *English East India Company Court Minutes* (above, n. 2), pp. 409–410.

69. *Ibid.*, pp. 469–470.

70. Sanderson, ed., *Foedera* (above, n. 3), p. 407.

phenomena of the great design were connected by a shared logic of unconstrained global action founded on the secrets of art, nature, and empire; the design sought to transform the parameters of possibility. This logic shaped the formation not only of ambitious global designs, but of new state structures for reasoning about and intervening within the world. It came into conflict with older Hippocratic divisions of climes and arts and the privileges accorded to corporations within society.

Over five months, the young Prince Charles argued with the company; soon, however, a competing adventure called for his attention. Charles, accompanied by Villiers, Glenham, and Porter, among others, and followed by Carlisle, set off incognito on a voyage to Madrid to broker a match with the Spanish Infanta, and he remained there from February to October 1623.⁷¹ Considering its proposed piracy on Spanish shipping, the 1622 great design was no longer in accordance with the court's new Spanish interests. Although James and Charles abandoned the great design at this juncture, the latter never let go of his aspirations for the unconstrained royal power it signified. The projectors of the Jacobean court continued to maintain their patron/client relationships and spin careers around the globe under his reign, even as English global intervention entered a new era with the establishment of the triangle trade during the 1640s.

Charles seems never to have employed the submarine abroad, although some seventeenth-century writers claimed that the king of England gave a submarine to Moscow as a "rare and incredible thing."⁷² In 1624, however, Drebbel's two associates and future sons-in-law, the Küffler brothers, described another ambitious plan of his that they claimed had pleased Prince Charles before he went to Spain. This one would centrally heat the entire city of London through an artificial sun:

The most recent and most excellent invention Drebbel discovered was an artificial sun, that is to say, a perpetual fire which would burn and illuminate forever. When the Prince of Wales [Charles] went to Spain [in 1623], Drebbel proposed to him that just as one has filled London with fountains by means of a small river, conducted by little pipes to all the houses [by the New River

71. Alexander Samson, ed., *The Spanish Match: Prince Charles's Journey to Madrid, 1623* (Aldershot, UK: Ashgate Publishing, 2006).

72. Georg Harsdörffer, *Delitiæ Mathematicæ*, vol. 2 (Nürnberg: Dümmler, 1651), p. 493: "in welchem der jüngst-verstorbene König in Engeland auff der Teims selbst gefahren / welcher auch eines anden Gross-Fürsten in Moscau / als eine seltne und ungläubliche Sache / verehret."

Company], he [Drebbel] would make a fire on a little hill near London, whence all the Londoners could obtain fire and conduct it to their houses, and with this fire they could boil and roast their meats without need for wood. The voyage that this Prince undertook prevented him from furnishing what would be necessary to have this miracle made.⁷³

This sounds like an unlikely project. However, the neat parallel to the 1622 design, for which we know Charles strenuously campaigned, forces us to reconsider. A project to centrally heat London with a perpetually burning artificial sun should be no less improbable, at the time and to the Prince, than the very seriously considered plan to air condition the Mughal court and to explore the Indian Ocean with the newly invented submarine.

Although Drebbel never did centrally heat London, his transformative climatic technologies, both for heat and cold, were not forgotten by those in a position to employ them around the world. His knowledge of the elements allowed him to know and control the weather, and, according to one courtier, he could create lightning and thunder, which he demonstrated to the king.⁷⁴ According to his son-in-law Johann Sibbert Küffler, Drebbel had “devices How to coole roomes in Summer as wel as to heate them by his Stoves in Winter.”⁷⁵ Küffler’s friend Samuel Hartlib described a large collection of Drebbel’s secrets, including the submarine and “refrigeratory instruments for the summer and especially for hot places such as India [*Refrigatoria Instrumenta pro aestate et imprimis in locis calidioribus vti India*].”⁷⁶ Drebbel’s device for heating rooms was successfully de-

73. Nicolas-Claude Fabri de Peiresc, “Relation de ce que j’ai appris de la vie et des inventions de Corneille Drebbel,” Bibliothèque Municipale Inguimbertaine (ms. 1776, f412v): “La dernière et plus excellente invention que Drebbel aye trouuée, est de faire un soleil artificiel, cest a dire en feu perpetuel qui bruslera et esclaire tousiours. Lorsque le Prince de Galles alla en Espagne Drebbel [*sic*] luy proposa que comme l’on avoit rempli Londres de fontaines par le moyen d’une petite riviere qu’on y avoit conduit et divisée par petits tuyeaux a toutes les maisons qui en avoient voulu. Qu’il vouloit entreprendre de faire un feu sur une petite montagne aupres de Londres, d’ou tous ceux de Londres pourroient aller prendre du feu et le conduire a leurs maisons, Et avec ce feu faire bouiller et roytir leur viande sans avoir besoin de bois. Le voyage qu’entreprint lors ce Prince l’empescha de fournir ce qui estoit necessaire pour faire faire ce miracle.”

74. Samuel Hartlib and the University of Sheffield, *Ephemerides: The Hartlib Papers CD*, 2nd ed. (Sheffield, UK: University of Sheffield, 2002): “Drebbelius et Cuffler especially the first had made a glasse wherin hee could raise both lightning and thunder with another weather-glasse which both were presented to the King” (*Ephemerides*, 1635, 29/3/48B).

75. *Ibid.*, 29/3/55B.

76. *Ibid.*

ployed both in the New World and in a profitable industry run by the Küfflers.⁷⁷

Even more than specific technologies, however, the results of the 1622 great design would be seen in the personnel it brought together. From the start of his reign, Charles promoted global projects.⁷⁸ Many of these involved individuals with previous careers and networks from the Jacobean court and, in particular, with a connection to the 1622 great design. Charles never abandoned the idea of a trading company to rival the East India Company. In 1627, he granted a South American patent to the Dutch banker and Crown financier William Courten (1572–1636), who would finance the English colonization of Barbados.⁷⁹ Courten lost his Barbados title to the Earl of Carlisle.⁸⁰ In 1635, however, Charles granted Courten a patent for a trading association in the East Indies along with Porter, one of the servants proposed for the 1622 Indian expedition. Courten passed away within the year, but his son, physician William Courten (1609–55), realized the expedition.⁸¹

Why Courten? He was a member of a southern Netherlandish Reformed network, which had fled to the northern Netherlands from the Spanish-controlled Catholic south. It was these southern refugees who had jumpstarted Dutch global trade within the space of a few years upon their arrival in the north, largely founding the Dutch East and West India companies and colonial ventures abroad.⁸² They

77. Bruce White and Walter Woodward, “‘A Most Exquisite Fellow’—William White and an Atlantic World Perspective on the Seventeenth-Century Chymical Furnace,” *Ambix* 54:3 (2007): 285–298.

78. Thomas Cogswell, “‘In the Power of the State’: Mr Anys’s Project and the Tobacco Colonies, 1626–1628,” *English Historical Review* 123 (2008): 35–64.

79. George Carew, *Hinc illae lacrymae, or, An epitome of the life and death of Sir William Courten and Sir Paul Pyndar* (London, 1681).

80. Pestana, *The English Atlantic in an Age of Revolution* (above, n. 62), p. 16.

81. K. N. Chaudhuri, *The English East India Company: The Study of an Early Joint-Stock Company, 1600–1640* (New York: Augustus M. Kelley, 1965), p. 73. On 16 October 1636, the expedition visited the viceroy in Goa “and presented him with scarlett and divers rarities.” See *Journal of a Voyage Begun with the Ships the Dragon, the Sun, the Katherine, the Planter, the Ann, and the Discovery, for East India, Set Forth by Sir William Courteen and Others, Adventurers*, in State Papers (UK National Archives, Kew), 16/351, f56-64v, esp. f59v.

82. Ole Peter Grell, *Brethren in Christ: A Calvinist Network in Reformation Europe* (Cambridge: Cambridge University Press, 2011); Johannes Hermanus de Stoppelaar, *Balthasar de Moucheron: een bladzijde uit de Nederlandsche handelsgeschiedenis tijdens den tachtig-jarigen oorlog* (The Hague: M. Nijhoff, 1901); Victor Enthoven, *De Verenigde Oostindische Compagnie in Zeeland* (Middelburg: Koninklijk Zeeuwsch Genootschap der Wetenschappen, 1989) and “Een Symbiose tussen Koopman en Regent: De Tweetrapsraket van de

were especially eager to combine global trade with an attack on the Spanish Habsburgs. Their highly mobile family members continued to manage Dutch global trade over the course of the century. For instance, the manager of Courten's affairs and his relative was Jacob Pergens, who became a director (*bewindhebber*) of the Amsterdam chamber of the Dutch West India Company in 1643, serving for three decades and becoming one of the wealthiest merchants of the Dutch Golden Age.⁸³

This Reformed diaspora had been continually on the move for several generations by the early seventeenth century. What the members of this network appreciated about Drebbel was not his Dutch nationality, but his ability, like them, to make a new home for himself not only in a new land (in this case, England), but even within entirely new elements. For instance, the Dutch-born secretary of the royal favorite Villiers (later styled the Duke of Buckingham), Balthasar Gerbier, was a scion of a Flemish-French Huguenot family that had founded Dutch global trade during the 1580s. He was a participant in Buckingham's "glorious design" (and was also the founder of his own Guianese colony). Gerbier described his colleague in the English court—Drebbel—as "nature's darling" ("*Naturas Troetel kint*") and a "superhuman" ("*meer dan Mensch*") with the ability to override all the boundaries of nature and possibility. Referring no doubt to Drebbel's invention of the submarine and perhaps his attempts to fly, Gerbier described him as someone "who lacks no Art, would dare to swim like a fish, to fly on the winds, to soar up to the Moon and into the depths of the sea, to sail without mast, tiller, oars, sail, or, yard-arm."⁸⁴

Drebbel's natural philosophy and instruments offered a view of climate that appealed to global merchants and transnational refugees.

opkomst van de Republiek en Zeeland," in *Ondernemers & Bestuurders: Economie en Politiek in de Noordelijke Nederlanden in de Late Middeleeuwen en Vroegmoderne Tijd*, ed. C. Lesger and L. Noordegraf (Amsterdam: NEHA, 1999), pp. 203–236; Claudia Schnurmann, "Representative Atlantic Entrepreneur: Jacob Leisler, 1640–1691," in *Riches from Atlantic Commerce: Dutch Transatlantic Trade and Shipping, 1585–1817*, ed. J. Postma and V. Enthoven (Leiden: Brill, 2003), pp. 259–283.

83. Johann Engelberg Elias, *De vroedschap van Amsterdam, 1578–1795*, vol. 1 (Amsterdam: Israel, 1963), p. 388.

84. Mon heur est en gerbe [Balthasar Gerbier], *Eer ende Claght-dicht: Ter Eeren van den loofweerdighen Constricken ende Gheleerden Henricus Goltius* ('S-Gravenhaghe: Aert Meurs, 1620): "Hem die gheen Const ontbreeckt, die sich sou onderwinden / Te swemmen g'lijck een Visch, te flighen op de winden, / Te stijghen tot de Maen, in d'afgront van de Zee, / Te seylen sonder Mast, Stuer, Riemen, Zeyl, oft' Ree" (p. 11).

Pergens was a dedicatee of the 1628 edition of Drebbel's *On the Nature of the Elements* and a member of a transnational network first circulating Drebbel's thermometric devices—a network that included Pergens's friends, the Küfflers.⁸⁵ When the English Crown sought to embark on a global project, it sought out these transnational refugees, such as Courten, whose families had first brought global projecting to the United Provinces; it also patronized the philosophers and artisans whom these refugees approved.

This heritage of religious diaspora and continual transplantation distinguishes the Dutch West and East India companies from their English counterparts. This distinct makeup can help explain why the Dutch joint-stock companies were more eager to settle globally (and thereby to attack Catholic powers) than the more locally entrenched English merchants. When the English Crown, seeking expanded political powers, sought to deploy a great design around the globe, it borrowed from the pattern set by such confessionally and economically motivated global projectors, rather than from the patterns followed by English merchants. Charles wished for the English East India Company to engage in ambitious colonial activities in the style of the Dutch. Who better to pit against the English East India Company than a transnational merchant family that had helped initiate Dutch global trade?

In planning the Courten expedition, King Charles continued to tangle with the East India Company. He wished to outfit his nephew Prince Rupert of the Rhine with a fleet and make him his viceroy of Madagascar in connection with Courten and Porter's expedition. The company was so opposed to Rupert's participation that that part of the plan had to be dropped. Charles continued to project global plans in the ambitiously grand style of a great design, and the East India Company continued to object. While Allison Games has seen the Madagascar project as part of a peculiarly English "web of empire," such ambitious global projects were learned directly from the transnational examples of figures like Courten and Gerbier.⁸⁶

85. On Pergens as Courten's manager, see Ethel Bruce Sainsbury, ed., *A Calendar of the Court Minutes . . . of the East India Company, 1660–1663* (Oxford: Clarendon Press, 1922), p. 222. For Pergens as a dedicatee, see Cornelis Drebbel, *De natura Elementorum* (Frankfurt: Rotel and Fitzer, 1628). For the Küffler and Pergens families, see J. T. Young, *Faith, Medical Alchemy and Natural Philosophy: Johann Moriaen, Reformed Intelligencer, and the Hartlib Circle* (Aldershot, UK: Ashgate Publishing, 1998), p. 10; and Gerdien Wuestman, "Het familie boeckje van Pieter Boudaen Courten (1594–1668): Memoires van een geportretteerde," *Bulletin van het Rijksmuseum* 53:1 (2005): 19–42.

86. Games, *The Web of Empire* (above, n. 50), pp. 181–218; Ethel Bruce Sainsbury, ed., "King Charles to Prince Rupert" and "Project of Prince Rupert for Colonizing Madagas-

Although failing in his plans for India and Madagascar, Charles continued to deploy the servants of the great design at home and in Europe. Soon after his accession to the throne in 1626, Heydon, who James had commissioned to serve as his “lieutenant general” of the East, became the lieutenant general of the ordnance office, the Crown’s military supply. He was ordered to keep Drebbel’s inventions secret there.⁸⁷ Drebbel served Heydon—and after the latter’s death, his brother John Heydon—as an engineer in the ordnance office for the rest of his life.⁸⁸ Drebbel’s underwater torpedoes were deployed in the 1627 expedition of Villiers to the Isle of Ré off the coast of France under William Heydon’s guidance. For this battle, which defended French Huguenots in Rochelle against Catholic France, Gerbier also installed the very same type of bomb that the Catholic Duke of Parma had deployed when attacking Gerbier’s ancestors in Antwerp.⁸⁹ Drebbel’s underwater torpedoes literally backfired in that battle, Heydon drowned, and Villiers was assassinated not long afterwards. However, Drebbel’s career was by no means “blown out of the water” as previous accounts have suggested. The group of patrons, administrators, and artisans brought together for the 1622 project cohered and continued to collaborate until Drebbel’s death in 1633.

Drebbel himself never left Europe. The world of transnational, court-protected projectors in which he operated, however, was the world that shaped new modes of global intervention. It is easy today to dismiss his proposals for submarine treasure hunts, air conditioning the Mughal court, and centrally heating London as the ideas of an isolated charlatan. Drebbel was not, however, isolated. He was densely networked with a world of global merchants and transnational projectors who would shape the future of English global intervention. His unconstrained views of nature and the powerful secrets of nature supported their bravado. This was the world that the Crown attempted to use in its search for new sources of global power.

car,” in *A Calendar of the Court Minutes etc. of the East India Company, 1635–1679* (Oxford: Clarendon Press, 1907), pp. 244–245.

87. State Papers (UK National Archives, Kew), 16/31/14, 4 July 1626.

88. Edward Murray Tomlinson, *A History of the Minorities, London* (London: John Murray, 1922), pp. 136, 400.

89. Frederick Devon, *Issues of the Exchequer* (London: Rodwell, 1836), p. 350. The king did not, however, allow Gerbier’s bomb to be used; see State Papers, 16/74, f50, 17 August 1627. On Gerbier’s bomb, see Keller, “The ‘framing of a new world’” (above, n. 37), p. 160 and fig. 3; Zeeuws Archief, ZI-III-1026, “Een ontplofbare machine tot vernieling van vijandelijke schepen en steden, aangeboden ann burgemeester, schepenen en raden van de stad Vlissingen,” in *Baltazar Gerbier Knight to all men that loves truth* (Paris, 1646), p. 3; and Balthasar Gerbier, *A Manifestation* (London, 1651), pp. 3–4, 8–9.

Conclusion: Secrets of Nature and Secrets of Empire, or, Baconian Knowledge and Power Revisited

The later configurations of colonial science cannot be usefully projected backwards to understand the role of technology in the great design. However, the relationship between the secrets of nature and the secrets of empire developed by early seventeenth-century projectors can help us understand how the parameters of these later configurations were first shaped. In particular, the Baconian equation between knowledge and power, which has often been seen through the lenses of later colonialism and Orientalism, can itself be viewed as a product of the culture of projecting.

The relationship between knowledge and power in projecting that would shape later colonialism can be better understood through new perspectives that entangle the history of technology, the environment, and power. Drawing on environmental history and geography, world historians have begun to relate shifting power dynamics to fluctuating flows of global energy. These views override disciplinary distinctions between natural and social power, and they can be usefully combined with older, anthropologically informed modes of micro-history. Such a combination can uncover the forgotten ways that early moderns once reasoned about natural sources of energy and related them to concepts of global power.⁹⁰ Economic historians like Andre Gunder Frank have dramatized the contingency of the rise of the West through global structural views. Exploring early modern reason also has the ability to dramatize contingency, as does Frank's work, but it does so by returning us to the period's horizon of possibility. In that vein, this essay has been closer to an anthropology of economic thought than to economic history; rather than analyzing economic data according to current economic reasoning, it has explored early modern forms of reasoning about both the global economy and nature through the culture of projecting and the mode of great designs.⁹¹ While economic history analyzes parameters that seem rational to us today, such as access to coal or oil, early moderns

90. Power can be considered as the form (social or natural) through which energy is harnessed. See Edmund Russell, James Allison, Thomas Finger, and John K. Brown, "The Nature of Power: Synthesizing the History of Technology and Environmental History," *Technology and Culture* 52:2 (2011): 246–259; and Martin Pasqualetti, "The Geography of Energy and the Wealth of the World," *Annals of the Association of American Geographers* 101:4 (2011): 971–980.

91. Andre Gunder Frank, *ReOrient: Global Economy in the Asian Age* (Berkeley: University of California Press, 1998).

were equally interested in exploring powers that seem irrational to us and thus outside the purview of economics.

Early moderns were seeking universal sources of *energy* and what they might call the “soul of the world”—the *primum mobile*, the *quintessence*. This, the ultimate secret of nature, did seem rational to many; it was what could allow humans to transgress the natural limits on their movements and to operate against the nature of the four elements. It was this that Drebbel claimed to have discovered and to illustrate through the perpetual motion that James displayed at Eltham Palace. Such abilities to control the global access to energy shaped ambitions to act in an unconstrained manner around the world: to heat London or to cool India, to lift any weight, to found a submarine treasure-hunting industry, to import arts around the world, or perhaps even to found global tobacco and sugar plantations.

The development of global, slave-based sugar plantations was that which, according to Kenneth Pomeranz, did finally lever England into greater positions of power vis-à-vis Asian economies. The signal eventual difference between the two, leading to the great divergence of the Industrial Revolution, Pomeranz contends, was a differential in energy inputs, either through naturally occurring coal reserves in Britain or through the high-caloric, cheap sugar produced by a new form of power—the institution of slave plantations, largely in the Americas.⁹² Although morally reprehensible, slave-based sugar plantations do not seem to us to lie in the same zone of impossibility, as does perpetual motion. From an early modern perspective, however, both were searches for energy that could lever England into a new position in the global flow of goods and power. The English 1622 great design in Asia and the Dutch 1623 great design in the Americas operated according to a related logic: for the generation that founded the triangular trade, both global sugar plantations and the quintessence occupied similar horizons of invention and possibility.⁹³

92. Kenneth Pomeranz, “Political Economy and Ecology on the Eve of Industrialization: Europe, China, and the Global Conjunction,” *American Historical Review* 107:2 (2002): 425–446.

93. Guido Pancirolli (1602) considered both sugar and alchemy to be new inventions. See Pancirolli, *The History of Many Memorable Things Lost Which Were in Use Among the Ancients, and an Account of Many Excellent Things Found, Now in Use Among the Moderns* (1602; translation, London: Nicholson, 1715), pp. 294–295; and C. de Rochefort, *The History of the Caribby-islands*, trans. J. Davies (London: Dring and Starkey, 1666), p. 194. The three-roller mill for sugar, most likely invented in China, was in use in Peru and Brazil by 1610, from where knowledge of it reached Europe; see J. H. Galloway, *The Sugar Cane Industry: An Historical Geography from Its Origins to 1914* (Cambridge: Cambridge University Press, 2005), pp. 39, 80–83. Giovanni Tortelli had already mentioned sugar as a new invention in about 1450, however; see Alex Keller, “A Renaissance Hu-

Alchemical views inspiring plantation projects in New England are well-known.⁹⁴ The viewpoint of early seventeenth-century projectors stretched, however, well beyond New England. Transformative technologies might be equally deployed in Asia or in England as in New England. This fungibility of place helped create the “view from nowhere,” or the idea that science and technology are culturally nonspecific.⁹⁵ Once power differentials solidified in later colonialism, the view from nowhere would serve to conceal the Europeanization of the world. At a time of European weakness, however, the intent was to uncover a universal perspective that might globalize and strengthen European polities.

Such dicta as the Baconian equation between knowledge and power have been seen in studies of colonial science as legitimizing cycles of global accumulation of knowledge toward metropolitan centers like London.⁹⁶ This was not, however, how Bacon related the world to England. He hoped to shift local perspectives toward global ones in an effort to locate ultimate universal causes—that is, the knowledge of metaphysical forms underlying all matter. Two examples relating to the 1622 great design dramatize this.

In his *Advancement of Learning* of 1605, Bacon illustrated the experimental notion of a *polychrest*—one discovery that can lead to many more, unexpected ones—with the example of the compass. The compass had the ability to lead human investigations further into the open waters of knowledge in various directions.⁹⁷ For the

manist Looks at ‘New’ Inventions: The Article ‘Horologium’ in Giovanni Tortelli’s ‘De Orthographia,’” *Technology and Culture* 11:3 (1970): 345–365.

94. David Gwyn, “Richard Eden: Cosmographer and Alchemist,” *Sixteenth-Century Journal* 15 (1984): 13–34; Walter W. Woodward, *Prospero’s America: John Winthrop, Jr., Alchemy, and the Creation of New England Culture, 1606–1676* (Chapel Hill, NC: Omohundro Institute of Early American History and Culture, 2010); Thomas Leng, “Sources and Interpretations: ‘A Potent Plantation well armed and Policeed’: Huguenots, the Hartlib Circle, and British Colonization in the 1640s,” *William and Mary Quarterly* 66:1 (2009): 173–194.

95. Steven Shapin, “Here and Everywhere: Sociology of Scientific Knowledge,” *Annual Review of Sociology* 21 (1995): 289–321, and “Placing the View from Nowhere: Historical and Sociological Problems in the Location of Science,” *Transactions of the Institute of British Geographers* 23 (1998): 5–12.

96. Elisabeth Crawford, Terry Shinn, and Sverker Sörlin, “The Nationalization and Denationalization of the Sciences: An Introductory Essay,” in *Denationalizing Science: The Contexts of International Scientific Practice*, ed. E. Crawford et al. (Dordrecht: Kluwer, 1993), pp. 1–42.

97. Francis Bacon, *Of the Proficiency and Advancement of Learning, Divine and Humane*, vol. 2 (London: Henrie Tomes, 1605), p. 33.

Latin edition of 1623, however, Bacon changed his example of a model polychrest from the celebrated compass to the seemingly obscure phenomenon of artificial cooling through saltpetre, which he had also described in another work that year as an invention in use in “hot countries.”⁹⁸ Such a choice, at first, seems bizarre because artificial cold does not carry the directive and navigational connotations of the compass, which are so necessary for conceptualizing the polychrest. Bacon’s choice of artificial cold as his exemplary polychrest in 1623 makes sense, however, in the context of the Crown’s 1622 proposal to use this invention as part of a great design. A single discovery tapping underlying natural causes, such as chemical air conditioning, could shift natural parameters and the possibilities of human action around the globe. In the 1622 great design, this single intervention would serve as the justification for a wide array of further, interrelated projects, just as the polychrest might point toward further experiments.

In the *Novum Organum* of 1620, Bacon proffered still more examples of polychrests. These included “a certain machine of a small ship which can carry men considerable distances under water which had recently been invented”—that is, Drebbel’s submarine.⁹⁹ Through its paradoxical ability to traverse normally experienced nature, the submarine continued to serve as a central trope for a natural philosophy both imagined and practiced in distant colonial settings.¹⁰⁰ Rather than offering a means to deploy English viewpoints abroad, however, the submarine offered a foreign viewpoint from which European perspectives could be reimagined. Natural philosophers like Marin Mersenne and John Wilkins imagined rebuilding Drebbel’s submarine as a vast underwater colony; by displacing knowledge, a submarine colony would serve as the ultimate position from which to question the assumed knowledge of earth dwellers. As Wilkins wrote: “Severall Colonies may thus inhabit, having their children born and bred up without the knowledge of land, who could not chuse but be amazed with strange conceits upon the discovery of

98. Bacon, “De augmentis scientiarum,” in *Opera* (above, n. 14): “Exempli gratiâ, Experimentum Artificialis Conglaciationis Aqua, per Glaciem cum Sale nigro” (p. 176).

99. Francis Bacon, *Instauratio Magna, Part 2: Novum Organum*, ed. Graham Rees and Maria Wakely (Oxford: Clarendon Press, 2004): “Atque audivimus inventam esse iam Machinam aliquam Naviculae aut Scaphae, quae homines subter Aquis vehere possit ad spatia nonnulla” (p. 420).

100. James Delbourgo, “Divers Things: Collecting the World under Water,” *History of Science* 49 (2011): 149–185.

this upper world.”¹⁰¹ This distant perspective could help reform the blinkered, terrestrial perspective of Englishmen. For Robert Boyle, Drebbel’s submarine stood as an example of a Baconian *optative*, or a wished-for object that seemed almost impossible, like “Chymerical Projects.” Optatives proved how experimental natural philosophy could advance knowledge in ways not possible from the limited viewpoint of the ordinary trades.¹⁰²

The ambitious perspective of the global project equated ultimate knowledge with the ability to overcome constraints on global power, shaping Bacon’s vision to enlarge “the bounds of Humane Empire, to the Effecting of all Things possible.”¹⁰³ In attempting to displace natural knowledge from the local to the global, philosophical projectors like Bacon drew on Crown-backed models of global expansion. In turn, the early Stuart Crown drew not on the expansion of Englishness abroad (James, after all, was Scottish), but on transnational designs. Such strategies did not seek to remake one region in the image of another, but instead sought to continually import and export arts around a global space where distance implied quantitative, rather than qualitative, differences.

Such views were not, however, universally shared nor uncontested. The tensions apparent in the planning of the great design point to the several divergent views of knowledge and power, and how the two ought to be related. These divergences suggest how the current eco-critical and eco-historical attention to climate might be further nuanced through additional scrutiny of the contested concepts of climate. Eco-criticism has recently brought attention to the ways in which climate and climate change may have motivated searches for power, whether in the form of the knowledge necessary to control climate or the energy necessary to compensate for it. Gillen d’Arcy Wood has criticized eco-criticism for its lack of historical consciousness and attention to previous eras of climate change. He suggests instead an “eco-historicism.”¹⁰⁴ Eco-historicism, however, needs to be still further historicized. D’Arcy Wood’s examples of eco-historicism tend to posit a shared discourse across society in response to climate change. Climate, as a large-scale phenomenon, offers a

101. Marin Mersenne, *Cogitata Physico-mathematica* (Paris: Bertier, 1644), p. 256; and John Wilkins, *Mathematical Magick* (London: Gellibrand, 1648), p. 179.

102. Robert Boyle, “Usefulness of Natural Philosophy, II, 2,” in *Works of Boyle*, vol. 6, 1668–71, ed. M. Hunter (London: Pickering & Chatto, 2000), p. 480.

103. Francis Bacon, *New Atlantis* (London, 1658), p. 26.

104. Gillen d’Arcy Wood, “Eco-historicism,” *Journal for Early Modern Cultural Studies* 8:2 (2008): 1–7.

window onto large-scale changes, widely held views, and continuously maintained discourses. However, while climatic events may be experienced across a society, the views of climate are not necessarily likewise shared across it.

Climatic events interact with differing religious, political, cultural, and philosophical commitments. This interaction does not produce consensus on climate and climate change; in fact, such interactions can serve instead to intensify other underlying divergences, as it has in the contemporary United States. In the case of this story, the experience of religious diaspora and continual transplantation helped support one view of global spaces and their malleability, which differed from that held by more locally entrenched populations. Contention cascaded between religious exiles and their persecutors, between those exiles' own religious and economic/political aims, between the English Crown and the English East India Company, and between the Dutch and English East India companies.

Such contention helps explain why the 1622 great design was not put into practice. Although unfulfilled, it remains highly informative. Analyzing what was divisive about the great design allows us to uncover what was at stake for the varying actors involved. In later periods, such as the later seventeenth- and eighteenth-century cases identified as eco-historical by d'Arcy Wood, the establishment of continual discourses like colonialism, Orientalism, nationalism, and universal scientific languages would, perhaps, render the relationships between scientific centers and peripheries more monolithic. The transnational nature of global great designs would be reinterpreted as "Dutch" or "English" once nationalism obscured prior transnational identities, and scientific authority trumped earlier epistemic eclecticism. It may even be the case that it was a newly shared discourse of climate that helped render the imperial project, unlike the great design, possible.

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Appendix: Colonial Record Office 77, 34.

Date and editorial principles: In its current file, the date is suggested as "after 1622" and "? early 1627," with a note of the 1627 warrant to pay Drebbel for making water engines. The latter, however, were prepared by Drebbel under Heydon's guidance for the siege at the Isle of Ré; they do not offer a date for this document. The great design described here can be re-

dated to 1622 based on James's commission for the voyage (14 September 1622) and the extensive discussion between the East India Company and the servants of the Crown in the East India Company records (beginning on 29 April 1622). James Hay's title of the Earl of Carlisle used here suggests a date for this document following 12 September 1622, when he gained the title. Contractions have been silently expanded. The use of "i" and "j" and "u" and "v" has been modernized. The original punctuation and formatting have been preserved.

Concerning the designe which hath byn presented unto his Majestie and referred unto the right honorable Lords the Committees thereof; Let it be pleased to be taken into consideracon, that there appeares a necessitie for your sudden & present sending out of one great shipp of countenance & burden, as well to serve for honoring of the kings name, as to be of force, portage, and sufficiency for safetie of returning such profitt as God willing shalbe in the first attempt gathered together. Also two pinnasses, both to be handmaydens unto this great shipp, the one speeding to returne to his Majestie with such overture of possessions, & first profitt as shalbe made, the other to trade in the countrie from port to port & supplie & relieve the people thereof with such clothinge & other necessities as shall not only be welcome to them, and well paid for, but also preserve them unto us in all friendly prospecte untill the great designe be put in execucon

That for a quick starte such commodities be sent out, & to such valuacon as maye returne a wellcome & expected profitt; which maye be theis menconed, and wilbe unto those rich princes both well received & paid for

Broadclothes, Kersyes & perpetuaries, Tynn, lead, quicksilver, Allam, Ellefante tooth, Corrar, Amber beades, & such like.

But most especially, and for those princes & courtes uses.

Old antique jewells, as pinnes & ringes of all sorts basons & ewers & other great peeces of plate, both off silver, & silver & gilt, And yff any sett with stones, they are there to be valued at high rates

Also fire lock peeces, pistolls, knives, embroyderies, saddles & furnitures for horses & men, caparisons, picktures

Tappestries, cases off bottles off strong waters, sack & white wine, also two or three peeces of ordinance, to present either the king of Bantam, Machassa, or Empire of Mattaram, all our good frends, all which will & maye stand us in stead

And although that of some part of theis commodities mencioned, there wilbe just cause & necessitie of presenting a quantitie thereof; yet there will not faile a returne to be made, & that to a greater valuacon, and a thing commonly & formerlie donne; Soe that, hereby

maye be gathered, that what stocke [verso] soever in theis things shalbe sent out, it will returne three for one proffitt, and that in the time of two yeres or thereabouts only, for present, the danger of looseing this first season is to be feared, and that in this shortt time is to be considered, the duple sheathing of the shippes & well victua-leing of them, as also of skillfull & well governed Marriners & other necessarie provisions hereunto belonging, all which maye serve for two yeres time at leaste, by which is intended two things of ymport. The first to court, please & observe the kings in those Indian parts, and that with such rarities & novellties as are above menconed, and so with severall sorts of musickes, of motions, & other slight toyes & delights, which will fasten them unto us, and bring them on our shippes board, and maye serve to welcome us on shoare, & that with-out any suspition wherby the safetie and lives of such persons as shalbe herein employed maye be the better secured, & freed from danger.

Now the designes which are pointed at, and hathe byn perticularly delivered unto the right honorable the Lord of Carlile are in breif theis, which his Lordship maye be pleased to inlarge, as he hath received them.

1. Ffirst takeing possession of Summatra
2. The attempt that maye be made on the towne & treasure of Ache-ine
3. Concerning the towne & wealth of Sciam
4. Prisalls of the China Jonnakes with whom we have noe comerce as also on the Spaniards & Portingalls & their adherents our enemies together with the laudable trade of Japann & the venting of our English cloth there, and hereby to recover the (almost) lost honour of our nation, in all parts of India
5. The fishing of Pearles in many parts of India, a thing of great hope and import, provided his Majestys engines made by Cornelius Dribble prove true, & maye be had, soe that of all these designs here mentioned, there are great hopes and probabilities, not only to returne a present proffitt, but an annual & everlasting treasure to his Majesty & his Successors for ever; of all which the parties at present employed, will leave under their hands a large and ample demonstracon, as well to remain here recorded, as to inable those that shall follow in the great attempt which (God willing) is intended to be put in execucion.