The Prehistory of Serendipity, from Bacon to Walpole

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Abstract: During the past four decades there has developed a burgeoning literature on the concept of serendipity, the name for sudden insights or conceptual breakthroughs that occur by chance or accident. Studies repeatedly note that it was Horace Walpole, the eighteenth-century man of letters, who coined the word. None of them, however, notice that Walpole's term is itself indebted to a much older tradition, invoking a formula developed by Francis Bacon. Recovering the prehistory of the term suggests that "serendipity," rather than being a name for a special mode of discovery invented by Walpole, has all along accompanied empiricism as the name for an essential gap in its epistemology. Serendipity bears directly on the "induction problem," or what has more recently been called the "conceptual leap." Though Walpole gave it its current name, versions of the concept have all along isolated a critical gap in the method of the sciences inaugurated by Bacon.

Serendipity is the discovery of something useful while on the hunt for something else. In the last decade alone, the concept inspired more than a hundred focused essays, joining thousands of articles that mention, by name, instances of serendipitous discovery. These studies are interested in the structure of the unexpected insight; they have benefited from developments in cognitive philosophy, advances in neurobiology, funding from the business sector, and a renewed interest in "innovation" in research and information technology. But, like most cognitive modeling enterprises, studies of serendipity are what one scholar calls "here-and-now" things, interested in how we think right now and not, on the contrary, in how we got this way.[1] This is especially true for studies of accidental invention—which are more concerned with modeling serendipity in practice than with establishing the history and development of the concept. There are reasons for this lack: serendipity poses special problems for historian and philosopher alike. But establishing the history of the idea provides clues to serendipity's peculiar status in studies of technology, the arts, and the sciences. A history of the concept promises an answer to why, speaking generally, we have found it hard to describe and to analyze sudden insights and groundbreaking discoveries.

It is not that we lack a widely attested and well-known history of the *word*. Almost without fail—indeed, with metronomic regularity—studies of serendipity trace it to Horace Walpole,

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[1] William Clancey, *Situated Cognition: On Human Knowledge and Computer Representations* (New York: Cambridge Univ. Press, 1997), p. 226.

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the eighteenth-century man of letters who invented the term. Robert Merton's masterful history, composed in the late 1950s but not published until 2006, takes it from there, tracing the integration of the concept into the modern sociology of science.[2] But none of these studies—Merton's included—remarks on the conditions, on the state of letters and the progress of the sciences, that led Walpole to the term in the first place. We are left to assume that Walpole's new word was itself a sort of serendipitous discovery, accidentally coined while he was on the lookout for something else. We are likewise left to assume that Merton's turn to the word represented a new idea in the sociology of science—which in a sense it was—rather than, in addition, the naming of something that was inherent to the sciences all along. For Walpole owes debts in word and phrase to Francis Bacon, who penned his thoughts on serendipity (though under a different name) a century and a half earlier. It is the purpose of this essay to compile serendipity's prehistory, filling in the gaps in the studies of the concept. This prehistory, it will turn out, is written under the shadow of its lateness; as will become apparent in its place, the first person to ponder what it would mean to construct a prehistory of serendipity was the man who coined the word.

This, then, is the thesis of this essay: far from a curious mode of accidental learning particular to Walpole, far from being itself "accidental," "serendipity" has all along named an aspect of the progress and development of knowledge. "Serendipity" is another name for the "induction problem," or what has more recently been called the "conceptual leap."[3] It names the way concepts emerge from the unexpected bumps and nudges of the material world, and it therefore isolates a critical tension in the method of the sciences, especially as that method was understood and formalized by Francis Bacon. Recovering the contours of Walpole's history suggests that "serendipity," rather than being a quaint name for a special exception to the new science, labels an essential gap that has accompanied that philosophy from the start.

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Serendipity is, by its earliest definition, what happens when someone possessing the right sort of "sagacity" stumbles across an appropriate "accident," or, to put it differently, when someone discovers something useful that they did not know they were looking for.[4] Commonly cited examples of serendipitous discovery include penicillin, cyanoacrylates, almost all psychopharmaceuticals, and the glue 3M uses on its Post-It notes, for each of these things was discovered while its inventor was on the scent of something different. More ambitious examples are often named: oxygen, x-rays, hydrostatics, gunpowder, gravity, electricity, the

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[2] Robert K. Merton and Elinor Barber, *The Travels and Adventures of Serendipity* (Princeton, N.J.: Princeton Univ. Press, 2006). The dazzlingly Shandean *Travels and Adventures of Serendipity* was substantially written by 1958, but only published in 2006, when it was revised in a partnership with Elinor Barber. The vast majority of studies on serendipity begin their discussion with Walpole's definition. See, e.g., Paul André *et al.*, "Discovery Is Never by Chance: Designing for (Un)Serendipity," *ACM Creativity and Cognition*, 2009, pp. 305–314; Gary Alan Fine and James G. Deegan, "Three Principles of Serendip: Insight, Chance, and Discovery in Qualitative Research," *Qualitative Studies in Education*, 1996, 9:434–447; Mark de Rond, *The Structure of Serendipity* (Cambridge: Judge Business School); and José Campos and A. Dias de Figueiredo, "Programming for Serendipity," *AAI Technical Report* (2002), n.p.

[3] For one recent treatment see Malvina Klag and Ann Langley, "Approaching the Conceptual Leap in Qualitative Research," *International Journal of Management Reviews*, 2013, *15*:149–166. See also Peter Urbach, "Francis Bacon as a Precursor to Popper," *British Journal for the Philosophy of Science*, 1982, 33:113–132, esp. p. 128.

[4] The definition was there before the word—but these two formulations turn up in tandem in Walpole's remarks. Horace Walpole, *The Yale Edition of Horace Walpole's Correspondence*, ed. W. S. Lewis, 48 vols. (New Haven, Conn.: Yale Univ. Press, 1937–1983) (hereafter cited as **Walpole, *Correspondence***), Vol. 26, p. 34.

Americas, fire.[5] Lists like these are a common part of the genre of serendipity studies,[6] and they can be long enough that more than one scholar has suggested that all truly original discoveries may, in the end, be serendipitous.[7] If only it could be systematized (so the argument runs), induced, lured out of hiding, or otherwise prompted, if the conditions for it could only be prepared, or the mind-set conducive to encountering it could be learned—well, the potential payoffs are immediately obvious. It is this lure that accounts in large part for the large number of studies dedicated to the phenomenon.

Setting out to systematize the word, hunting after serendipity itself, ends up being a slippery task, however. Serendipity is what Merton has tabbed a "self-exemplifying concept"; studying serendipity has historically meant staying on the lookout for prominent examples while on the hunt for something else.[8] For serendipity is itself about the observation of anomalous but strategic data: anomalous, because unexpected, but strategic, because related to the reorientation of a field of knowledge. This is why students of the idea generally prefer the oblique path of examples, attempting to catch serendipity as it flies.[9] The straight path of definition will not do; it misses the precise sense of the word, which intends to capture what happens when definitions are preempted or overthrown by anomalies, when, in other words, one is surprised by something one is *not* looking for.[10] The accidental, in the sense of how things have "fallen out," is therefore built into its study.

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[5] One such list, which contains these examples and more, is Royston M. Roberts, *Serendipity: Accidental Discoveries in Science* (New York: Wiley, 1989).

[6] Iain Morley and Mark de Rond's introduction to a recent collection on the topic begins by enumerating thirty-six distinct instances; Pek van Andel's "Anatomy of the Unsought Finding" was composed from a "collection of more than one thousand examples"; Morton Meyers's *Happy Accidents* is an extensive look at examples from medical research; even Merton and Barber's *Travels and Adventures of Serendipity* is built on the evidence of hundreds of examples of serendipity in the arts and sciences. See Iain Morley and Mark de Rond, "Introduction," in *Serendipity: Fortune and the Prepared Mind*, ed. de Rond and Morley (Cambridge: Cambridge Univ. Press, 2010), pp. 1–6; Pek van Andel, "Anatomy of the Unsought Finding: Serendipity: Origin, History, Domains, Traditions, Appearances, Patterns, and Programmability," *Brit. J. Phil. Sci.*, 1994, *45*:631–648; Morton A. Meyers, *Happy Accidents: Serendipity in Modern Medical Breakthroughs* (New York: Arcade, 2007); and Merton and Barber, *Travels and Adventures of Serendipity* (cit. n. 2).

[7] Aharon Kantorovich's *Scientific Discovery: Logic and Tinkering* (Albany: State Univ. New York Press, 1993) is among works that make this point explicitly, but it draws on a philosophical tradition including Karl Popper, Donald Campbell, and, more radically, Paul Feyerabend. See Karl Popper, *The Logic of Scientific Discovery* (London: Hutchinson, 1959), p. 17; Donald Campbell, "Unjustified Variation and Selective Retention in Scientific Discovery," in *Studies in the Philosophy of Biology*, ed. F. J. Ayala and T. Dobzhansky (London: Macmillan, 1974), pp. 139–161; and Paul Feyerabend, *Against Method* (London: New Left, 1975). On sociology itself see Alejandro Portes, "The Hidden Abode: Sociology as Analysis of the Unexpected," *American Sociological Review*, 2000, *65*:1–18. See also Kevin Dunbar and Jonathan Fugelsang, "Causal Thinking in Science: How Scientists and Students Interpret the Unexpected," in *Scientific and Technical Thinking*, ed. M. E. Gorman *et al.* (Mahwah, N.J.: Erlbaum, 2005), pp. 57–79.

[8] On hunting after serendipity see Martin F. Rosenman, "Serendipity and Scientific Discovery," *Journal of Creative Behavior*, 1988, *22*:132–138. "Self-exemplifying concept" is Merton's term to describe a peculiar characteristic of the sociology of science; it has, he claims, a "strongly self-exemplifying character: its own history and behavior exemplify sociological ideas and findings": Robert K. Merton, *The Sociology of Science: An Episodic Memoir* (Carbondale: Univ. Southern Illinois Press, 1979), p. 4. See also Paolo Ammassari, "Robert K. Merton: The Relation between Theory and Research," in *Robert K. Merton and Contemporary Sociology*, ed. Carlo Mongardini and Simonetta Tabboni (New Brunswick, N.J.: Transaction, 1998), pp. 21–44; Maria Luisa Maniscalco, "Serendipity in the Work of Robert K. Merton," *ibid.*, pp. 273–284; and Riccardo Campa, "Making Science by Serendipity," *Journal of Evolution and Technology*, 2008, *17*:75–83, esp. p. 77.

[9] See, e.g., Alan Baumeister, Mike Hawkins, and Francisco López-Muñoz, "Toward Standardized Usage of the Word Serendipity in the Historiography of Psychopharmacology," *Journal of the History of the Neurosciences*, 2010, *19*:253–270; and Juan Miguel Campanario, "Using Citation Classics to Study the Incidence of Serendipity in Scientific Discovery," *Scientometrics*, 1996, *37*:3–24.

[10] M. K. Stoskopf remarks that "serendipity" has "a very robust plasticity in common usage," for it seeks to capture a range of

There is a shortcut—and it is the route taken by Merton, who was largely responsible for reintroducing the word into modern circulation. This is the path of etymology, unpacking the clues contained in the word itself. The polymathic Merton stumbled across the word in the *Oxford English Dictionary*; the *OED* duly reports that it was invented by Horace Walpole, who in the course of a 1754 letter about something else described a certain species of discovery that had no proper name. Walpole, in turn, was borrowing from the title of a sixteenth-century Italian picaresque, *The Three Princes of Serendip*; "as their Highnesses traveled," Walpole remarks, "they were always making discoveries, by accidents and sagacity, of things which they were not in quest of."[11] This, Walpole somewhat archly insists, is "serendipity." Rarely is an origin so clearly marked. At least, when it comes to the name, we can know precisely where it began—and with whom. It is therefore to Walpole's letter, with possibly a gesture to the word's eponymous precursor, that studies of serendipity revert, just as it is on this letter that Walpole's fame, at least in journals of the hard sciences, chiefly rests. A certain suggestive parallel emerges: historically speaking, this single passage in Walpole's letters has prompted more inquiries to the staff of the Lewis Walpole Library "than all other passages of the Walpolian correspondence put together"; and Walpole, for this word alone, remains among the most-cited eighteenth-century men of letters (possibly *the* most cited) in publications on the sciences.[12]

Walpole is today best known for the astonishing mass of letters he left behind. Roughly four thousand have survived, a body of work composed with the ambition of capturing the tone and timbre of an age. There are among his works a novel, a play, two sprawling memoirs of backstairs politics, the first history of British painting with ambitions to exhaustiveness, and a handful of smaller histories on more antiquarian topics. He built a wildly ornate villa in Twickenham, a house that helped solidify a taste for the "Gothic." But while this villa housed the first private press in England, an important institution in the career of such poets as Thomas Gray, as well as a massive private collection of antiquities, it contained no laboratory, for Walpole was no man of science, and his press published no papers of importance to natural history. The closest Walpole ever came to being part of the new science was when he was named (in 1753) to the inaugural board of trustees for the collection that was to become the British Museum. Walpole begged off—saying that he had no interest in a hodgepodge of "hippopotamuses, sharks with one ear, and spiders as big as geese."[13]

It has therefore struck more than one investigator that Walpole is a poor point of origin for a concept that has become so important in the sciences—even if he demonstrably offers the true origin for the word. To this end, Susan E. Alcock, in the leading essay of the 2010 Darwin Lectures on that topic, asks if there might be "a prehistory to the, as yet uncoined, term," whether it might not be that serendipity "exist[ed] before its formal eighteenth-century

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encounters with unexpected particulars. See M. K. Stoskopf, "Observation and Cogitation: How Serendipity Provides the Building Blocks of Scientific Discovery," *Journal of the Institute of Laboratory Animal Research*, 2005, *46*:332–337, on p. 332. William I. B. Beveridge's classic *The Art of Scientific Investigation* (New York: Random House, 1957) gives ten examples of chance intervening in an investigation—with nineteen more in an appendix—before hazarding, in place of a definition, a maxim: "look out for the unexpected" (pp. 37–55).

[11] Walpole, *Correspondence*, Vol. 26, p. 34. See also Schuyler V. R. Cammann, "Christopher the Armenian and the Three Princes of Serendip," *Comparative Literature Studies*, 1967, *4*:229–258; T. G. Remer, ed., *Serendipity and the Three Princes of Serendip: From the Peregrinaggio of 1557* (Norman: Univ. Oklahoma Press, 1965); and Elizabeth Jamison Hodges, ed., *The Three Princes of Serendip* (New York: Atheneum, 1964).

[12] For the quotation see Wilmarth Sheldon Lewis, in Walpole, *Correspondence*, Vol. 26, p. 34n.

[13] Horace Walpole to Horace Mann, 14 Feb. 1753 (roughly a year before the "serendipity" epistle), in Walpole, *Correspondence*, Vol. 20, p. 358.

christening."[14] This would be to provide a systematic explanation for a word that names the way systems are overthrown by unforeseen accidents, for it would recast one man's work under the sign of greater cultural influences. The difficulty, however, is knowing where to start. Alcock is an archaeologist and a classicist, and she turns her gaze to the classical world, beginning by collecting examples—indeed, enlisting colleagues and friends to help in her collecting. She joins thereby the weight of studies on the topic that undertake an inductive project in the absence of anything like an intellectual history. Put as a question of classical prehistory, the answer to her own question turns out to be a tentative "no": serendipity was not part of the classical world, not a recognized element of Greek or Roman life.[15] With the possible exception of Archimedes' original "Eureka!" moment, which has seemed to more than one scholar not quite to qualify anyway, serendipity by this reckoning seems to have been invented much later.[16]

A closer look at Walpole's efforts to define his own word suggests, however, that he himself had a working understanding of the history of the idea; there are strong indications that he had been thinking for some time about the nature of discovery and was drawing from what he understood to be a tradition of theory about unexpected insights. Walpole coined "serendipity" in a 1754 letter penned to his longtime friend and correspondent Horace Mann, the British Minister of Florence. He was sending his thanks for a gift he had just received, a portrait of Bianca Cappello Walpole believed to have been painted by Vasari. He found the image striking, but it had arrived unadorned; and so, between receiving the package and penning his thanks, Walpole bespoke a frame. This was to bear the arms of the Cappellos on one side and the arms of the Medicis on the other, for the celebrated Bianca Cappello was the second wife of Francesco I de' Medici, Grand Duke of Tuscany. It was while he was engaged in research on this project that Walpole made "a critical discovery." "*À propos*," he writes,

> in an old book of Venetian arms, there are two coats of Capello, who from their *name* bear a hat, on one of them is added a flower-de-luce on a blue ball, which I am persuaded was given to the family by the Great Duke, in consideration of this alliance; the Medicis you know bore such a badge at the top of their own arms. This discovery, indeed, is almost of that kind which I call *Serendipity*.[17]

The portrait of Bianca Cappello has not survived. But Walpole's copy of the book of Venetian arms has; it was discovered and deposited at Yale by the editor of his letters, Wilmarth Sheldon Lewis. Appearing on the same page of this book are two versions of the same coat of arms: two caps with blue balls, identical except for a tiny smudge of a fleur-de-lis in the second. One may still see a little "x" in the margin, penciled by Walpole to mark his frisson of discovery, the first serendipitous discovery so-called (see Figure 1).[18] It is a question, in Walpole's words, of

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[14] Susan Alcock, "The Stratigraphy of Serendipity," in *Serendipity*, ed. de Rond and Morley (cit. n. 6), pp. 11–25, on pp. 11, 14.

[15] For a discussion of the categorical exclusion of serendipity from philosophy after Aristotle see Michael Witmore, *Culture of Accidents: Unexpected Knowledges in Early Modern England* (Stanford, Calif.: Stanford Univ. Press, 2001), pp. 17–41.

[16] Archimedes found what he *was* looking for—a solution to the problem of how to measure the volume of an irregular object—though not *while* he was looking for it. See Alcock, "Stratigraphy of Serendipity" (cit. n. 14); but see also A. Dias de Figueiredo and José Campos, "The Serendipity Equations," in *Proceedings of the Workshop Program at the Fourth International Conference on Case-Based Reasoning* (Washington, D.C.: Navy Center for Applied Research, 2001), pp. 121–124, esp. p. 123.

[17] Walpole, *Correspondence*, Vol. 26, p. 307.

[18] *Le arme overo insegne di tutti le nobili . . . di Venetia* (Venice, 1578), p. 12, Lewis Walpole Library, Farmingham,

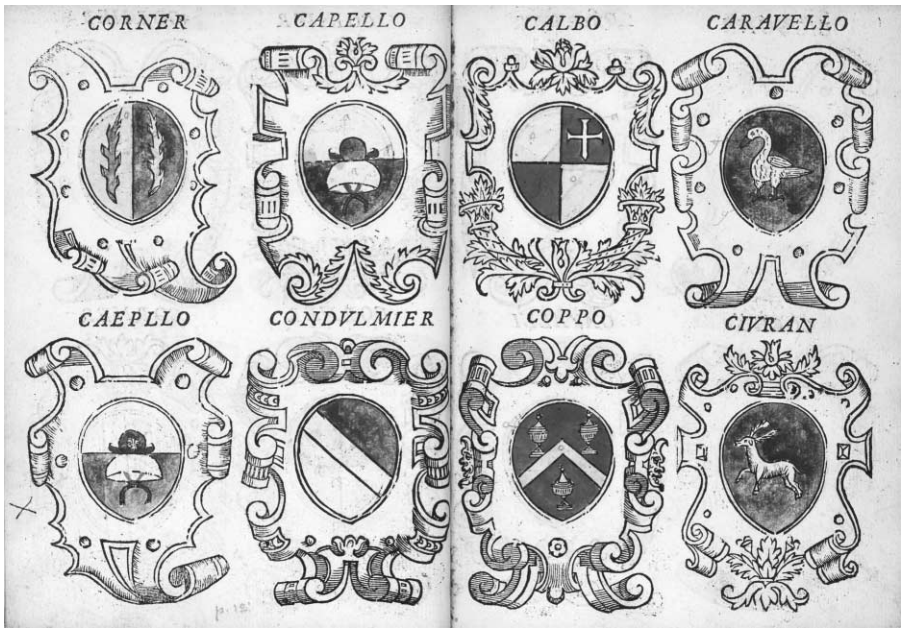

Figure 1. Walpole's marginal "x" marks the spot of the first serendipitous discovery so-called. *Le arme overo insegne di tutti le nobili . . . di Venetia* (Venice, 1578), p. 12. © Lewis Walpole Library, Yale University. Though this has not yet been accomplished, the Lewis Walpole Library has plans to make the entire collection of digital images available on its website.

"persuasion": events and context have caused a detail—the merest blot of color—to bear rhetorical force, convincing him that he is witnessing the sign of a political union.[19] He has, however, thought other differences not worth reporting. He has disregarded, for instance, the transposition of letters between "Capello," over the first coat of arms, and "Caepllo," over the second. For another researcher, on the trail of a different question, this difference might blossom into significance; as for Walpole, whose mind was versed in questions of heraldry and Venetian politics, he no doubt dismissed "Caepllo" as an uninteresting printer's error, a mere accident in the typographical sense of the word.

Walpole does not stop here.

> I once read a silly fairy tale, called *the three Princes of Serendip*: as their Highnesses traveled, they were always making discoveries, by accidents and sagacity, of things which they were not in quest of: for instance, one of them discovered that a mule blind of the right eye had travelled the same road lately, because the grass was eaten only on the left side, where it was worse than on the right—now do you understand *Serendipity*?

Connecticut, call no. 49 2051. Walpole commonly marked passages suggesting surprising discoveries with a marginal "x." See, e.g., Walpole's commonplace book, which he called his *Book of Materials* (1777), at the Lewis Walpole Library, pp. 6, 27, 29, etc.

[19] "Capello's portrait opens . . . onto an interlocking, ever-expanding nexus of image, history, and text. It is as if each object in the *Wunderkammer* ineluctably unfolds its own history, a history that is tied to other images, other places in the text": James D. Lilley, "Studies in Uniquity: Horace Walpole's Singular Collection," *ELH*, 2013, 80:93–124, on p. 119.

> One of the most remarkable instances of this *accidental sagacity* (for you must observe that *no* discovery of a thing you *are* looking for comes under this description) was of my Lord Shaftsbury, who happening to dine at Lord Chancellor Clarendon's, found out the marriage of the Duke of York and Mrs. Hyde, by the respect with which her mother treated her at table.[20]

Each of these examples is from a different sort of source: the first regards a sixteenth-century Italian portrait; the second pertains to a sixteenth-century translation of an Arabic collection of stories; the third is an episode from the Restoration Court, recalled perhaps from John Locke's memoir of Shaftesbury. But all three examples evince the same formal pattern. Each attends to something small and out of place, something seemingly accidental, and leverages it into a revised understanding of a situation.[21] Walpole, noticing a small detail in the arms of the Cappellos, finds an alliance with the most powerful house in Florence. The three princes, struck by the difference between long and cropped grass, suspect the passage of a one-eyed mule—a detail that comes to be important as the story wears on. And Shaftesbury, tipped off by an unexpected token of deference, is startled to discover a union where he did not expect it. This small detail would come to reorient his sense of the political landscape, for it signaled a secret alliance between the Duke of York—the future King James II of Anglican England—and Anne Hyde, the daughter of a commoner reputed to be a Catholic.[22] Like Walpole, who already had knowledge of Bianca Cappello's marriage to the Grand Duke of Tuscany, Shaftesbury had to have the political wisdom to understand what he was witnessing. But just as Walpole could see in that fleur-de-lis the trajectory of the Medicis, a mere word or two exchanged between mother and daughter was enough to overthrow Shaftesbury's understanding of the drift of English politics. From an unanticipated detail, then, to a revised understanding of the situation: this is the basic trajectory of serendipity.

Walpole names the term, provides its etymology, and illustrates it with a couple of instances. He has set the pattern to be repeated in countless studies, many of which return to Walpole's examples by way of establishing an origin. Much ink has been spilled over the significance of the Cappello fleur-de-lis, the trimmed grass on the left side of the road, and the respect paid to Anne Hyde by her mother. But these are false origins, for while the name of the phenomenon is borrowed from the *Three Princes of Serendip*, the concept itself—specifically, its critical pairing of "sagacity" and "accident"—pays much older debts. In his description of the phenomenon, Walpole repeats a formulation of invention mooted by Francis Bacon in an allegorical exegesis entitled "The Fable of Pan." Bacon's reading of Pan is exactly the kind of text that would have caught Walpole's fancy. First appearing in his *De sapientia veterum* (1609), and incorporated into his *De dignitate et augmentis scientiarum*

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[20] Walpole, *Correspondence*, Vol. 26, pp. 307–308.

[21] Actually, the "sixteenth-century translation of an Arabic collection of stories" is an English translation of a French translation of an Italian translation of an Arabic tale. See Renzo Bragantini, "The Serendipity of the Three Princes of Serendip: Arabic Tales in a Collection of Italian Renaissance Short Stories," in *Le répertoire narratif arabe medieval: Transmission et ouverture*, ed. Frédéric Bauden, Aoubakr Chraïbi, and Antonella Ghersetti (Geneva: Diffusion, 2008), pp. 301–308. For the memoir see John Locke, "Memoirs of the Life of the Earl of Shaftesbury," in *Works of John Locke*, 9 vols. (London, 1824), Vol. 8, p. 274. Walpole probably encountered Locke's remarks while compiling his notes on Clarendon and Shaftesbury for his *Catalogue of Royal and Noble Authors*, though he may have known them before. The best extended discussion of all these examples is Merton and Barber, *Travels and Adventures of Serendipity* (cit. n. 2), pp. 1–4, 108–109.

[22] The example of Anne Hyde and the Duke of York was perhaps suggested by superficial similarities with the story of Bianca Cappello and Francesco, Grand Duke of Tuscany. Hyde was the daughter of Edward Hyde, created Earl of Clarendon in the following year.

(1623), it is an "acroamatic" reading of the classical myths and fables surrounding the half-man, half-goat god of the natural wilderness. As Bacon understood them, these fables were "Parabolical Poesy," poetry in its most "sacred and venerable" form, by which "ideas that are objects of the intellect are represented in forms that are objects of the sense."[23] We might say that Bacon read them as philosophical allegories; he accordingly undertook a lengthy project to unpack their latent philosophical content, revealing what he took to be the wisdom of the ancients.

Walpole seems to have drawn the language he needed for the definition of serendipity from just one of Bacon's acroamatics, but Bacon himself developed here a metaphorical shorthand that he would repeatedly employ in his scientific writings. This is in spite of the fact that *De sapientia veterum*, by celebrating classical learning, would seem to be at cross-purposes with what Bacon is now best known for—the radically new path to knowledge that, despite his many silent debts to the tradition, he saw as a break from Aristotelianism. For this reason, the text has historically been classed as one of Bacon's moral, rather than scientific, papers.[24] More than a few of his acroamatics, however, seem clearly to point toward his grand project of the reformation of philosophy, which by 1609 was already under way; Bacon's "Fable of Pan," for instance, joins a handful of experimental essays written at about the same time, each of which differently thinks through a philosophy outside the neo-Aristotelean logic of the Schools.[25] What is more, the same reading of the fable of Pan served Bacon in his 1623 *De augmentis scientiarum* as a critical example of how poetry might relay ideas of natural philosophy.[26] It is therefore better, as Paolo Rossi and Brian Wormald have separately insisted, to read the work as part of Bacon's interest in recovering a body of learning composed before the swerve in philosophy initiated by Aristotle.[27] Crucially, the lessons compiled here, especially in the use of metaphor in the pursuit of learning, make their way into Bacon's more mature work. As Bacon had noted as early as *The Advancement of Learning* (1605), scholars seeking the truth of nature often find it "necess[ary] . . . to have recourse to similitudes and translations"—that is, "metaphors"— both for the purpose of "making themselves understood" and in order "to prove and demonstrate." The weak version of Bacon's claim is that metaphor is a tool useful in the pursuit of truth, a rhetorical technique like any other; the strong version is that metaphors offer models, useful not just to clinch an argument but also in developing

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[23] Francis Bacon, *De augmentis scientiarum*, in *The Works of Francis Bacon [and] The Letters and the Life of Francis Bacon*, ed. James Spedding, 14 vols. (London: Longman, 1857–1861) (hereafter cited as **Bacon, *Works*, ed. Spedding**), Vol. 8, pp. 440, 442. "Acroamatic" is Bacon's own description. On the term see Howard B. White, "Bacon's 'Wisdom of the Ancients,'" in *Antiquity Forgot: Essays on Shakespeare, Bacon, and Rembrandt* (The Hague: Nijhoff, 1978), pp. 109–136, esp. p. 110; and Diana B. Altegoer, *Reckoning Words: Baconian Science and the Construction of Truth in English Renaissance Culture* (Cranbury, N.J.: Associated Univ. Presses, 2000), pp. 86–91.

[24] Fulton Anderson, *The Philosophy of Francis Bacon* (Chicago: Univ. Chicago Press, 1948), p. 57; and Benjamin Farrington, *Francis Bacon: Philosopher of Industrial Science* (New York: Schuman, 1949), pp. 76–78. On the Aristotelianism of Bacon and the Baconian tradition see Marco Sgarbi, *The Aristotelian Tradition and the Rise of British Empiricism* (Dordrecht: Springer, 2013), pp. 147–166.

[25] Benjamin Farrington, *The Philosophy of Francis Bacon* (Chicago: Univ. Chicago Press, 1966). See also Craig Martin, *Subverting Aristotle: Religion, History, and Philosophy in Early Modern Science* (Baltimore: Johns Hopkins Univ. Press, 2014), pp. 145–168.

[26] Francis Bacon, *The Wisdom of the Ancients*, in *Works*, ed. Spedding, Vol. 13, pp. 122–125, 129–131, 92–101; the fable of Pan appears with few changes in *De augmentis scientiarum*, *ibid.*, pp. 444–457.

[27] Paolo Rossi, *Francis Bacon: From Magic to Science*, trans. Sacha Rabinovitch (Chicago: Univ. Chicago Press, 1968), pp. 73–134; and B. H. G. Wormald, *Francis Bacon: History, Politics, and Science, 1561–1626* (Cambridge: Cambridge Univ. Press, 1993), pp. 92–96. See also Perez Zagorin, *Francis Bacon* (Princeton, N.J.: Princeton Univ. Press, 1998), pp. 70–73.

insights through the analogies they provide.[28] Viewed this way, papers like Bacon's "Fable of Pan" are experiments in the meaning of metaphor, actively unspooling fables as a means of gaining insight into the nature of nature itself. And, indeed, formulations first tried out in *De sapientia veterum* would become important resources throughout his philosophical career.

Bacon calls the fable of Pan the "noblest of all antiquity," for he takes Pan as a figure for "nature" itself. Its critical episode, providing language that will turn up in Walpole's letter, concerns Pan's discovery of Ceres. Ceres is the goddess associated with the harvest, but, grieving over the loss of her daughter, she has absented herself from Olympus. Because Ceres has allowed the spring to pass without her usual encouragements to agriculture, the gods set out to find her, but Pan, indifferent to the general fate, remains behind. He shrugs off the search in favor of a hunt of a different sort; it is, however, precisely while he is in chase of his own wild game that he stumbles across Ceres in her desolation. Bacon provides this interpretation of the episode:

> The part of the fable which attributes the discovery of lost Ceres to Pan whilst he was hunting—a happiness denied the other gods, though they diligently and expressly sought her—contains an exceeding just and prudent admonition; viz., that we are not to expect the discovery of things useful in common life, as that of corn, denoted by Ceres, from abstract philosophies, as if these were the gods of the first order, —no, not though we used our utmost endeavours this way, —but only from Pan, that is, a sagacious experience and general knowledge of nature, which is often found, even by accident, to stumble upon such discoveries whilst the pursuit was directed another way.[29]

Pan never bagged his deer; what he found was something he didn't know he was looking for until he found it. As Bacon interprets it, Pan's fortune in finding Ceres while looking for something else provides an important lesson: useful discoveries—even those as useful as wheat or corn—are not to be made by looking for them, but only through a wide knowledge of nature combined with careful attention to the unexpected. This is the first place in the protoscientific tradition where this species of discovery is formalized; in the works of the man most often associated with the early drive to systematize knowledge is a contrary exhortation to asystematicity. And though Bacon would come to qualify these remarks, working out ways of imagining hunts of a different, more systematic sort, he would nevertheless continue to call this form of accidental invention "the Hunt of Pan," meaning to capture the habit or knack

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[28] Francis Bacon, *The Advancement of Learning*, in *Works*, ed. Spedding, Vol. 3, p. 407. The stakes of Bacon's metaphors are explored in the debates following Carolyn Merchant's *The Death of Nature*—especially those metaphors that seem to involve hunting, trapping, torturing, and otherwise assaulting a female-gendered nature. Specifically addressing metaphor itself are Peter Pesic, "Wrestling with Proteus: Francis Bacon and the 'Torture' of Nature," *Isis*, 1999, 90:81–94; Katharine Park, "Bacon's 'Enchanted Glass,'" *ibid.*, 1984, 75:290–302; and Carolyn Merchant, "The Scientific Revolution and *The Death of Nature*," *ibid.*, 2006, 97:513–533. Offering nearly simultaneous summaries of this tradition from both sides of the debate are Brian Vickers, "Francis Bacon, Feminist Historiography, and the Dominion of Nature," *Journal of the History of Ideas*, 2008, 69:117–141; Pesic, "Proteus Rebound: Reconsidering the Torture of Nature," *Isis*, 2008, 99:304–317; and Merchant, "'The Violence of Impediments': Francis Bacon and the Origins of Experimentation," *ibid.*, pp. 731–760.

[29] Bacon, *Wisdom of the Ancients*, in *Works*, ed. Spedding, Vol. 13, p. 100. Peter Shaw describes Bacon's interpretation of the Pan myth as itself requiring sagacious experience. "These kind [*sic*] of explanations," he remarks, speaking of Bacon's sometimes orphic acroamatics, "may appear like forced accommodations, to hasty and juvenile minds; but perhaps will have a greater effect upon sober and philosophical natures, versed in the knowledge of men and things." See Peter Shaw, ed., *The Philosophical Works of Francis Bacon*, 3 vols. (London, 1733), Vol. 1, p. 63 n a.

whereby useful discoveries can be made while searching for something else. It is therefore not Walpole, but Bacon, who offers the first modern attempt to formalize serendipity—and even to propose it as an essential component of discovery.[30]

Walpole happened upon "The Hunt of Pan" while on a chase of his own, composing an antiquarian history that required wide reading and attention to things by the way. A series of events occurring at around the moment of Walpole's neologism suggests how he might have run across Bacon's text, for Walpole was during those years acquainted with Bacon's most important eighteenth-century editor. This was Peter Shaw. Shaw's edition was important because it offered Bacon's philosophical and moral works entirely in English, bypassing the handful of popular translations (including a single alternate translation of "The Fable of Pan") to work them up from the original Latin.[31] It is only in Shaw's edition of Bacon's *Works* that "*sagaci*" is rendered as "sagacious" and "*casu quodam*" as "accident"—the precise terms that make their way into Walpole's letter.[32] And Shaw, who was already recognized as the most important authority on Bacon's writings, was well known to Walpole. Walpole mentions Shaw multiple times in his letters; they moved in the same circles and counted many of the same friends. Among other things, Shaw was named physician-in-ordinary to King George II at roughly the same time that Walpole began seriously investing himself in penning a memoir of backstairs politics. But the connections run deeper than this: Shaw had been one of a small number of scholars who had gathered under the patronage of Walpole's uncle. He edited and published *The Philosophical Works of Francis Bacon* largely with support of this uncle, to whom it was dedicated. Through a curious coincidence, this patron uncle was namesake to the belletrist nephew; this means that the dedication page of Shaw's edition of Bacon's works prominently displays, in magisterial block capitals, the name of its patron: "Horace Walpole."[33] From family connections, in other words, to London celebrity and the circles of the Court, Shaw and Walpole repeatedly crossed each other's wakes, thrown into mutual company during precisely the same years that Walpole was becoming interested in the craft of research.

Walpole only once mentions "the learned Mr. Shaw" in his capacity as editor, but it is a telling gesture. "My Lord Bacon," Walpole writes to his friend Henry Seymour Conway, "as Doctor Shaw says very prettily in his preface to the Works [of Bacon], *had the art of inventing arts*."[34] This of course helps confirm that Walpole had read Shaw's edition of Bacon—in

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[30] Phillip Ball, *Curiosity: How Science Became Interested in Everything* (Chicago: Univ. Chicago Press, 2013), pp. 90–96. Ball's discussion is heavily indebted to William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton, N.J.: Princeton Univ. Press, 1994).

[31] For the other English translation of "The Fable of Pan" see Francis Bacon, *The Wisedome of the Ancients*, trans. Sir Arthur Gorges (London, 1619), p. 35. Gorges's translation, the only one to appear in Bacon's lifetime, was commonly appended to the *Essays*. The critical repeated terms do not, however, appear; Gorges offers instead "chance" and "discrete observation and experience."

[32] Francis Bacon, "The Fable of Pan, Explained of Natural Philosophy," in *Philosophical Works of Francis Bacon*, ed. Shaw (cit. n. 29), Vol. 2, p. 63. It is also worth mentioning, though it casts no glory on Walpole, that Shaw's edition was the first to give *De augmentis scientiarum*, with its translation of "The Fable of Pan," pride of place among Bacon's works. Walpole, who was always more likely to read the first volume of a collection than the last, would have run across Bacon's thoughts on poetry in the first hundred pages of the first volume of Shaw's three-volume edition.

[33] *Philosophical Works of Francis Bacon*, ed. Shaw, Vol. 1, p. 4. Walpole mentions Shaw in his letters mostly in his capacity as physician to royalty and the aristocracy. See, e.g., Walpole, *Correspondence*, Vol. 21, p. 79; Vol. 30, p. 54; Vol. 31, p. 10; Vol. 38, p. 83.

[34] Walpole to Henry Seymour Conway, 29 Aug. 1748, in Walpole, *Correspondence*, Vol. 37, p. 292. There is an additional twist here. Walpole misascribes the quotation, tracing it to Shaw's "Preface" to the *Works of Mr. Boyle*. We have a reasonably full sense of the books Horace Walpole owned (see Alan Hazen, *A Catalogue of Horace Walpole's Library* [New Haven, Conn.: Yale

which the critical passage on the Hunt of Pan turns up on the sixty-third page of the first volume. But it also gives some insight into what Walpole deemed interesting about what he found there, signaling among other things Walpole's abiding interest in sorts of discovery. It is in the same letter to Conway that Walpole confesses, in his mobile form of mock-seriousness, that he was himself engaged in "a treatise or panegyric on the great discoveries made by posterity in all the arts and sciences." This "treatise or panegyric" is clearly an invention, a plan for a book of science fiction that got no further than a long paragraph of fanciful ideas. But it is also a mock-satire, bearing on Edward Somerset's 1655 *Century of Inventions*.[35] Walpole is known to have been reading this book, which he called Somerset's "*Inventionary*," at about the same time; it is loaded with wishful ideas for useful contraptions: a description of a primitive steam engine, but also a cipher that can be decoded by taste, a perpetual motion machine for raising water from a well, a design for an artificial bird that can fly, sing, and hover "as long as one pleaseth." This list of ideas (for Somerset claimed to have lost his notes on how to effect all these things) stood in contrast to the lessons provided by Bacon. To Walpole, Somerset is the scholar for whom discovery is a mere exercise of the intellect, for whom invention is as simple as dreaming up a technical desideratum. He has set down "a catalogue of titles of things," but with "no directions how to execute." Bacon, on the other hand, rigorously "taught" (in Shaw's words) "the ways of bringing to light . . . modern Discoveries and Improvements." The inventions of "the Moderns," writes Shaw, are "in general, no more than a part of what [Bacon] foresaw in his mind," but rather than giving mere titles or descriptions of things, he has "open'd the Springs of Knowledge and Practice."[36] This is what Walpole, quoting Shaw, calls "*the art of inventing arts*."

Walpole was not writing a history of inventions "made by posterity." But he was writing a book—which was about as different from a list of notional inventions as can be. He was compiling an antiquarian *Catalogue of Royal and Noble Authors*, his first major scholarly undertaking and the one that, more than any other, helped him develop his taste and approach as a scholar. Marginalia in Walpole's copy of Somerset's *Century of Inventions* indicate that he read it as part of his research for the *Catalogue*; it was also while researching the *Catalogue* that Walpole encountered Bacon in an extensive way—for Bacon was of course Earl of Verulam and therefore fell within its royal and noble scope. Walpole would call Bacon "the Prophet of Arts, which Newton was sent afterwards to *reveal*"—a formulation that was destined to become, for Walpole, something of an epithet, but that was first tried out in the letter to Conway, where it recalls Shaw's encomium of Bacon for his "*art of inventing arts*." The contrast between Somerset and Bacon, in this regard, could not have been greater—and it returns us to what lent "The Fable of Pan" its importance in Walpole's understanding of the nature of invention. For all its ambitions of exhaustiveness, Walpole's *Catalogue of Royal and Noble Authors* was researched with no design apart from simply husbanding everything he was

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Univ. Press, 1969]), among which was Shaw's *Works of Mr. Boyle*. However, as Wilmarth Sheldon Lewis was the first to observe (in Walpole, *Correspondence*, Vol. 37, p. 292 n 11), the passage *isn't* from the preface to the Boyle volumes; it is from the preface to Shaw's *Philosophical Works of Francis Bacon* (Vol. 1, p. ix)—the very edition that contains Shaw's translation of "The Fable of Pan."

[35] Edward Somerset, Marquis of Worcester, *A Century of the Names and Scantlings of Such Inventions as at Present I Can Call to Mind* (London, 1663). See Walpole to Conway, 29 Aug. 1748, in Walpole, *Correspondence*, Vol. 37, p. 292. Walpole's copy of Somerset's book, with his marginal notes, is at the Lewis Walpole Library, call no. 49 1608 4.

[36] Walpole, *Correspondence*, Vol. 35, p. 252; and Peter Shaw, "General Preface," in *Philosophical Works of Francis Bacon*, ed. Shaw (cit. n. 29), Vol. 1, p. xi.

able to discover.[37] In Bacon, Walpole discovered a vocabulary for this sort of research. Over the course of his career, he would return repeatedly to language reminiscent of Bacon's "Fable of Pan," multiply referring to discovery as (for instance) what happens when sagacity meets an appropriate accident or what occurs when a huntsman is "*a la chasse* of something very different."[38] To put it differently: "The Fable of Pan" offered to Walpole the antiquarian's research program; it provided a justification for distinguishing Somerset's fanciful list of a hundred imaginings from Walpole's painstakingly developed catalogue of more than a hundred separate authors.

In reading "The Fable of Pan" as a general defense of discovery by accident, of discovery of the sort he himself favored, Walpole was encountering Bacon as a modern writer. The theory of invention that Bacon inherited, though not the one he develops, descends from Cicero through the rhetorical tradition. Posed with an argument, a rhetor ranges over the memories he has treasured up, locating examples and images that will fit his present purpose. Though Bacon's debts to this school have been shown to be deep, this is not the sort of discovery he was after.[39] Invention in this rhetorical sense, Bacon insists, is a "hunt," but it is "a chase . . . of deer in an inclosed park"; his purpose was instead to describe the more ambitious chase "in a forest at large." As he puts it, "the invention of arguments is not properly an invention: for to invent is to discover that we know not, not to recover or resummon that which we already know." The productive form of invention that Bacon offers as an alternative is characterized by its attachment to experience, targeting the active work of hunting lessons out of masses of particulars. Bacon was attempting, as Marta Cavazza puts it, to "bridge the great gap in Aristotelean logic," Aristotle's "failure adequately to discuss" the painstaking "art of searching" as a component of discovery in natural philosophy.[40] It is for this reason that Bacon himself is often named as the critical figure in the emerging sense that invention might mean two distinct things: the systematic exploration of things already known and the discovery of something profoundly new.[41] It might, in other words, mean finding what one knows to look for, but it might also mean discovering something one does not know is wanted until after it has been found.

By sectioning off invention in its rhetorical sense, Bacon created space for a more radical form of creativity, what he (and later Walpole, in the letter to Conway) called the discovery "of arts and sciences." But here, too, there is a further distinction, a sometimes blurry internal distinction *between* invention of arts and invention of sciences, where we can see Bacon and

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[37] Horace Walpole, *Catalogue of Royal and Noble Authors*, 2 vols. (Twickenham: Strawberry Hill Press, 1758), Vol. 1, p. 181. Walpole describes his intentions in gathering this information in the "Advertisement," *ibid.*, pp. i–vii.

[38] Walpole, *Correspondence*, Vol. 31, p. 325. He writes that the princes "are always making discoveries, by accidents and sagacity," and that Lord Shaftesbury provides "one of the most remarkable instances of this *accidental sagacity*."

[39] Richard McKeon, *Rhetoric: Essays in Invention and Discovery* (Woodbridge: Oxbow, 1987), pp. 25–36. On Bacon's cognitive model see Karl R. Wallace, *Francis Bacon on the Nature of Man* (Urbana: Univ. Illinois Press, 1969). On his debts to Scholasticism, especially through the rhetorical tradition, see Lisa Jardine, *Francis Bacon: Discovery and the Art of Discourse* (Cambridge: Cambridge Univ. Press, 1974), pp. 31–32, 69–71, 170–171.

[40] Bacon, *De augmentis scientarium*, in *Works*, ed. Spedding, Vol. 9, p. 83; and Marta Cavazza, "Metafore venatorie e paradigmi indiziari nella fondazione della scienza sperimentale," *Annali dell'Instituto di Discipline Filosofiche dell'Università di Bologna*, 1980, *1*:107–133, on p. 111. See also Peter Dear, "The Meanings of Experience," in *Cambridge History of Science*, Vol. 3: *Early Modern Science*, ed. Katharine Park and Lorraine Daston (Cambridge: Cambridge Univ. Press, 2006), pp. 108–131.

[41] Raphael Hallett, "Space, Text, and Creativity in the Late Sixteenth and Seventeenth Centuries," in *Concepts of Creativity in Seventeenth-Century England*, ed. Rebecca Herissone and Alan Howard (Croydon: Boydell & Brewer, 2013), pp. 105–148; and Carolyn R. Miller, "The Aristotelian *Topos*: Hunting for Novelty," in *Rereading Aristotle's Rhetoric*, ed. Alan G. Gross and Arthur E. Walzer (Carbondale: Southern Illinois Univ. Press, 1988), pp. 130–147.

Walpole begin to part ways. "Almost all mechanical arts," Bacon notes, "have sprung from small beginnings presented by nature or chance." In a fabular turn worthy of *The Wisdom of the Ancients*, Bacon makes the distinction by returning to the myth of Prometheus. "You would not say," Bacon remarks,

> that Prometheus was led by speculation to the discovery of fire, or that when he first struck the flint he expected the spark; but rather that he lighted on it by accident, and (as they say) stole it from Jupiter. So that in the invention of arts it would seem that hitherto men are rather beholden to a wild goat for surgery, to a nightingale for music, to the ibis for clysters, to the pot lid that flew open for artillery, and in a word to chance, or anything else, rather than to Logic.

The very list of things Bacon provides—Prometheus's fire, the monk's gunpowder, the surgeon's goat—suggests the genre that has become familiar in serendipity studies. It has been compiled from similar lists, in Pliny and elsewhere, and will give way to further lists, in compendia on discovery and ingenuity. The method of ripening apples by placing them together, Bacon notes, was drawn from an observation of the ripening of grapes on the vine; distilling was invented, he suspects, after observing droplets on a lid covering a pan of boiling water; "nor would a man have ventured to imitate thunder and lightning"—that is, to invent gunpowder—"if it had not been suggested by the pot of the monkish chemist suddenly flying up with great force and a loud report."[42] We might add to Bacon's list of discoveries of the arts other standard examples of serendipity, without feeling much of a slippage. In the arts, the sparks of discovery do not fly up from the mind of the craftsman; they are prompted by unexpected sparks among things. And in this sense alone, the monk's pot lid and Prometheus's spark are of a kind with Sir Alexander Fleming's contaminated petri dish, Joseph Priestley's bright-burning candle, Wilhelm Röntgen's glowing screen, and so on, for each of these examples follows the form of the Hunt of Pan.[43]

Bacon's list of discoveries would have been the sort of thing that seized Walpole's attention— but to read discovery of the arts as the lesson of Bacon's philosophy is to read him very much against the grain, for Bacon seemed to think that philosophy encounters an aporia when confronted with the unexpected. "The mechanical arts draw little light from philosophy," Bacon lamented, precisely because they take their lessons from accidents.[44] The reverse is also true. "Logic," Bacon suggests, "says nothing, no nor takes any thought, about the invention of arts." Its association with happenstance leaves craft knowledge with a poor reputation. Relying on accident, Bacon insists, has produced a "quite imperfect and undeveloped" science of discovery. If discoveries of the arts had been achieved through genuine "discoveries of the sciences," Bacon insists, they would each have been attended by a host of further discoveries. A perfected philosophy, he promised, would naturally lead "to the effecting of all things possible," a preliminary sketch of which he offered in his *New Atlantis*. But discoveries made by chance, as Bacon understood them, had no way to advance beyond

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[42] Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 9, pp. 66, 76–77.

[43] These well-known examples turn up regularly. See Roberts, *Serendipity* (cit. n. 5), pp. 25–26, 139–143, 159–164; Thomas S. Kuhn, *The Essential Tension: Selected Studies in Scientific Tradition and Change* (Chicago: Univ. Chicago Press, 1977), pp. 167–174; and James H. Austin, *Chase, Chance, and Creativity: The Lucky Art of Novelty* (Cambridge, Mass.: MIT Press, 1977), pp. 86–90.

[44] Francis Bacon, "Thoughts and Conclusions," in Farrington, *Philosophy of Francis Bacon* (cit. n. 25), p. 73 (this work is included in an appendix). The arts do, however, Bacon admits, "gradually enlarge the humble web woven by experience."

the local tricks or knacks with which they began, for there was no revolution in understanding behind the learning of the hand. Discovery in the arts could therefore "hardly be esteemed . . . a part of philosophy."[45] Indeed, as Bacon insisted, neither could discovery of the arts *itself* be deemed "an art," for according to this account it consists only of precisely whatever new techniques are accidentally developed.

Bacon's fullest discussion of the importance of accident in the conduct of learning is posed in the text most explicitly dedicated to finding a better way, an infallible system for the advancement of knowledge. This is his *Novum organum*, Bacon's "new organ" or inductive method, which was intended finally to release investigators from their reliance on goats, nightingales, the ibis, and pot lids for their breakthroughs. Among the critical sections of the *De augmentis scientiarum* is a list of the types of experiments to be employed by a philosopher on the trail of nature's laws; each of these types hinges on a logical relationship between the knowledge sought and the things that might be tried in order to produce it.[46] Rigorously compiled tables of examples, folded together with equally rigorous counterexamples, were to lead, gently and of themselves, upward to higher levels of generalization. This was invention of the sciences, discovery presented as a method; the process is to leave the experimenter with "a form affirmative, solid and true and well defined."[47] This stands in contrast to inventions of the arts, which, though undoubtedly useful, work without anyone knowing why. Inventions of the arts, the kind Bacon continued to characterize as the fruits of the Hunt of Pan, were therefore in this magnum opus to be restricted to an appendix-like fifth book, a planned volume called "Forerunners, or Anticipations of the New Philosophy." As forerunners, inventions encountered during the regular practice of craft would merely approximate the great work of an exhaustively compiled, inductively developed system of natural laws—from which practical applications would follow in due course.

Thus was initiated a break between discoveries of the arts, which are encountered while doing something else, and discoveries of the sciences, which are achieved deliberately, through method. Bacon continued to insist on this distinction in spite of his own observations that discovery in the sciences was anything but straightforward. Discovery in the crafts, Bacon insisted, is conducted obliquely, through tricks and stratagems, what William Eamon distinguishes as *metis* rather than *episteme*.[48] The way of craft is labyrinthine, a lesson Bacon develops in his acroamatic on Daedalus and that informs his later remarks on discovery in the arts. But precisely the same figures turn up in his descriptions of the progress of discovery in

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[45] Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 9, pp. 64 ("logic says nothing"), 71 ("part of philosophy"); Bacon, "Thoughts and Conclusions," p. 73 ("quite imperfect and undeveloped"); and Francis Bacon, *The New Atlantis*, in *Works*, ed. Spedding, Vol. 3, p. 156. Discovery of the sort effected through craft or experiment is not quite guided by philosophy; it is organized, Bacon remarks, by an acquired "sagacity": Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 9, p. 71.

[46] Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 9, p. 72.

[47] Francis Bacon, *Novum organum*, in *Works*, ed. Spedding, Vol. 8, p. 205. Bacon offers a sample of his method, of the three sorts of tables: *ibid.*, pp. 194–210. For a review of Bacon's method, summarizing the debates in recent scholarship, see H. Floris Cohen, *How Modern Science Came into the World* (Amsterdam: Amsterdam Univ. Press, 2010), pp. 245–249; and Dana Jalobeanu, "Learning from Experiment: Classification, Concept Formation, and Modeling in Francis Bacon's Experimental Philosophy," *Revue Roumaine de Philosophie*, 2013, 57:75–93.

[48] See Francis Bacon, "Daedalus," in *Works*, ed. Spedding, Vol. 13, pp. 129–131. This is not "*episteme*," William Eamon notes, but what the Greeks called "*metis*." The "straight lines of philosophy" are no use here. "Once we enter the realm of engineers and craftsmen," Bruno Latour remarks, "no unmediated action is possible." Eamon, *Science and the Secrets of Nature* (cit. n. 30), p. 282; and Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass.: Harvard Univ. Press, 1999), p. 175.

the sciences, which involves (Bacon notes) a "winding and intricate" path. Even the most rigorous application of the rules of investigation, as Peter Urbach notes of Bacon's account, "necessitates a conjectural leap more or less independent" of the rules themselves, a subtle, intricate, winding journey that leans on tips and tricks learned in the past.[49] The trick is navigating the labyrinthine path from the realm of ideas to the conduct of experiment or the massing of histories—and from the application back to the lesson.[50] There is, in Bacon's words, a kind of "madness" here, the "Chances of experiment," papered over with what Bacon variously calls "learned experience," "a kind of sagacity," and an "ingenuity" that is neither systematic nor accidental.[51] Commentators as early as Bacon's most significant Victorian readers observed the slippage. James Spedding, for instance, suspected that Bacon himself, with the advantage of hindsight, would have recognized the progress of science as one long, uninterrupted Hunt of Pan; the sagacity of the hunt seemed to Spedding to be implied even in the arrangement of meaningful groups to begin with. William Whewell similarly observed that no art of discovery, separate from the practice of the many sciences, would be possible, for "at each step of the progress of science, are needed invention, sagacity, genius."[52] "When the observer's mind is prepared . . . with sagacity and invention," Whewell concludes, "a very few facts, or it may be a single one, may bring the process of discovery into action."[53]

What is more, Bacon's discussion of discovery in the sciences borrows repeatedly from language developed in his analysis of discovery in the arts, especially from vocabulary elaborated in "The Fable of Pan." Hounding, hunting, tracing, and tracking: Bacon lights on the metaphor in "The Fable of Pan," but it turns up repeatedly thereafter, often enough to suggest that the basic affordances of hunting are deeply bound up with Bacon's understanding of the progress of knowledge.[54] As argued by a string of scholars from Paolo Rossi and Marta Cavazza to William Eamon and Rhodri Lewis, the venatorial metaphor is constitutive of Bacon's thought.[55] All things in nature, writes Bacon, "every natural action, every motion and

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[49] Urbach, "Francis Bacon as a Precursor to Popper" (cit. n. 3), p. 128. This point, about the craft of the sciences, is also raised more generally by Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: Univ. Chicago Press, 1958).

[50] These ideas are partly explored in the fragment "Filum labyrinthi," in *Works*, ed. Spedding, Vol. 6, pp. 416–428. On this point see Daniel Garber, "Physics and Foundations," in *Cambridge History of Science*, Vol. 3: *Early Modern Science*, ed. Park and Daston (cit. n. 40), pp. 19–69: and Lynn S. Joy, "Scientific Explanation from Formal Causes to Laws of Nature," *ibid.*, pp. 70–105.

[51] Bacon discusses these partially overlapping terms at length in *De augmentis scientiarum*. See, e.g., Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 9, p. 82 ("Chances of experiment"); Vol. 9, p. 71 ("learned experience" and "a kind of sagacity"); and Vol. 8, p. 512 ("ingenuity"). On "learned experience" see Jalobeanu, "Learning from Experiment" (cit. n. 47); on "ingenuity" see Rhodri Lewis, "Francis Bacon and Ingenuity," *Renaissance Quarterly*, 2014, 67:113–163.

[52] James Spedding, in Bacon, *De augmentis scientiarum*, in *Works*, ed. Spedding, Vol. 2, p. 370 n 1; and William Whewell, *Philosophy of the Inductive Sciences*, 2 vols. (London, 1840), Vol. 1, pp. vii–viii. "Particular facts" are not merely "brought together" in the production of knowledge, but a "New Element [is] added to the combination," sealing the discovery in the realm of knowledge. This "Conception of the Mind" is supplied through the working of the "invention and sagacity" of the observer, and no set of rules can be adduced for how that conception might be coaxed from sets of facts that do not contain it (*ibid.*, Vol. 2, pp. 43–44).

[53] Whewell, *Philosophy of the Inductive Sciences*, Vol. 2, pp. 23–24. On this question in Whewell, Bacon, Boyle, and others see Joseph Agassi, *The Very Idea of Modern Science: Francis Bacon and Robert Boyle* (Dordrecht: Springer, 2013), esp. pp. 57–80.

[54] On Bacon's language in his discussion of discovery in the sciences see Rhodri Lewis, "Francis Bacon and Ingenuity" (cit. n. 51); and Romano Nanni, "Technical Knowledge and the Advancement of Learning: Some Questions about 'Perfectibility' and 'Invention,'" in *Philosophies of Technology: Francis Bacon and His Contemporaries*, ed. Claus Zittel *et al.* (Leiden: Brill, 2008), pp. 51–66. Regarding "hunting" and the progress of knowledge see Park, "Bacon's 'Enchanted Glass'" (cit. n. 28), p. 297; and Vickers, "Francis Bacon, Feminist Historiography, and the Dominion of Nature" (cit. n. 28), pp. 127–129.

[55] Lewis, "Francis Bacon and Ingenuity," pp. 135–139; Cavazza, "Metafore venatorie e paradigmi indiziari nella fondazione

process of nature, is nothing else than a hunt"; "the sciences and arts hunt after their works," he insists, but so too do "human counsels hunt after their ends," just as "all things in nature hunt after their food."[56] And while the metaphor is ultimately an inherited one, borrowed from Cicero among others, Bacon leans on it in ways new enough that at least one of his usages, the verb "hounding," appears to be his own coinage.[57] Furthermore, "sagacity" participates in this metaphorical economy. The special sort of wisdom shared by the craftsman and the investigator, the "sagacity" of the craftsman and philosopher alike, remembers hunting in its etymology; it draws by way of Latin from the Germanic root "*sok*," meaning "to seek" or, more distantly, "to perceive by scent." As Peter Pesic suggests in his careful study of Bacon's metaphors, the scientific endeavor is a hunt through and through, exactly because hunting names the natural relationship between a field of knowledge and the desideratum appropriate to it.[58] Not all of the hunt involved looking for one thing and finding something else; evidently Pan, active and sagacious, sometimes caught what he was looking for—indeed, developed strategies and complex systems to help him find it. The critical thing is his learned experience; knowing how to hunt, having the sagacity to capture lessons from anomalies, is the investigator's most important trait.[59] This is what Shaw meant when he suggested that Bacon "*had the art of inventing arts*"; Shaw saw what Bacon largely obscured: that his investigation into the sciences depended on the sort of ingenuity, the acquired sagacity, intrinsic to craft.[60]

And so, if Bacon offers the first remarks on what would become serendipity, developed as part of his work on the reformation of knowledge, he also begins the process of its erasure, plowing it back into a set of inductive procedures. In fact, Bacon's mistrust of craft repeats, rather than corrects, an Aristotelian set of convictions. While Bacon rejects, for instance, the Aristotelian schema of the four causes, he nevertheless aspires to the elucidation of the "form" of things as the rule of their operation—a vexed batch of borrowings that Antonio Pérez-Ramos aptly calls Bacon's "non-Aristotelian Aristotelianism." For Aristotle, as C. D. C. Reeve puts it, "natural science deals with things that are necessarily a certain way, whereas craft knowledge deals with the same thing as luck," which is to say "particulars that can be manufactured or modified." Bacon, after the set of essential rules that might lead to essential causes, likewise overlooked the importance of craft to the advancement of knowledge. An opportunity was missed. It was perhaps necessary to appeal to method in the institutionalization of natural philosophy. The establishment of the Royal Society, for instance, depended on

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della scienza sperimentale" (cit. n. 40); Paolo Rossi, *Philosophy, Technology, and the Arts in the Early Modern Era*, trans. Salvator Attanasio (New York: Harper, 1970); Keith Thomas, *Man and the Natural World: Changing Attitudes in England, 1550–1800* (Oxford: Oxford Univ. Press, 1983), pp. 160–165; William Eamon, "Science as a Hunt," *Physis: Rivista Internazionale di Storia della Scienza*, 1994, 3:393–432; and Eamon, *Science and the Secrets of Nature* (cit. n. 30), pp. 269–300. Eamon's "Science as a Hunt" relies on Richard Boyd, "Metaphor and Theory Change: What Is 'Metaphor' a Metaphor For?" in *Metaphor and Thought*, ed. Andrew Ortony (Cambridge: Cambridge Univ. Press, 1979), pp. 356–404.

[56] Bacon, *Wisdom of the Ancients*, in *Works*, ed. Spedding, Vol. 13, p. 98.

[57] On this point see Merchant, "Scientific Revolution and *The Death of Nature*" (cit. n. 28), p. 528.

[58] Pesic, "Wrestling with Proteus" (cit. n. 28), pp. 83–84. See also Robert M. Schuler, *Francis Bacon and Scientific Poetry* (Philadelphia: American Philosophical Society, 1992), p. 53.

[59] Dana Jalobeanu, "The Philosophy of Francis Bacon's Natural History: A Research Program," *Studii de Stiintja si Cultura*, 2010, 23(4):18–36, esp. p. 24; and Eamon, *Science and the Secrets of Nature* (cit. n. 30), p. 290.

[60] See also Jürgen Klein, "Francis Bacon's *Scientia Operativa*, the Tradition of the Workshops, and the Secrets of Nature," in *Philosophies of Technology*, ed. Zittel *et al.* (cit. n. 54), pp. 21–50; Sophie Weeks, "The Role of Mechanics in Francis Bacon's *Great Instauration*," *ibid.*, pp. 133–196; and Dana Jalobeanu, *The Hunt of Pan: Francis Bacon's Art of Experimentation and the Invention of Science* (Bucharest: Zeta, 2014).

reimagining the advancement of knowledge as a systematic endeavor. But investigators from Robert Hooke to Joseph Priestley would henceforth have to disguise the role of accidents in their most important discoveries, admitting them at most with a blush.[61] It was precisely because Walpole remained an outsider that he was prepared to see, and even perversely to delight in, the formative role of particulars in the generation of new ideas.

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The complex passage of the word "serendipity" into and out of circulation, from the sciences into antiquarian history and back again, provides rich instances of the workings of the concept itself: episodes in which sagacity and accident have crossed. It is, as I have already suggested, "self-exemplifying." Looked at as the articulation of a research program, serendipity bubbles up naturally in the 1930s as part of the professionalization of research in the American Northeast.[62] Part of this culture involved the systematic description of discovery, especially in practice; "serendipity" provided a name for the gap between old ideas and new ones. A glance at institutional causes like these helps to explain a surprising fact: "serendipity" seems to have been brought back into circulation nearly simultaneously by two major scholars, one at the end of his career and the other at the beginning. Walter B. Cannon and Robert K. Merton each separately published remarks on serendipitous discovery, evidently without knowledge of the other. There are reasons—contextual, social, logical reasons—to explain what appears at first to be a coincidence.[63] The accelerated pace of research during the first decades of the century—especially following World War I—brought into sharp relief the fits and starts by which technologies are improved; the need for a sociology of discovery became a pressing concern at places such as the Institute for Advanced Study, Columbia University, and Harvard Medical School, which were differently parts of Cannon's and Merton's orbits. What is more, the Yale librarians had been working tirelessly to get Walpole's letters into a reliable edition—and though this story features its own share of extraordinary happenings and slim chances, by the time the University Press began its edition the letters had gained the air of institutional

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[61] Antonio Pérez-Ramos, *Francis Bacon's Idea of Science and the Maker's Knowledge Tradition* (Oxford: Clarendon, 1988), pp. 113–115; and C. D. C. Reeve, *Substantial Knowledge: Aristotle's Metaphysics* (Indianapolis: Hackett, 2000), p. 60. On Hooke and Priestley see Merton and Barber, *Travels and Adventures of Serendipity* (cit. n. 2), pp. 160–162.

[62] As numerous studies have suggested, the critical thing is how the story is told. See Jutta Schickore, "Doing Science, Writing Science," *Philosophy of Science*, 2008, 75:323–343; Simon Schaffer, "Making Up Discovery," in *Dimensions of Creativity*, ed. M. A. Boden (Cambridge, Mass.: MIT Press, 1993), pp. 13–51; Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Los Angeles: Sage, 1979), pp. 28–29; Larry Holmes, "Scientific Writing and Scientific Discovery," *Isis*, 1987, 78:220–325; Holmes, "Argument and Narrative in Scientific Writing," in *The Literary Structure of Scientific Argument: Historical Studies*, ed. Peter Dear (Philadelphia: Univ. Pennsylvania Press, 1991), pp. 164–181; and Dear, "Narratives, Anecdotes, and Experiments: Turning Experience into Science in the Seventeenth Century," *ibid.*, pp. 135–163. See also Francis Crick, *What Mad Pursuit: A Personal View of Scientific Discovery* (London: Penguin, 1988); Austin, *Chase, Chance, and Creativity* (cit. n. 43); and J. Michael Bishop, *How to Win the Nobel Prize: An Unexpected Life in Science* (Cambridge, Mass.: Harvard Univ. Press, 2003).

[63] For Cannon's remarks see Walter B. Cannon, "The Role of Chance in Discovery," *Scientific Monthly*, 19 Mar. 1940, pp. 204–209. Milton J. Rosenau claims, in his presidential address to the Society of American Bacteriologists, that the word was in common use at Harvard Medical School and that he himself learned it from Cannon. See Milton J. Rosenau, "Serendipity," *Journal of Bacteriology*, Feb. 1935, 29:91–98. Merton himself charts most of this story in Merton and Barber, *Travels and Adventures of Serendipity* (cit. n. 2), pp. 137–139. Regarding matters of the larger context for seeming coincidences see Augustine Brannigan, *The Social Basis of Scientific Discoveries* (Cambridge: Cambridge Univ. Press, 1981).

inevitability.[64] Walpole was, in other words, on people's minds, and so Harvard-based Cannon and Harvard-trained Merton could be expected to have had access to the same sorts of ideas. Looked at this way, "serendipity" merely provides a name for a more general phenomenon that would have been observed anyway—or that bubbled up out of a cocktail of cultural pressures.

Serendipity, as Carlo Ginzburg suggests, may therefore be looked at as one version of a broader research program. The "clue," understood as an important part of an evidentiary paradigm, gained its prominence around the turn of the twentieth century. Preceded by literary experiments in detective fiction (including a strain that descends from *The Three Princes of Serendip* by way of Voltaire, Poe, and Conan Doyle, bypassing Walpole altogether), social conditions around the turn of the century condensed to encourage a new investigative interest in details.[65] But this research program, Ginzburg argues, itself militates against these sorts of sweeping explanations. Viewed at the level of its finer threads, the conceptual smoothness of the history of ideas vanishes; on the terrain of discovery, at the level of individual narrative, serendipity swims back into view. Walpole coined the word in a letter about something else, but after he sent it off to Mann "serendipity" dropped out of circulation for more than a century. How Cannon stumbled on the word is unclear, but Merton, like Walpole, provides an etiology. "Serendipity" survived of course in various imperfect editions of Walpole's letters, but it might have been forgotten completely were it not for a query—in *Notes and Queries*—about the picaresque novel to which Walpole refers; in this brief but spirited exchange about *The Three Princes of Serendip* the word received new life, making its desultory way into use among a circle of bibliophiles, lexicographers, and collectors of literary curiosities.[66] It is from this culture that the word was picked up by the editors of the *Oxford English Dictionary*, who included "serendipity" in their first edition of 1912.[67] This is where Merton found it—or, perhaps we should say, it found him. Concerned that his Depression-era paper money might not have any value at all, Merton turned his whole savings (as he tells the story) over to a Harvard Square book merchant, acquiring a freshly printed, thirteen-volume edition of the *OED* in 1933. It was while he was browsing through his new purchase, looking for a word he has now forgotten, that he stumbled across "serendipity." It stuck, Merton suggests, because it gave a local habitation and a name to a phenomenon that was already in the air; indeed, "serendipity" arrived on the scene in this instance at roughly the same time

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[64] Regarding the "extraordinary happenings and slim chances" pertaining to the publication of Walpole's letters see Wilmarth Sheldon Lewis, *The Collector's Progress* (New York: Knopf, 1951).

[65] Carlo Ginzburg, *Clues, Myths, and the Historical Method*, trans. John Tedeschi and Anne Tedeschi (Baltimore: Johns Hopkins Univ. Press, 1986), pp. 96–125. Ginzburg touches on Walpole's "serendipity," noting that his borrowing from *The Three Princes of Serendip* was preceded by a few years by Voltaire's *Zadig* (1747). Ginzburg traces the detective story from Voltaire through Poe and Conan Doyle, offering an alternate history for attention to surprising details that mostly bypasses Walpole's work.

[66] See Edward Solly, "Serindip, Serendipity," *Notes and Queries*, 3 Aug. 1878, 5th Ser., *10*:98. The word also appears, with its etymology, in Solly, *Index of Hereditary English, Scottish, and Irish Titles of Honour* (London: Index Society, 1879), p. v. In the ensuing years, "serendipity" was to turn up in a serial novel, in the name of an antiquarian bookshop, and as an idea in a literary-critical study entitled *The Oriental Tale in England*. More than one of these sources hint that the word was already in common circulation. The serial novel, Grant Allen's *Miss Cayley's Adventures* (London, 1898), is mentioned in Merton and Barber, *Travels and Adventures of Serendipity* (cit. n. 2), p. 131; for the Serendipity Shop see Everard Meynell, *Life of Francis Thompson* (London, 1913), p. 286; for the literary-critical study see Martha Pike Conant, *The Oriental Tale in England in the Eighteenth Century* (London, 1908).

[67] This information comes from the "Publication History" of "Serendipity" in the *Oxford English Dictionary Online*. On serendipity and the *OED* see also Peter Gilliver, "Thoughts on Writing a History of the Oxford English Dictionary," *Dictionaries: Journal of the Dictionary Society of North America*, 2013, *34*:175–183.

as the founding of the American tradition of the sociology of science—in which Merton was a principal figure.[68]

It was around Merton that serendipity, a concept cobbled together from early modern natural history, made its way from lovers of books and *belles lettres* back into the sociology of science. Merton was in some ways the perfect person to pick up the thread dropped by Walpole. His first major intellectual project was a study of aspects of discovery in seventeenth-century science; the claim still referred to as the "Merton thesis" positions the rise of scientific practice alongside the cultural backdrop of Protestantism. This is clearly an account, now highly controversial, of the sweeping cultural-historical type; it considers, as parallel developments, the Protestant spirit of inquiry and a new interest in natural phenomena as branches of a single set of cultural "sentiments."[69] But Merton was of Walpole's mold in other ways, delighted with the play of ideas and open to unexpected occurrences. Among the projects articulating this aspect of Merton's mind is an extensive, astonishingly detailed study of the prehistory of a phrase attributed (incorrectly, he demonstrates) to Sir Isaac Newton; *On the Shoulders of Giants* is in many ways the partner of *The Travels and Adventures of Serendipity*, for, like this companion text (written earlier, but published far later), it is virtuosic in its compilation of surprising examples and masses of particulars.[70]

In part thanks to his training in early modern philosophy, and in part because of his own delight in unexpected insights, serendipity appealed to Merton; it is also due to Merton's unusual training that his discussions of the concept are among the last to capture the full richness of "accident" as Walpole intended it. "Accident" is often taken, especially in the study of discovery, to mean a "mistake" or an unintended occurrence. An accident, as the word is generally used, is "an event occurring without an immediate cause." And, as it is the job of the philosopher to recover cause, by Aristotle's account and Bacon's, accident after Aristotle was to fall outside the scope of philosophy. As Michael Witmore elegantly summarizes the case, accident represented an "epistemological dead end."[71] But Merton was drawing from a different set of traditions, in which "accidents" are the critical thing, indeed becoming almost ubiquitous. This has in part to do with an anachronistic understanding of accident—not merely as an event occurring without cause, but as a particular, especially an unanticipated particular. A "serendipity pattern," Merton argues, is the "fairly common experience of observing an *unanticipated, anomalous and strategic* datum." The investigator, according to this formula, encounters something "unanticipated," or what Walpole calls "things which they were not in quest of." It is "anomalous," or nonessential in terms of the field as it is currently understood. This anomaly must also be "strategic," or capable of rising to a new order of knowledge—at least when seen by the right person. Finally, the serendipitous discovery turns on a "datum," a discrete particle or fact about the world. The "anomalous

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[68] Robert K. Merton, "Unanticipated Consequences and Kindred Sociological Ideas: A Personal Gloss," in *Robert K. Merton and Contemporary Sociology*, ed. Mongardini and Tabboni (cit. n. 8), pp. 295–318.

[69] The "thesis" appears in two forms: Robert K. Merton, "Puritanism, Pietism, and Science," *Sociological Review*, 1936, 28:1–30; and Merton, "Science, Technology, and Society in Seventeenth-Century England," *Osiris*, 1938, 4:360–632. The controversy surrounding Merton's influential claims is summarized and explored in H. Floris Cohen, *The Scientific Revolution: A Historiographical Inquiry* (Chicago: Univ. Chicago Press, 1994), pp. 310–335; and I. Bernard Cohen, ed., *Puritanism and the Rise of Modern Science: The Merton Thesis* (New Brunswick, N.J.: Rutgers Univ. Press, 1990).

[70] Robert K. Merton, *On the Shoulders of Giants: A Shandean Postscript* (New York: Free Press, 1965). See also Steven Shapin, "Understanding the Merton Thesis," *Isis*, 1988, 79:594–605, esp. pp. 598–601; and Peter Simonson, "The Serendipity of Merton's Communications Research," *International Journal of Public Opinion Research*, 2005, 17:1–21.

[71] Jeremy Molesworth, *Chance and the Eighteenth-Century Novel: Realism, Probability, Magic* (Cambridge: Cambridge Univ. Press, 2010), p. 14 ("an event occurring without an immediate cause"); and Witmore, *Culture of Accidents* (cit. n. 15), p. 5.

datum" is Merton's effort to make sense of the "accident," as intended by Walpole (after Bacon); its "unanticipated . . . strategic" dimensions point to the "sagacity" of the observer. Accident is in this sense the unexpected particular that is seen and interpreted; it is something that has "fallen out" differently than would be expected—and witnessed as such.[72]

The precise context of Walpole's neologism, as he shares it with Mann, draws from a particular understanding of "accident" that can shed light on its usage. This context is heraldry, which was one of the fields in which Walpole was most comfortable. Walpole was consulting a Venetian dictionary of coats of arms when he found something small—the minimal difference between two such coats—that he was nevertheless prepared to read as something significant. Like Aristotelean metaphysics, heraldry has its essential forms and its historical accidents. In the case that interested Walpole, the "cap," signaling "Capello," is a matter of form, for without it the arms would not signal the same family. Other details of the heraldic device, however, are "accidental" in the technical sense particular to that art, for they point to historical alliances or signal accomplishments, rather than the bloodline of the family itself. In this particular case, the fleur-de-lis Walpole sees on the second coat of arms is an "accident" in the word's heraldic sense; it is a small detail revealing the historical link, by marriage rather than blood, of the Cappello family to the Medici. But this small detail, this "accident," nevertheless points to a series of hidden causes, all of which hinge on Bianca Cappello, who, through a series of motivated misadventures, became first the mistress and then the wedded consort of the Grand Duke.[73] It is not, that is, an accident that Walpole found the coat of arms. He was looking for the coat of arms. On the contrary, Walpole found a particularly interesting accident *in* the coat of arms. The accident, the material particular, of itself points to a much larger system, possibly reshaping and reorienting the relationships between things.

The serendipitous fact is not "simply 'out there,'" writes Merton, "but is in part (but only in part) a function of its observer's construction." And, as such, serendipity at once reminds us that theory is always involved in the way that we see things, at the same time that it (that is to say, the serendipitous disruption of theory) also provides "a brake on the tendency . . . to construct one's own 'object' for investigation by conceptual selection of reality."[74] The argument is a familiar one, voiced by Bacon as early as his *Novum organum* and again in an acroamatic on the fable of Dionysus. It is voiced, too, by Walpole. "The passion for systems," Walpole would insist, "did not introduce more errors into the old philosophy, than hypothesis has crouded into history and antiquities." In his typical way, Walpole is borrowing from what he took to be the revolutions in the sciences to explain the ethics of historiography; the problem, as Walpole puts it, is that a theoretical commitment or hypothesis "wrests all arguments to the favorite point." A man who "sees with Saxon eyes, sees a Saxon building in every molehill." On the other side of system are particulars. "Truth," Walpole opines, "is the sole merit of most antiquities," and so the trick is to let these antiquities speak for themselves—or at least seem to speak for themselves—even if that means "losing our history" or

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[72] Robert K. Merton, *Social Theory and Social Structure* (New York: Simon & Schuster, 1949), p. 157. See also Ross Hamilton, *Accident: A Philosophical and Literary History* (Chicago: Univ. Chicago Press, 2007); and Witmore, *Culture of Accidents*.

[73] The best biography of Bianca Cappello probably remains that of Clifford Bax, *Bianca Capello* (New York: Viking, 1928).

[74] Merton, "Unanticipated Consequences and Kindred Sociological Ideas" (cit. n. 68), p. 312; and Maniscalco, "Serendipity in the Work of Robert K. Merton" (cit. n. 8), p. 282. See also Kevin Niall Dunbar *et al.*, "Do Naïve Theories Ever Go Away?" in *Thinking with Data*, ed. Marsha Lovett and Priti Shah (New York: Erlbaum, 2007), pp. 193–206.

"our historians."[75] The Hunt of Pan offered him an ethics—what we might call Walpole's ethics of serendipity.[76]

Walpole's preference for the accidental emerges as part of a larger set of historiographic commitments; from the start, it was merely "curious facts" that Walpole insisted he was "interested in relating, never attempting to establish an hypothesis, which of all kind of visions can nourish itself the most easily." The task of the inventor was not to strike out new things from his native wit. Rather, he "treasures up ideas & reflections; he compares them with new occurrencies [*sic*], and strikes out new lights from the Collision."[77] His essays were exercises in this form of invention. Walpole's *Memoires of King George II and III*, his four-volume *Anecdotes of Painting in England* and his *Catalogue of Royal and Noble Authors*, his commonplaces and miscellanies, even his letters offer repeated articulations of surprising discoveries, things brought into unexpected but illuminating contact. Likewise, objects in his collection, which have nothing else in common, are similar in their particularity: a "perfectly unique" silver bell thought to be by Benvenuto Cellini, the spurs worn by William III at the Battle of the Boyne, an "eagle found in the gardens of Boccapadugli," the kennel-coal speculum used by John Dee in his occult experiments, the clock given by King Henry VIII to Anne Boleyn on their wedding day, the suit of armor owned by Francis I—the list goes on.[78] Each of these objects is less interesting for what it can teach us about a type or series of things than it is as a unique object, an accident of history with its own light to shed.

The results of Walpole's risky practice have often been exposed by later investigators. Walpole was probably right about the fleur-de-lis in the Cappello coat of arms,[79] and he was right (or Shaftesbury was right) about Mrs. Hyde and the Duke of York. But later scholars have suspected that he was wrong about a surprising number of other things—part of a more general regime of misattribution and misinformation due to be corrected by precisely the attention to anomalies that Walpole himself helped champion.[80] He misattributed, for instance, the "perfectly unique" silver bell; it was one of a number of objects he attributed to Cellini, all incorrectly. He called it *alto relievo*; it is certainly cast. He thought it belonged to the Pope; it belonged to Emperor Ferdinand I.[81] A suit of armor of Francis I, also attributed to Cellini, was at best a reproduction of an original (certainly not by Cellini) and at worst merely a fine example of ornamental or parade mail; a list of materials for a royal procession

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[75] Bacon, *Novum organum*, in *Works*, ed. Spedding, Vol. 8, p. 77; Bacon, *De augmentis scientiarum*, in *Philosophical Works of Francis Bacon*, ed. Shaw (cit. n. 29), Vol. 1, pp. 64–66 (acroamatic on the fable of Dionysus); Horace Walpole and George Vertue, *Anecdotes of Painting in England*, 4 vols. (Twickenham: Strawberry Hill Press, 1762), Vol. 1, p. 27; and Walpole, *Correspondence*, Vol. 16, p. 234.

[76] On this point see James McClellan, "Accident, Luck, and Serendipity in Historical Research," *Proceedings of the American Philosophical Society*, 2005, *149*:1–21; and Aharon Kantorovich and Yuval Ne'eman, "Serendipity as a Source of Evolutionary Progress in Science," *Studies in History and Philosophy of Science*, 1989, *20*:505–529.

[77] Walpole and Vertue, *Anecdotes of Painting in England* (cit. n. 75), Vol. 1, p. 27; and Horace Walpole, *Miscellany: 1786–1795*, ed. Lars E. Troide (New Haven, Conn.: Yale Univ. Press, 1978), p. 20.

[78] Horace Walpole, *Description of the Villa of Mr. Horace Walpole* (Twickenham: Strawberry Hill Press, 1784), pp. 67 (silver bell), 77 (spurs of William III), 49 (the Boccapadugli eagle), 77 (John Dee's speculum), 35 (Anne Boleyn's clock), 31 (the armor of Francis I).

[79] We have no way of knowing, however, if Walpole's portrait was by Vasari—or even if it represented Bianca Cappello.

[80] This is Ginzburg's argument in *Clues, Myths, and the Historical Method* (cit. n. 65).

[81] Charles H. Read, *The Waddesdon Bequest: Catalogue of the Works of Art Bequeathed to the British Museum by Baron Ferdinand Rothschild* (London: British Museum, 1902), p. 95; and Hugh Tait, *Catalogue of the Waddesdon Bequest in the British Museum* (London: British Museum, 1986), pp. 69–70. Walpole's tendency to attribute objects to Cellini is probably a consequence of his respect and admiration for Cellini's colorful autobiography, which is itself a farrago of accidents and unexpected occurrences.

was probably an inventory of the King's draper; a portrait Walpole attributed to van Somer, which figured so prominently in the inspiration for his best-known work and only novel, was almost certainly by the younger Gheeraerts.[82] In the play between observation and theory, between what Merton calls the "anomalous datum" and its "strategic" value to a system, Walpole preferred to begin on the side of the datum. He drew more than a few conclusions that he might wish, in hindsight, to take back. It is to Walpole, on the strength of that misread inventory roll, for instance, that we owe one of the longest and most misguided defenses of the character of King Richard III—the only monarch, Walpole later noted, that he ever defended.[83] But to him we also owe a series of unmatched backstairs histories of his age, the first full compilation of the history of royal and noble authors of England, the publication of the first history of British painting with ambitions of exhaustiveness, a massive corpus of letters, which perhaps more than any experiment before or since has succeeded in summarizing an age, and, summarizing them all, the complex multifaceted aesthetic of the Gothic in literature and the arts. Had he lived today, we might have called him an architect of innovation.

"Antiquarians," writes Stephen Bann, "have been associated, particularly in the early part of the period . . . with misconceptions, errors and, indeed, forgeries." This is generally a way of discounting the antiquarian's relationship to knowledge. "All this means that they have stood somewhat askew to the historical law."[84] But read according to the paradoxical imperative of a mind like Walpole's, the investigator's position outside the "law" is another way of registering his or her commitment to the rule of Pan, the faithfulness, even to a fault, to the anomalies of history. And while Walpole's delight in difference often gets labeled as amateurism, even by Walpole himself, it is precisely for his mad pursuit, what he tabbed "serendipity," that he has emerged as an important figure in the empirical sciences, corporate culture, research into computer–human interaction, and so on. Walpole meant to label his delight in unexpected ends, but he ended up describing the importance of asystematicity in the regular development of knowledge about the world. It is because Walpole was not invested in the greater Baconian project that he was able to read the eccentricities in Bacon's system as its most important lessons. That is, it took a belletrist and sharp-witted dilettante to read Bacon as a champion of accident— despite the manifest commitment of Bacon's work to the establishment of method. It was Walpole who developed the concept into a rule of practice, an ethics, and even an aesthetic, but serendipity has become important in the study of the sciences precisely because the concept was cobbled together out of materials drawn from the sciences in the first place.

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[82] See Barrett Kalter, *Modern Antiques: The Material Past in England, 1660–1780* (Lewisburg, Pa.: Bucknell Univ. Press, 2012), pp. 181–190 (the suit of armor); and Sean R. Silver, "Visiting Strawberry Hill: Horace Walpole's Gothic Historiography," *Eighteenth-Century Fiction*, 2009, *21*:535–564 (the list of materials). The portrait, by Marcus Gheeraerts the Younger, depicts Henry Cary, 1st Viscount Falkland; it is maintained by the Sarah Campbell Blaffer Foundation, at the Museum of Fine Arts, Houston.

[83] See Silver, "Visiting Strawberry Hill," pp. 545–550, 548 n 29.

[84] Stephen Bann, "Clio in Part: On Antiquarianism and the Historical Fragment," *Perspecta*, 1987, 23:24–37, on p. 32.