Where There's Smoke . . . Photography's Causal Histories

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In the midst of an extended obituary for the semiotic analysis of photography, one prominent historian of the medium recently felt liberated enough to "admit personally never having understood how these ideas borrowed from Peirce . . . could be pivotal for us."[1] Grateful that this approach has been largely exorcized from photography scholarship, this skeptic remains puzzled by even the attenuated persistence of Peircean semiotics: "We may marvel at the fact that a theory having shown itself to be unsuitable is still considered useful." This long-suppressed hostility now bursts forth, as if vindicated by the apparent ruptures in the medium's recent history. The inherent unsuitability of this "amorphous pseudo-theory" is implicitly attested by the dissolution of photography's bond with its referent at the hands of digital imaging.[2] In this view, the specific commensurability of Peirce's conception of the index with the conventional attributes of a photograph is merely a particular instance of the general, naive, realist linkage between world and representation, which the manifest constructedness of digital images has unmasked.[3] With the truth claims of photography successfully demolished, Peircean semiotics rendered nothing more than the key to a ruined house.

We find ourselves in the midst of joyfully recovering the very particular alternative histories that a narrative empowered by the referential assurances of the index had repressed: those of the long-standing and multifarious practices of manipulating photographs. The appeal of these accounts derives in part from endowing the formerly benighted Victorian pasticheur with perspicacity while debunking the naiveté of the modernist promulgators of an impossibly "straight" photography. Similarly, for many early explicators of digital photography, the

1. Michel Frizot, "Who's Afraid of Photons?," in *Photography Theory*, ed. James Elkins (London: Routledge, 2007), p. 271.

2. Ibid., p. 270.

3. Tom Gunning astutely identified this response to digital as the "schizophrenic position," which consists in "celebrating the release of photographic images from claims of truth, issuing in a world presumably of universal doubt and play, allowing us to cavort endlessly in the veils of Maya." Tom Gunning, "What's the Point of an Index? Or, Faking Photographs," *Nordicom Review* 5, no. 1/2 (2004), pp. 39–40.

OCTOBER 163, Winter 2018, pp. 3–20.

most severe break from analog predecessors was the invalidation of an origin story in which "automatically captured shaded perspective images are made to seem causal things of nature rather than products of human artifice."[4] Since "the distinction between the causal process of the camera and the intentional process of the artist can no longer be drawn so confidently and categorically," it is as if photography's "referent has become unstuck" from its representation. Of all of the facets of photographic indexicality that have ostensibly been dispatched by the digital, it is this causal dimension that seems to have been nullified most forcefully. As a result of this comprehensive expulsion of causality from the history of photography, focusing now on this dimension seems an encroachment on the terrain of analytic philosophy; indeed, that field has quarantined this question in disciplinary insularity.[5] But this matter should not be ceded, for the understanding of causality is *itself* capricious and historically specific, not reliably immutable. What a particular historical milieu takes to be the basis for understanding the relationship between a cause and effect, or whether such a relationship even seems important or knowable, is significant for attending to the role of a representational system that was—and is—so often enmeshed in these categories.

These causal understandings seem most legible when a dominant paradigm has begun to lose its preeminence and an alternative has begun to manifest itself. The last third of the nineteenth century was such a conjunction, an era that has been memorably, if perhaps too decisively, called "the revolt against positivism."[6] Among the most pervasive consequences of Auguste Comte's epistemological system, first articulated in his *Course in Positive Philosophy* (1830), was the wide diffusion of deterministic models of thought. Events in the natural and social worlds could reliably be understood in terms of their comportment with general laws, and the discovery of such laws might enable the prediction of future possibilities. As Stephen Kern has pointed out in his reading of the literary accounts of causality, on this subject divergent voices could be heard forming something of a chorus, from George Eliot attesting to "an undeviating law in the material and moral world . . . an inexorable law of consequences," to Balzac insisting that "every effect has a cause and every cause a principle, every principle is dependent upon a law."[7]

4. William J. Mitchell, *The Reconfigured Eye: Visual Truth in the Post-Photographic Era* (Cambridge, MA: MIT Press, 1994), p. 30. Even at this embryonic stage, though, there were skeptics. See the essays in Martin Lister, ed., *The Photographic Image in Digital Culture* (London: Routledge, 1995).

5. See the contributions to Scott Walden, ed., *Photography and Philosophy: Essays on the Pencil of Nature* (London: Wiley, 2010), which seem, for those interested in historical questions, to operate in an alternate universe.

6. The phrase first appeared in H. Stuart Hughes, *Consciousness and Society: The Reorientation of European Social Thought, 1890–1930* (New York: Alfred A. Knopf, 1958), p. 33.

7. Stephen Kern, *A Cultural History of Causality: Science, Murder Novels, and Systems of Thought* (Princeton: Princeton University Press, 2009). On Eliot's determinism, see George Levine, "Determinism and Responsibility in the Works of George Eliot," *Publications of the Modern Language Association of America* (1962), pp. 268–79.

This determinism's disciplinary iterations were numerous, encompassing fields as disparate as geology, criminology, and historiography. Discovering the iron laws of causality became a central aim of the study of the past as practiced by positivist historians like Henry Thomas Buckle, once the most successful popular historian in the English language and now lost in obscurity.[8] The proposition that the natural world's diversity of apparently chaotic processes could be assimilated to general laws had, by the middle of the century, infiltrated the study of historical processes. In this view, historians, operating like scientists, would seek to uncover general laws of historical development.

In each of these arenas, and many others, the positivist account of causality found itself under virtually unremitting attack by the end of the century. The revolt was felt especially acutely in the case of historiography, when, beginning in the 1870s, historians and philosophers of history began to object to their reclassification as scientists. Wilhelm Dilthey articulated this profound disquiet, asserting a radical dissimilarity between natural science and the human sciences and popularizing the term *Geisteswissenschaften* to describe the latter.[9] Where the former sought to establish universal laws of cause and effect, the latter were principally concerned with unique occurrences, the non-repeating character of which would make such laws impossible to discern and irrelevant for purposes of explanation. As one commentator noted, "Causation was regarded" amongst these dissidents "as the typical category of scientific understanding. It was therefore assumed that causal analysis could not play a dominant part in historiography."[10] The search for general laws of causation was a "monstrous incursion of science into the world of history,"[11] which one particularly dismissive account found akin to trying to locate "laws such as are found in hydraulics" in the vicissitudes of the past.[12] The last three decades of the nineteenth century saw the slow and nearly comprehensive collapse of positivist history, and no grievance was more regularly levied at the declining school than the reductive scientism of its account of causality. For the emerging generation of historian, the "iron laws of causality" would need to bend, or even break.

Recognizing this crisis compels us to look at photographs of the period differently. We need to consider such photographs as the products of tension

8. Buckle's *History of Civilization* (1857) was perhaps the best-selling history of its time, despite being a vulgar application of Comte to history. See Isaiah Berlin, "History and Theory: The Concept of Scientific History," *History and Theory* 1, no. 1 (1960), pp. 1–31.

9. Wilhelm Dilthey, *Einleitung in die Geisteswissenschaften* (1883).

10. Maurice Mandelbaum, "Causal Analysis in History," *Journal of the History of Ideas* 3, no. 1 (1942), p. 33.

11. Michael Oakeshott, "Historical Continuity and Causal Analysis," in *Philosophical Analysis and History*, ed. William H. Dray (New York: Harper and Row, 1966), pp. 193–212.

12. Charles A. Beard, "Written History as an Act of Faith," *The American Historical Review* 39, no. 2 (1934), pp. 219–31.

between two fundamentally different epistemologies, or, more specifically, what we might call "cultures of causality." Doing so offers the opportunity to understand these photographs as neither the settled products of a secure causal relationship nor as precocious debunkers of that security. Rather, we need to investigate these photographs as sites of negotiation that are privileged precisely because they seem to offer the capacity for interrogation of—and experimentation with—specific and local conceptions of causal relationships.

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Few places had more at stake in the integrity of the "iron laws" in dispute than Naples. When Charles Dickens arrived in the city in 1846, he observed the long shadow cast by its most prominent feature: "The mountain is the genius of the scene," he wrote, apprehensively noting that he and his compatriots "watch Vesuvius . . . as the doom and destiny of all this beautiful country, biding its terrible time."[13] The history of the volcano's ferocity scarred the city, as Mark Twain noted after traversing "the narrow streets and narrower sidewalks, paved with flags of good hard lava, the one deeply rutted with the chariot-wheels, and the other with the passing feet of the Pompeiians of by-gone centuries."[14]

Between the revolutions of 1789 and 1848, volcanoes figured regularly as interruptions of narrative continuity in popular literature and spectacle, their eruptions often synchronized with the revolutions occurring amongst the dramatis personae downstage.[15] Geological and human history were intertwined by the metaphorical richness of the volcano, which was particularly linked to the forces of politics. By the latter part of the century, such isomorphism was precisely what the ascendant anti-positivism sought to reject, insisting on the fundamental incommensurability of the natural and human sciences. The causes of a revolution in politics could never be evaluated as though they were the forces that led a volcano to stir.

The isomorphism of man and his natural surroundings is insistently evident in one of the most beguiling photographs made in Naples during this period,

13. Charles Dickens, *Pictures from Italy* (London: Bradbury and Evans, 1846), p. 247. There was a considerable history of representations of Vesuvius, which often had to negotiate the sober visual idiom of science and the more dramatic possibilities to which the destructive power of the volcano lent itself. See Mark A. Cheetham, "The Taste for Phenomena: Mount Vesuvius and Transformations in Late 18th-Century European Landscape Depiction," *Wallraf-Richartz-Jahrbuch* 45 (1984), pp. 131–44.

14. Mark Twain, *The Innocents Abroad; Or, The New Pilgrims' Progress: Being Some Account of the Steamship* Quaker City*'s Pleasure Excursion to Europe and the Holy Land; with Descriptions of Countries, Nations, Incidents and Adventures, as They Appeared to the Author* (Hartford: American Publishing Company, 1869), p. 327.

15. Nicholas Daly, "The Volcanic Disaster Narrative: From Pleasure Garden to Canvas, Page, and Stage," *Victorian Studies* 53, no. 2 (2011), pp. 255–85.

Giorgio Sommer. Tarantella. *Ca. 1870.*

Giorgio Sommer's *Tarantella* of about 1870. Standing in the doorway, through which we see a plume emanating from Vesuvius in the distance, is a barefoot rustic smoking a pipe. His hat, seen in three-quarters view, echoes the crown of the volcano, the puff of smoke he emits rhyming with the discharge across the bay. This visual rhyme evokes the most commonplace stereotype of Neapolitans then in circulation: of volatile denizens whose seething passions might suddenly erupt, shattering the languid indolence that generally prevailed. The setting of Naples meant that even the climate was marked by a seeming impetuousness, which is again likened to a human disposition. While "in our northern provinces all atmospheric phenomena take place with more or less constant regularity," one visitor wrote in 1869, in the south "it rains, snows or hails all at once, the winds swirl about in every direction; the sun appears, disappears, comes back into view like a man who can't make up his mind."[16]

16. Nelson Moe, *The View from Vesuvius: Italian Culture and the Southern Question* (Berkeley: University of California Press, 2002), p. 197.

The easy reflexivity with which the tenor and vehicle of this metaphor are positioned is arresting. What is the vector of this likeness of environment and inhabitant? The idiom of grand tourism offered its perspective with regularity. Goethe wagered that "the Neapolitan would certainly be a different creature if he did not feel himself wedged between God and the Devil."[17] The juxtaposition of the loveliness of the Mediterranean setting with the quiet menace of the volcano seemed to him to inscribe itself onto the inhabitants. A century later, the development of the positivist school of criminology, under the aegis of the Verona-born Cesare Lombroso and his acolytes, inflected this debate with its own preoccupations. Proposing the existence of the "born criminal," whose deviance was legible in his (and, later, her) anatomical features,[18] brought to the forefront of scientific debate the question of whether biological atavism or climatological condition was the cause of the criminal predispositions of the southerners.[19]

Sommer. Tarantella *(detail). Ca. 1870.*

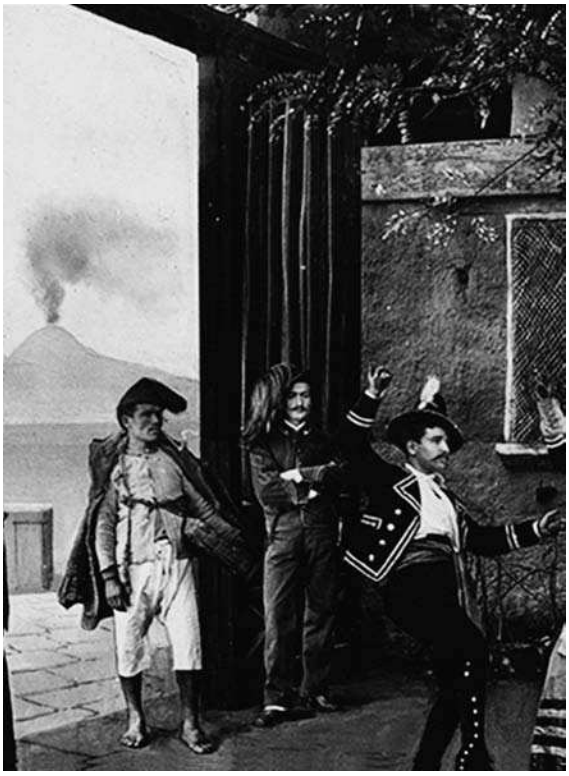
The pairing of the peasant and the volcano inserts this ambivalence into *Tarantella*, doing so in a way that mobilizes the resources and assumptions of the photographic medium. If it is the smoldering Vesuvius that provides the natural prototype for the smoking rustic—the metonymic "making" of the man by his environment—it is nevertheless the work of the photographer that constructs the juxtaposition. And this labor is made pointedly evident by the peculiar structure of the photograph, for as a photomontage, or composite print, it reflects more demonstratively upon its own madeness. This type of photograph asserts with special force its independence from the world fashioned by nature. The palpable conglomeration of figures and setting remind the viewer of the non-referentiality of the event depicted, of a scene whose integrity is purely the product of artifice and

17. Johann Wolfgang von Goethe, *Italian Journey*, trans. W. H. Auden and Elizabeth Mayer (New York: Penguin, 1962), p. 215.

18. Cesare Lombroso, *L'Uomo delinquente, studiato in rapporto alla antropologia, alla medicina legale ed alle discipline carcerarie, per prof. Cesare Lombroso . . .* (Milan: U. Hoepli, 1876), and *La donna delinquente, la prostituta e la donna normale* (Torino: Editori L. Roux, 1893).

19. Mary Gibson, "Biology or Environment? Race and Southern 'Deviancy' in the Writings of Italian Criminologists, 1880–1920," in *Italy's 'Southern Question': Orientalism in One Country*, ed. Jane Schneider (Oxford: Berg, 1998), pp. 99–116.

not of nature. The element of the picture where the "artistry" of Sommer is most apparent is the seam between the vignette of the volcano and the interior of the rude cottage in which the dance takes place. The plainly visible facture of the contours of Vesuvius, the smudged charcoal of its smoky trail, and the roughly sketched recession of the stones at the threshold are traces of nonphotographic activity.



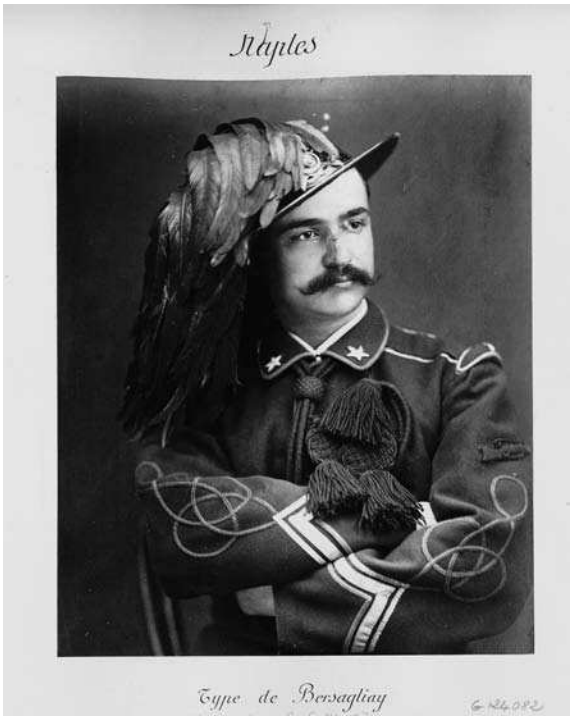
Sommer. Tarantella *(detail). Ca. 1870.*

The *Tarantella*'s constructedness must have been particularly evident as a result of its commercial production and dissemination. From the splendors of the "Palazzo Sommer," the Frankfurt-born émigré presided over Naples' most successful photographic enterprise.[20] The rational organization of his catalogue of 1886 makes plain the relationship amongst this tableau and its constituent elements.[21] Under the heading "Costumi," we note the availability of prints of the *Tarantella*, and also of independent portraits of several of the individual figures who populate his scene. Browsing through the house's stock would have revealed that, for instance, the *Bersagliere* (military marksman) or *Lazzarone* (rogue) appearing in the group scene were originally independent of that contrived interaction. Clearly, the forthrightness with which this contrivance is offered alongside its component parts indicates that the blade of the compositor had taken epistemic preeminence over the pencil of nature. The tableau denies the causal necessities that generically privileged

20. On Sommer's career, see Adam D. Weinberg, *The Photographs of Giorgio Sommer* (Rochester: Visual Studies Workshop Press, 1981); Marina Miraglia and Ulrich Pohlmann, eds., *Un viaggio fra mito e realtà: Giorgio Sommer fotografo in Italia 1857–1891* (Rome: Carte Segrete, 1992); and Marina Miraglia, "Giorgio Sommer's Italian Journey: Between Tradition and the Popular Image," *History of Photography* 20, no. 1 (1996), pp. 41–48.

21. Giorgio Sommer, *Catalogo di fotografie d'Italia, Malta e Ferrovie del Gottardo* (Naples, 1886).

this medium over others, suturing together the disparate temporalities of the figures into the fabricated rhythms of the dance. Whatever "caused" the *Tarantella* as a photograph had little to do with the contingencies of the natural world. Indeed, the Tarantella (the dance) had evolved by provoking causal questions, and by linking them to the vagaries of nature, and of human nature.



Sommer. Bersagliere. *Ca. 1865–70.*

The south's regional difference has long been marked by its imputed irregularity, its unpredictability. Even the Marquis de Sade was scandalized by Naples. When he arrived in the summer of 1775, hoping to outrun charges of sexual improprieties in his household, the fugitive was confronted with "every form of libertinage imaginable," more than his indelicate sensibilities could abide.[22] He was especially repulsed by the spectacle of the *cuccagna*, a carnivalesque tradition in which peasants endeavored to capture an elusive prize mounted atop a greased pole planted in the ground. This was, for him, "the most horrible lesson of disorder." This chaotic capriciousness seems initially to characterize the particular scene that Sommer has depicted. The centripetal force of the photograph is the folk dance, performed by two costumed dancers, a guitarist, and a tambourine player. Traditionally, the wild, irregular movements of the Tarantella were thought to be alternately the result of the toxic bite of the tarantula spider, which supposedly induced a kind of spasmodic mania, or a curative measure whose vigorous activity would expel the venom through perspiration. The causal relationship of the dance to the spider is incommensurably multiple, variously symptom and remedy. The dubiousness of the origin of the dance, and of the efficacy of

22. Donatien Alphonse François de Sade, *Voyage d'Italie: précédé des premières oeuvres, suivi de opuscules sur le théâtre* (Paris: Tchou, 1967), p. 185.

Sommer. Lazzarone. *Ca. 1865–70.*

the treatment, was fodder for snide grand tourists and opportunistic musicians. Samuel Pepys had encountered a gentleman who "is a great traveller, and, speaking of the tarantula, he says that all the harvest long . . . fiddlers go up and down the fields everywhere, in expectation of being hired by those that are stung."[23] But by the middle of the nineteenth century, the perspiratory function of the dance had lost its therapeutic associations, and Sommer depicts instead the mimed courtship dance into which it had evolved. This is the sanitized performance of a modernizing Naples, whose atavistic tendencies were gradually being eroded by Italian unification. By the time of the photograph, a guidebook for English travelers could lament the change: "The porters and boatmen are now put under regulations. The Speronara, *Punch*, the Tarantella dances, and the improvvisatori are going out of date."[24] Contrast this regulatory regime with the frenetic chaos of the dance that had once bewildered a northern visitor, who was "frightened out of my wits" at the sight

23. *The Diary of Samuel Pepys, Esq., F.R.S., from 1659 to 1669* (London: Frederick Warne, 1883) p. 92.

24. *Bradshaw's Illustrated Hand-Book to Italy* (London: Bradshaw, 1865), p. 230.

of a victim "whose dancing was very wild . . . had neither rules, nor manners, only jumped and runned [*sic*] to and from."[25]

Modernity and rationality had intervened, though not nearly as thoroughly as the advocates of the Risorgimento had hoped. For them, the earthy ways of the southern peasantry could be understood not as the enduring of tradition but as an abnormal retrogression. The rejection by the peasantry of bourgeois deportment placed them, as one historian has noted, "closer to the origins of humanity," nearer to apes than to Apollo.[26] Lombroso, for his part, had first developed his concept of atavism while studying cretinism in Calabria. His student Alfredo Niceforo linked the asynchronous development of the human race with the growth of the newly unified Italy. The relapse of the south is figured like a stunted limb on the body politic:

> Not all the parts which compose [Italy's] multiple and differentiated organism have progressed equally in the course of civilization; some have remained behind. . . . Unfortunately the Mezzogiorno and the islands still possess the sentiments and customs—the substance if not the form—of past centuries. They are less evolved, and less civilized than the society to be found in Northern Italy.[27]

Here the positivist view is articulated with force, affirming the complete commensurability of political and evolutionary histories, the formation of the state and that of the evolved human body bound together in an inextricable conceptual knot.

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The tangled joining of natural and human history evinced by the *Tarantella* is perhaps an unsurprising preoccupation of Sommer's work, particularly in light of his other contemporaneous, and multifaceted, endeavors to probe the past. In the same catalogue and emporium in which he hawked his photographs, Sommer offered cast bronze replicas of artifacts excavated from Pompeii and Herculaneum. Hundreds of objects were offered in a choice of different patinas, including "moderna," "ercolano," and "pompeiano" styles. In receiving a commission from the director of the Pompeii excavations, Giuseppe Fiorelli, Sommer found himself collaborating with the first scientific archaeologist to superintend the site. If, as one recent study has argued, "Fiorelli defined the manner in which Pompeii was to be explored, and laid the conceptual grounds for Sommer's practice,"[28] it was the science of geology that oriented Fiorelli's digging for the past.

25. Stephen Storace, "A Genuine Letter from an Italian Gentleman, Concerning the Bite of the Tarantula," *Gentleman's Magazine* 23 (September 1753), p. 434.

26. Moe, *The View from Vesuvius,* p. 56.

27. Quoted in Daniel Pick, "The Faces of Anarchy: Lombroso and the Politics of Criminal Science in Post-Unification Italy," *History Workshop Journal* 21 (1986), pp. 60–86.

28. Brigitte Desrochers, "Giorgio Sommer's Photographs of Pompeii," *History of Photography* 27, no. 2 (2003), pp. 111–29.

Indeed, it was a stratigraphic conception of history, both human and natural, that made possible the arresting innovation that Fiorelli would offer in 1863.

Having seen too many human remains obliterated during antiquarians' chaotic digs for booty, Fiorelli identified a new mechanism of preservation. During the early stages of the cataclysmic eruption of Vesuvius in AD 79, three meters of cinders were dumped on the population of Pompeii. This was followed in rapid succession by a layer of volcanic ash that hardened, sealing in situ the writhing bodies of the asphyxiated victims. Thus, cavities in the form of the corpses remained intact for nearly two millennia. At the first sign of such a hollow beneath the surface, Fiorelli would fill the space with gesso, allow it to harden, and then remove it from the ash.[29] The resulting imprints (*impronta)* represented a taxonomic quandary: Were they the work of nature or of artifice, the material of geology or of history? The Pompeiian casts gave materiality to the wobbly isomorphism permeating the *Tarantella*, for they dissolve the border between geological and human traces to the point of invisibility. Are these cavities primarily the positive space of human remains, or negative space within the layer of hardened ash?[30]

The linkages between these two processes of imprinting underline the problem of causality vividly, nowhere more so than in the varied iterations of a photograph by Sommer's rival Michele Amodio of the so-called "Pregnant Woman," produced after

29. Victoria C. Gardner Coates, Kenneth D. S. Lapatin, and Jon L. Seydl, *The Last Days of Pompeii: Decadence, Apocalypse, Resurrection* (Los Angeles: Getty Publications, 2012), pp. 44–51.

30. As Patrick Crowley has argued in a wonderfully suggestive article, it was "specifically the positive-negative process" of photography that provided the metaphorical repertoire for conceptualizing these imprints. Patrick R. Crowley, "Roman Death Masks and the Metaphorics of the Negative," *Grey Room* 64 (Summer 2016), pp. 64–103.

Michele Amodio. Imprint of a Pregnant Woman. *1868.*

Amodio. Imprint of a Pregnant Woman. *1868.*

the excavation of the cast but before its enshrinement in Fiorelli's on-site museum.[31] Prone on a stone plinth, the figure is frozen in a contorted form that indicates a desperate effort to escape entombment. Set against a stratum of muddy earth, the cast reenacts the moment of its burial, which is simultaneously the beginning of an enduring aspiration to disinterment. In some prints of the photograph, the outline of a docile Vesuvius stands as a distant backdrop; in others, the presence of smoke is forcefully enhanced. What is, in the first instance, a gesture of frenetic contortion is now an act of indication, linking the cast with its putative cause. The apparently natural imprinting that takes place is of course the province of the photographer's (and printer's) prerogatives, of the capacity to emphasize and obscure by only the most fundamental decisions of process and exposure. To the extent that this staging of a causal relation indicts the volcano for the existence of the cast, this indictment comes at the expense of liquidating the expected causality of the photographic medium. The graphical substitution of the active for the dormant Vesuvius requires boldly undermining the causal imprinting of photography in order to articulate the causal relation between the volcano and the *impronta.*

The telltale smoke that secures this causal linkage, however, was becoming an increasingly unreliable sign of an imminent eruption by the 1870s. While the eruption of 1850 vigorously expectorated smoke, those of 1855, 1858, and 1868 emitted only "a scanty supply." Vesuvius had entered a period of apparently heightened activity beginning in the middle of the eighteenth century, lending a

31. Sommer and Amodio seem to have worked on their photographs contemporaneously. On the early attempts to photograph the casts, see Eugene J. Dwyer, *Pompeii's Living Statues: Ancient Roman Lives Stolen from Death* (Ann Arbor: University of Michigan Press, 2010), pp. 69–71.

particular urgency to attempt to understand the mechanisms and toxins of its eruptions. With understatement, one correspondent wrote that, after an especially active century, "the importance of a knowledge of the behavior of Vesuvius to the inhabitants of the rich and populous region surrounding it, came at length to be appreciated."[32] But doing so had become more difficult since, within the course of just twenty years, Vesuvius had begun to display a bewildering variety of symptoms. The challenge, in the words of one observer of the volcano, was "to arrive at some sound knowledge of what is the *primum mobile* of all these wonderful effects,"[33] a single source to which the phenomenal variety could be attributed. The focus on the most dramatic of these effects was an invitation to faulty causal reasoning. Too many observers failed to distinguish between the "main phenomena presented at and about volcanic active mouths, which can be employed to elucidate the nature of the causation at work far below," and those "which are called into action in and by the ejected matter of the volcanic cone *after* its ejection."[34]

The semiotic inconsistency of the smoke permitted other causal regimes to endure long into the era of positivism. When the first signs of smoke manifested, the rabble of Naples implored, as they had for centuries, the protection of San Gennaro—patron saint of the city's prelates—whose relics were paraded through the streets until the smoking subsided.[35] But the polysemy of the smoke also invited a search for other methods of assessing the meaning of the stirrings of Vesuvius.

The opening of a funicular railway in 1880, ferrying 300 passengers per day to the summit, made exploration of Vesuvius considerably less arduous.[36] One less hardy adventurer identified the new ease with which he could ascend: "The toil of climbing up on the loose ashes is so great, that we decided to avail ourselves of the railway."[37] This kilometer-long stretch of track rapidly annexed Vesuvius to the circuit of mass tourism already operational at Pompeii and Naples, and stimulated a demand for photographs commensurate with this new experience of the site. It was commercially imperative that the representation of Vesuvius strike the delicate balance of a safely dangerous attraction, one that retained enough of a frisson of

32. Luigi Palmieri, *The Eruption of Vesuvius in 1872* (London: Asher, 1873), p. 132.

33. Robert Mallet, "Introductory Sketch of the Present State of Knowledge of Terrestrial Vulcanicity, the Cosmical Nature and Relations of Volcanoes and Earthquakes," in Palmieri, *The Eruption of Vesuvius in 1872*, p. 49.

34. Ibid.

35. See Jordan Lancaster, *In the Shadow of Vesuvius: A Cultural History of Naples* (New York: I. B. Tauris, 2005); and Sean Cocco, *Watching Vesuvius: A History of Science and Culture in Early Modern Italy* (Chicago: University of Chicago Press, 2012).

36. Claire L. Kovacs, "Pompeii and Its Material Reproductions: The Rise of a Tourist Site in the Nineteenth Century," *Journal of Tourism History* 5, no. 1 (2013), pp. 25–49.

37. Paul Smith, "Thomas Cook & Son's Vesuvius Railway," *Japan Railway & Transport Review* (March 1998), pp. 10–15.

peril to attract curiosity while simultaneously furnishing the kind of protective assurances demanded by the broadening tourist demographic. The smoke of Vesuvius, by this time an almost continuous presence, and its semiotic underdetermination were especially amenable to these demands.

A tour book produced by Thomas Cook, the pioneer of the package holiday and operator of the funicular, provided an extraordinary description of one town in the path of destruction, capitalizing on the causal attenuation that the plume had undergone beginning in the middle of the century. "Torre del Greco is a town of 25,000 inhabitants, flourishing, lively, and unconcerned, though the smoke of Vesuvius daily floats over it."[38] Even though the town "is built of lava, and upon the lava stream that in 1631 destroyed two-thirds" of the settlement, and notwithstanding the fact that "three times since it has been destroyed by eruptions," a visit to the monastery, which commands a fine view of the slopes of Vesuvius, is deemed worth the risk. So while "all around is the stillness of death," visitors could be sure that "unless the volcano is actually in eruption, tourists may approach the brink of the crater without risk, except that of frizzling the soles of their shoes." And even that modest danger could be dispatched, for Cook's tour book of 1905 promised that "ladies or delicate passengers requiring special help can be provided with an extra guide or a *chaise à porteur* at a fixed moderate price." Giorgio Sommer, his fortunes no less implicated in this touristic infrastructure than Cook's, offered a group portrait of parasol-brandishing bourgeoises and their

38. *Cook's Tourist's Handbook for Southern Italy* (London: Thomas Cook Ltd., 1875), p. 263.

Sommer. Tourists with Carriers on the Crater of Vesuvius. *Ca.1880*.

rough-hewn porters inside the crater. Bafflingly nonchalant, these pioneers would be more at home resting on a manicured lawn at sea level than perched upon the most volatile patch of land in all of Europe.

This pacific image had to compete with the vividness of the volcano's periodic, terrifying outbursts, the extreme cases of which were potentially devastating for the profitable mass consumption of Vesuvius. Cook's guide of 1875 bore the particular burden of dispelling the public-relations disasters that followed a natural disaster a few years earlier. First, in 1872, a full-blown eruption engulfed a group of unlucky souls in a river of molten lava. And then, the following year, a party of tourists visiting Vesuvius during a period of apparent inactivity reached the summit just as a minor eruption occurred, opening up a lava pit into which the unfortunates were plunged. It was only fitting, then, that Cook's volume would anoint as "the hero of Vesuvius"[39] Professor Luigi Palmieri, who, "as the beast-tamer watched his captive," had been closely monitoring the activity of the volcano since 1848.[40] Palmieri's heroism was of a dubious order, but he was undoubtedly a man whose career was dedicated to studying—and mobilizing—the kind of reliability of the natural world on which the tourist trade was predicated.

The preferred path of ascent would take Cook's clientele past the observatory, Palmieri's fiefdom. Cognizant of the unreliability of smoke as a tocsin, Palmieri employed a battery of seismographic recording devices. Nonetheless, he had ventured into the more questionable realm of prediction, boldly asserting "that by the assiduous study of the central crater, and the indications afforded by" his apparatus, "we can obtain precursory signals of eruptions."[41] The eruption of 1872 revealed the consequences of these ambitious claims. As one of Palmieri's critics argued, "we cannot possibly foretell when, how, or by what mouth [the discharge] may issue." The most recent eruption demonstrated this impotence, for even "with Palmieri stoutly at his post upon the mountain, and the Observatory instruments in full activity, they gave no forewarning of the sudden and unexpected belch forth from the base of the cone, of that tremendous gush of liquid lava which in a few minutes cut off from life the unhappy visitors."[42] In light of the failure of Palmieri's premonitory program at Vesuvius, hubristic confidence about the regularity—and concomitant predictability—of the natural world was chastened. The tragic loss of life seemed to challenge, if not exhaust, positivist certainty about the uniformity of the natural world.

Palmieri was largely performing as a loyal acolyte of Charles Lyell, whose *Principles of Geology* (1830–33) had displaced the catastrophist view of terrestrial change with a gradualist understanding, tempering the explosive disasters of Old Testament apocalypses with reassurances of regularity. Lyell's geology was, as

39. Ibid., p. 262.

40. B. F. Fisher, "Vesuvius, Destroyer of Cities," *The Cosmopolitan* 32, no. 6 (April 1902), pp. 573–84.

41. Palmieri, *The Eruption of Vesuvius in 1872*, p. 135.

42. Mallet, "Introductory Sketch," p. 145.

Martin J. S. Rudwick has noted, a science of causes, in which observable current evidence could help the investigator "penetrate from the known present back into the more obscure past."[43] The claim of the uniformitarianism popularized by Lyell's *Principles* was revealed by the tome's subtitle: "An attempt to explain the former changes of the Earth's surface by reference to causes now in operation." For Lyell, past and present causes were of the same kind and produce the same effects. But, as Naomi Oreskes has argued of nineteenth-century geology, "the available relics of the past spoke to singular historical events," and because "the patterns revealed in the rock and fossil record were not repetitive" they were not amenable to prediction.[44] While the present may have been the key to the past, it did not unlock the future, and it was this shortcoming that Palmieri's inept forecasting revealed so dramatically.

The photographs of Vesuvius produced for the tourist trade begin, after about 1870, to depict, and to embody, a decidedly more conflicted causal procedure than Palmieri's "taming" of the subterranean beast would seem to license. The enduring legibility of the past in the present saturates a particular variety of photographs of Vesuvius that were increasingly prominent in the last decades of the century. At the same time, the discursive structures of these pictures struggle to reconcile the causal legibility of the present with the elusiveness of envisioning the future. In photographs depicting the crater, there is a compulsive emphasis placed upon dried lava, the residua of earlier eruptions. But the photographs of this subgenre represent the causal penetration of past into present in markedly ambivalent ways.

One photograph juxtaposing a smoking Vesuvius with lava begs to be seen as picturing a causal relationship, but its title splits the two into discontinuous temporalities that forgo the proximity in time that causality conventionally requires. Produced in the 1880s by the Brogi firm, the photograph is captioned "Vesuvio, lava del 1858," thus revealing that the foreground represents not lava belched forth from the contemporaneously active Vesuvius, but rather the cooled remnants of an earlier, precisely dated, eruption. Not only has a quarter-century intervened between the putative cause and its effect, but the relation between the two gleaned at first glance is shown to be inverted. The temporal asynchrony of the dated volcanic remnants and the much subsequent plume undermines the legibility of a causal relation between the two. For Peirce, smoke and fire served ably to demonstrate the complexities of causal reasoning and temporality. There is "often an appearance of reasoning deductively from effects to causes," as when we reason " 'There is smoke; there is never smoke without fire: hence, there has been fire.' " Yet, he notes, "smoke is not the cause of fire, but the effect of it . . . a demonstrative

43. M. J. S. Rudwick, "Lyell and the Principles of Geology," *Geological Society, London, Special Publications* 143, no. 1 (1998), pp. 1–15.

44. Naomi Oreskes, "Why Predict? Historical Perspectives on Prediction in Earth Science," in *Prediction: Science, Decision Making, and the Future of Nature*, ed. Daniel Sarewitz, Roger A. Pielke, and Radford Byerly (Washington, D.C.: Island Press, 2000), pp. 23–40.

Brogi. Vesuvio, lava del 1858. *Ca. 1880.*

sign of a certain previous event having occurred." We thus "reason deductively from relatively future to relatively past" even though "causation really determines events in the direct order of time."[45] This divergence ultimately obliges us to "reason against the stream of time," a phrase most evocative of the growing incommensurability of ways of knowing the vectors of past and present, cause and effect.

"Vesuvio, lava del 1858" is discursively marked as belonging to a multiplicity of moments: of the lava of 1858, of the plume of the 1880s, and of the present of the interpreter. Another photograph from the same series adds to the scene the time of past interpreters. Two men are perched upon the lava, having judged the smoke emitted from the distant volcano to pose no threat: For them, this sign is insignificant. Wandering amidst the material evidence of Vesuvius's destructive history, they evince confidence in the irrelevance of that material for the prediction of future perils. This local instance of semiotic interpretation recapitulates a historically specific account of causality, in which the certainties of positivistic knowledge about the Earth were crumbling.

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This contextual dimension reminds us that for Peirce, semiotic interpretation is deeply contingent. Even if the legibility of a sign ultimately tends towards consensus, or a "normal interpretant," that consensus is largely aspirational. The initial possibility of the immediate interpretant is actualized in a dynamic interpretant, which Peirce revealingly characterizes as "the actual effect produced upon a

45. Charles Sanders Peirce, "Grounds of Validity of the Laws of Logic: Further Consequences of Four Incapacities," *The Journal of Speculative Philosophy* 2, no. 4 (1869), pp. 193–208.

Brogi. Vesuvio, lava del 1858. *Ca. 1880.*

given interpreter on a given occasion in a given stage of his consideration of the sign."[46] All of these "givens" demonstrate the panoply of variables that enter into an act of interpretation. They accordingly suggest the dynamic instability of the index, or, as Kris Paulsen has put it, that "the index is the root of the photograph's openness to interpretation and doubt, not its guarantor of truth."[47]

This openness of the index is now valorized at every turn, embraced even by the most conservative institutional purveyors of histories of photography. Yet attributing to all nineteenth-century viewers the sophisticated constructivism that belongs properly to a most ambitious and imaginative subset of makers and users of photography risks flattening out the epistemic status of photography every bit as perilously as the account of uniform credulity now being supplanted. A useful history of photography must include the mutable, historically contingent constellations that made certain accounts of the medium plausible at particular moments and not at others. Now—a quarter-century after the wide dissemination of digital—is the time to jettison strident dogmatism about the index, but also to cast our inquiry more widely in order to encompass more expansive conceptions of referential and causal attributes. The revelations furnished by the "rupture" of digital photography have imposed upon a disorderly and varied past a rigid, presentist matrix. At every juncture in the nineteenth century, the broadest conceptual frames of reference through which photography could be understood were contested. Even if these debates lie dormant, their signs remain.

46. Peirce, *Logic Notebook* (1906). Charles Sanders Peirce Papers MS Am 1632 (339), p. 288. Houghton Library, Harvard University, Cambridge, MA.

47. Kris Paulsen, "The Index and the Interface," *Representations* 122, no. 1 (Spring 2013) p. 90.