LITERARY ESSAYS

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Stanford
University
Press

Stanford
California
1998

The Anxiety of the Engineer

Today, when machinery is set in motion, the process is not always as safe and unerring as claimed, or as might be thought once the machine—to all appearances—has been successfully activated. We find a demonstration of this in an unusual personal experience that was related some time ago by a young engineer. He was building refrigerators that produced temperatures lower than any found on earth. Such cooling apparatuses are needed by industry because, as one might expect, certain chemical compounds can be formed only at temperatures barely exceeding absolute zero. After countless trials, the young inventor got lucky: a new model, capable of setting further records, sprang from the drawing board. Yet at this point something strange happened to the inventor: his joy turned to anxiety and he began to wish that the next day would bring to light some flaw or mechanical failure, relieving him (and his colleagues as well) of the unease of his good fortune, and shattering the artificial machine along with its artificial product in its artificial space. And, against expectations, this is exactly what occurred the very next day during a routine test. Absurdly enough, as the test went awry, the failed magician breathed a sigh of relief, surprised at his own reaction. It is indeed astonishing that the young engineer should have felt this way regarding his own brainchild; and while his state of mind may be understandable to many older or old-fashioned laypersons, it is more difficult to comprehend from the viewpoint of the inventor, or within the context of the invention itself. On the other hand, the manifestation of his anxiety is not at all out of place in the Americanized big city where most engineers work—and even more so, where technology has achieved an apparent victory over the limits of nature. For the coefficient of known and, more significantly, unknown danger has increased proportionately. In order to properly account for the bourgeois-technical relationship to nature, the content of this anxiety must be spelled out and made palpable.

1. In the first place, much that is primitive can be heard to echo here, much that remains internal. Those who are weak may feel quite comfortable with the notion that they are not able to take risks precisely because they are not bold enough. Although they strive for success, or at least envy those who have attained it, they are fearful of falling from the heights of attainment. They are arrested in a state somewhat like the child

who, having been burned often, shuns the fire. In a similar way, perhaps, a grown man may be wary of stepping out of line.

2. Furthermore, this anxiety is rooted in very early stimuli, prickling with strangeness and containing repressed items that one would rather not encounter again; the shock of success often clothes something different. To children, the lighting of the streetlamps after sunset appears to be quite uncanny, artificial, and even insolent. The light that penetrates the night—in place of the sun's—is one's own, self-generated in violation of natural law. This very early feeling of dread, this particular, even incestuous, anxiety in relation to one's own courage may also echo in the mind of the engineer by virtue of his profession. He, too, penetrates Mother Nature with a creative and procreative aim, usurping the rights of the father, with sexual desire and deceit alike. Bad conscience, then, appears as the will to miss one's aim.

3. This is further supported by the calculating type of person who is now ubiquitous. For, as a middle-class citizen (and our young engineer takes on the appearance of this type), he is highly distinct from the knight or the adventurer; indeed, such a person "came, saw, and conquered" very much as the opposite of these heroic figures. He is not seeking anything; rather, he is afraid of life's uncertainties. He is especially afraid of whatever is liable to spring out of hiding during the hunt. Thus he surrounds himself with a thousand thoroughly rationalized safeguards, ensuring that the new is encountered in the same way as the conventional—or at least with no smaller degree of protection. The modern inventor, the technical pioneer, is not really a knight seeking adventure for its own sake, or in order to test his courage against wilderness and dragons. Rather, in venturing forth, he practices a good deal of cunning and draws upon tried-and-true information, equipped with safety fuses—while fearing that some fuse might prove to be too weak and burn out when the current is applied. The chance of an accident should rightly and properly be reduced to a minimum; yet this chance increases with every advance into the unknown. In the present case, the unknown lies at the thermal limit of absolute zero, which is enough to provoke a feeling of *non plus ultra.* At the same time, these technical safeguards (including the well-timed reversal) don't escape the calculations of insurance companies. Such calculations are intended to serve different ends; still, they are grotesque from the

viewpoint of the knightly adventurer. In a completely calculable world, of course, the figure of the knight who stands before the unknown would not exist. Yet in that world, the knight's opposite number, the engineer, likewise would have no role. For in the figure of the modern engineer—of the highest rank, at least—the spirit of adventure is still preserved, despite the sharp distinction between the technical pioneer and the traditional danger-seeker. Even hubris is still alive in the heart of the inventor, though it is filtered and diluted by empirical calculation. Thus we can see how, as in the present case, a conflict might arise between the two natures locked within one heart. This means that the inventor in his role as a modern citizen might well oppose the adventurous researcher in himself—if not immediately, then (as in our example) after the first successful foray into the danger zone. Here, we can distinguish a component of anxiety that is more mature, modern, and unknightly than the fears awakened by the lighting of the streetlamps, associated with trespass upon both Mother Nature and the exclusive light-disseminating right of the patriarchal sun. Or more precisely, the anxiety that the engineer as citizen feels vis-à-vis the engineer as adventurer can be expressed by the injunction: Man should not tempt the gods! Hence the joy when hubris cannot attain its ultimate goal of absolute zero—when, so to speak, hubris is not accepted there as a valid currency.

4. Not everyone today can be characterized as a fearful bourgeois. But can our inventor even locate that darkness whose surmounting might provide an exciting challenge for him? Hardly, for he would see himself then confronted with a very different haunted circle, where nothing is real, where everything appears to consist of *empty relationships*. For bourgeois production and its real world are increasingly externalized and alienated, with respect not only to its safety measures but also to its pioneering urge. Production is founded upon an abstractly compartmentalizing, labor-dividing rationality; this artificiality is just as detached from the living wholeness of the human being as it is from the "natural" context of the task in question. It is instructive to compare this to precapitalist times of anxiety as well as to the more trusting lifestyles of southern regions, where things are allowed to remain in a halfway real condition, and delight is taken in the way things come to their own equilibrium and completion. High above Naples, for example, there is a broken water pipe, and next to it some useless rails, the remnants of a bankrupt rack railway. But from

this multiplication of minuses—where nature has not been overstimulated—the following plus can result: for years, water from the broken pipe has flowed onto the railway tracks, following their path down the mountainside, to finally gush out, far below, into the streets of a previously water-deprived district. Here the old dragon sleeps, unprovoked, below the earth—he is not absent, at this short remove from Pompeii and Vesuvius, but a still "organic" world relies on the whims of a beneficent confluence of events, on the remedies offered by chance, allowing new (and not so new) life to blossom out of that which is defective and ruined. Conversely, the existence of the technologically advanced city is extremely dangerous and completely lacking in beneficent harmonies. There, natural correlations have been torn apart—as in New York or similar places where the world has become a scene of commercial activity and intercourse. The city of ever-increasing artificiality, in its detachment and distance from the natural landscape, is simultaneously so complex and so vulnerable that it is increasingly threatened by accidents to the same extent that it has rooted itself in midair—that is, the city is built upon roots that have grown more and more synthetic. This grandly suspended, inorganic metropolis must defend itself daily, hourly, against the elements as though against an enemy invasion. But most important, these elements are not of the old kind, made up of conventional modes of chance and accident. Instead, they dwell amid the complexities of mechanized existence itself; with respect to "nature," they inhabit nothingness: a nature consisting of nothing but calculations, a nature that arrived with the machine and that increasingly has taken up residence under ever less perceptible conditions, in ever more "mathematized" dimensions. Machines have been built according to such an alienated form of understanding, and pushed so far into the state of artificiality—and even partly beyond the category of objects—that they have begun to populate a new realm of the spirits. It is here that the old demons appear as a far more dangerous hollowness, and the dragon as the *emptiness of the modern battlefield.* The subject who bears the power of electrification knows (fortunately for him) little or nothing about what darkness is, or what the tocsin's ringing in the nighttime village means, or what the night of the evil ones implies—the night of Franz Moor[31] or of Shakespeare's Richard III ("The lights burn blue. It is now dead midnight"). For the subject, however, another mythical feeling has become all the more distinct: *the experience of the statue of Saïs.* In Schiller's ballad of the same name, this was anticipated not so

much as an experience of terror than of emptiness. "Isis" is not frightening in any still halfway definable sense that could be linked to the primitive fear of nature. Neither does "Isis" emerge here as the exultant goddess, inspiring the greatest rapture in her disciples—as in the famous ecstasy of Apuleius, the mystic of Isis, to whom the "sun at midnight" seemed to shine forth from the depths of the world-mother's being. Rather, "Isis" herself has been transformed into something null and void: the youth who is driven to the veiled statue by a burning desire for truth is not, like the medieval Faust, claimed by the devil but by a sense of absolute futility. The devil is still a fragment of the ancient Isis, namely, of demonic nature; however, the nothingness that stands behind the mechanized world, a world unmediated by humanity, is a mortuary in which people have been buried alive. The subject is teetering on the brink of absolute nihilism; and if this mechanization with or without purpose, this universal depletion of meaning, should come to fulfillment, then the future void may prove equal to all the death anxieties of late antiquity and all the medieval anxieties about hell. For the moment, such an outcome is prevented by the afterglow of precapitalist richness: a fund of belief long ago exhausted, but nonetheless pawned by the *juste milieu.* Meanwhile, fascism plays both Klages's Romanticism and Spengler's cult of heroism off against the "Saïs" theme. All for the sake of not having to see the underpinnings of the Weltangst, namely, the mechanics of existence in total emptiness. The face that it shows in the West and the East is quite similar: here, monopoly capitalism with democratic amelioration; there, state capitalism with the appearance, or with the false interpretation, of socialism. However, subjective preeminence in the problem (as it is often phrased) of "material well-being and spiritual misery" belongs to the West—here, the supports have not only been betrayed, but broken. The feeling that "there's nothing behind it all" is an old one in bourgeois society: think, for example, of the lines that Hamlet addresses to Yorick in the graveyard, or of Prospero's nihilistic final words in *The Tempest.* This feeling has always accompanied bourgeois abstraction—even in a period when the bourgeois class was on the rise, not just in its late period. Thus, the aforementioned cryogenic engineer—a contemporary of that idling motion reflected everywhere—also believes, *cum grano salis,* that he will glimpse only a terrifying false face at the bottom of his work, an entity radiating something worse than the coldness of space, namely, unreality. Not as though anything could be set right or even improved by reactionary

means, of course; by adopting such blind and stupid expedients as machine-smashing or other subaltern forms of Romanticism. On the contrary, as Kracauer has so aptly stated, "America" will disappear only after it has been completely discovered—meaning that the revolutionary path goes straight through capitalism, not around it. Therefore, the unleashing of the mechanical forces of production must be affirmed by the revolutionary spirit, along with the radical disenchantment of mythological appearances. This latter task must be carried out fearlessly, to the point of achieving its own specific nothingness, namely, a total lack of illusions. To the socialist-concrete consciousness, filled with a world quite different than the one that has persisted up to now, the capitalist-technical emptiness provides exactly that nothingness wherein one hopes to discover everything. What is meant by this "everything" are the real tendencies, the spaces of hope that open up once the false and illusionary stuffing has been pulled out, so that a "hollow" appears, free of terror and filled with a positive ferment: a hollow charged with sparks. Because of this, the terror of the Saïs experience remains not only a wholly authentic feeling, but also a wholly *energizable* one that can be used to break through the mask of unreality.

5. But even with this, the anxiety in question has not been thoroughly explained. For it bears yet another, darker attribute: that of the substitute that either deceives or does not recognize itself as such. We are alluding in the first place to disreputable deeds, in consequence of which even the honest inventor once found himself associated with gold-producing alchemists and the like. The technician of old, often still inclined toward magic, occupied himself not only with laboratory experiments and trade, but also filled a role in the outer chambers of the cultic temple, assisting priests in the performance of miracles. Thus, the technician was illegitimately involved in "magic"—of course, within a worldview that held magic, in principle, to be possible. Technology was the ignoble sister of magic, devoted to its service in a world interwoven with spells and miracles. For a long time, therefore, technology partook of the curious and fantastic: even during the Renaissance and the Baroque, when technology first began to properly separate itself from magic, the engineer cut a figure reminiscent of the magician. This association was passed down through tradition and received by E. T. A. Hoffmann, whose fictional characters include demonic charlatans and physicist-magicians à la Spa-

lanzani—because of the shudders they provoke, such characters have recommended themselves to all the implausible horror films ever since. It is true that the dark corners of the staircase and attic, the gloom of night, and all the favorite haunts of ghosts have been dissipated by the electric light. Nonetheless, the more advanced and unfrivolous technology is, the more mysteriously it mingles with the realm of taboo, with mists and vapors, unearthly velocity, golem-robots, and bolts of lightning. And so it comes into contact with things that were formerly conceived as belonging to the *magical sphere.* Edison is significantly closer to Doctor Faustus than Herbert Spencer is, for example. Much of what the old fairy tales promised has been achieved by the latest technology: radio is able to fetch voices from afar, and television—which resulted from the application of the soberest scientific principles—comes close to embodying the concept of a magic mirror. From the depths of the technological realm, therefore, certain magical themes have emerged that bear no relation at all to prevailing abstract methods of construction, but that are compelling in themselves. The association of such themes with technology is at first historical; later, to all appearances, it becomes a matter of actual content.

No inventor gives the impression of acting or thinking like a magician. And yet, even as we gaze wonderingly at the world brought forth by the inventor, we perceive our bodies to be accelerated very much in a fairy-tale fashion, and we find ourselves able to see and hear over great distances. In Washington, the president presses a button—and more than a thousand miles away, at the Panama Canal, the final parcel of earth is dynamited. In the windows of the most important Parisian banks, a small wireless device has been on display for some time now that relays the latest news from the London exchange. Within a fraction of a second after the rates are announced, this device is able to receive and transcribe them upon a tape that runs haltingly through an apparatus of gears and spools, until it is extruded from the "mouth" of the machine. Roger Bacon, the thirteenth-century experimentalist, was suspected—together with Albertus Magnus—of keeping a brazen head that could both speak and answer questions. As an idle rumor aimed at bolstering allegations of magical practices, this was too fantastic even for the heresy hunters. Yet the Parisian device, which has a mouth without a head, responds to questions about the exchange rate in a format already suitable for the archives. Furthermore, if one associates the radio transport of voices with something like a three-dimensional, freestanding telephoto image, then the idea of the doppel-

gänger is necessarily abolished, for crowds of distant people are capable of appearing before one in the flesh, so to speak—with the flick of a switch, the smallest room is filled with the Place de la Concorde, the Rhine River, the Hamburg harbor, Times Square at evening, the Gobi Desert, or St. Peter's Cathedral, to be supplemented soon enough with close-ups of lunar craters and Venusian jungles. In the midst of tables, chairs, and cabinets stands the Roman Forum, perhaps even (in our fondest fantasies) the Forum of antiquity, as an image retrieved from outer space, where its light rays are still traveling outward. All of this is rather like the legend in which Rabbi Löw conjured up Prague's Hradčany Castle before the eyes of Emperor Rudolf in a tiny room. Magic and technology are united, obviously, in their desire to change the world. Moreover, there is an amazing congruence between the results that both have claimed to achieve. However, the character as well as the method of the engineer are different from that of the magician (in spite of the similarity between Edison and Faust), and the technological engagement with natural objects is wholly distinct from the relations pertaining to the magical world. Technology works with analytically fragmented, rationally recombined component forces [Teilkräften] and laws; it works, above all, with a completely quantified nature, in comparison with the analogical essences of magic, which are founded in "sympathetic correspondences" between the qualities of things. Nevertheless, technology ultimately arrives at the same destination as magic; their area of intersection is so astonishing that *The Thousand and One Nights* could almost be used as a manual for inventions yet to come. Francis Bacon rightly commented that the fantastic magic of the prehistoric era bears the same relation to "natural" magic—that is, to rational technology—as the deeds of the Knights of the Round Table to those of Charlemagne. Yet it remains possible to compare one to the other, if only ironically. And just as magic draws upon powers that are unknown or forgotten today, twentieth-century technology makes use of forces that are no longer recognizable in terms of our mesocosmic[32] world. High-frequency and radio waves were not available *for use* before the existence of humans. And if machines of this kind operate in an abstract realm that has no basis in good old mechanics, still they touch upon old magic by virtue of their artificiality: for that which is artificial stands in potential proximity to nature's own art and power in changing the course of the world. Through its end results, then, technology possesses an entirely new relationship to nature's own creative power and to the "subject" of nature. Previously, such a subject was con-

ceived only by analogy with the human subject or the subject of history; yet, in spite of Bruno, Spinoza, and Goethe, these conceptions were not understandable. The metaphysics of nature too, with this intrusion of technology into *natura naturans*,[33] by participating with this (up to now) hypothetical entity, will acquire its ultimate moment of concreteness. And although no inventor acts like a magician either in terms of character or method, still the inventor's *successes* are not only wonder-inspiring but *uncanny*. At least (or especially) today, when even cryogenic engineers get so heated up about the problem of mechanization that they no longer wish to complete the project of discovering "America," and expect instead to find the "irrational"—as opposed to the rational and the determinable—at the bottom of their experiments. This "irrational" is reproduced, above all, as that which is no longer knowable, and therefore *anciently demonic*. Those who are susceptible can no longer invoke or banish their own creations, but instead fall victim to them. Thus a gap is opened between the technicians and the wonders of technology. Even if the engineer (as in some fable) is lucky enough to advance very far into the magical realm, he is likely to respond to his good fortune once again with anxiety. In this case, anxiety is directly related to content: it is aroused by the notion of *undeserved* luck, as well as by that of a *primeval realm of demons* from whence this luck originates. Both sources of anxiety are equally uncanny; the mind is not able to easily confront such matters. The truth of the engineer's merely artificial achievement is revealed to be accidental—this realization is compounded by fears similar to those felt by Polycrates concerning his excessively good fortune in finding the ring, or by Faust in his encounter with the "terrifying face" of the earth-spirit. *I did not call you forth*—this single phrase captures the feeling of anxiety in its highest, oldest, and strongest articulation. Congruent with this feeling of anxiety is the idea that impure spirits have somehow taken possession of a smoothly operating mechanism in order to goad it toward some hapless end. At best, the engineer's machines serve as mediators of those natural forces that rationalism has rightly stripped of false and mythological designations—without, however, being able to name their true motive force or to mesh with them in a concrete fashion. Doubtless only a socialist relation to nature (consequent to a socialist mode of production and exchange) could lay hold of the concrete aspects of the badly disenchanted magical sphere, as well as that which appeared in earlier times to be accessible through superstition, signifiable through mythology. This *ultimate appearance* of anx-

iety is therefore an important sign, one that surpasses the recent overweening presumption of having explained the nature of being through relations lacking in content, through mechanics. In this region, too, a shudder is still the best part of humanity—a line from *Faust* that does not permit us to forget that shudder's double meaning, its relation to light. Here we might find the beginning of a different order of wisdom than the one that describes a cycle of universal cooling, a new flare-up, and another phase of cooling—a carousel of entropy and anti-entropy from which mechanical philosophy draws its final conclusion.

6. So much for the remarkable case of the anxiety of an engineer, and its multiple meanings for today's (and even more, for tomorrow's) world. In interpreting these meanings, we have refrained from overburdening them with pathetic invocations of the spirit world or the occult. There is no need to mention Steiner[34] in this context: to do so would be more foolish than atavistic. We have also declined here to promote an occultism associated with the more refined strata of society, and given to such phrases as "the ruination of the earth by the mind," and "the mind as adversary of the soul." The engineer, although politically a socialist, may have heard of the fashionable Klages and his "cosmogonic Eros." Nonetheless, the shock that he experienced was not literary but naive, not reactionary but technically advanced. It is more appropriate here to recall Kant and his "moral and aesthetic reason," which could not be located within, or accommodated by, the mathematical and physical reason of his era. This allusion, while it is not literary, is obviously relevant to the facts of the case, yet it relates more to a feeling of unease than anxiety. Indeed, we may ask if this case does not touch upon that part of the human that is never satisfied by mechanical reason and that rejoices when it retreats in a reasonable manner, after having been honestly withstood. At the same time, the refrigeration experiment seems to have demonstrated—within the limits of this form of reason itself—that there exists yet another pathway for contemplating and traversing nature: a moral and, above all, an aesthetical trackway upon which every mechanical freight-car must come to a halt (even at the cost of derailment). Such an eventuality can be pictured as occurring within certain technical and causal limits—namely, at the point where these limits adjoin others and so turn back upon themselves with anxiety as well as joy. This response, paradoxical as it is, at least highlights the bad conscience behind contemporary relations to nature,

which have been compromised by an excess of industry and (consequently) of abstraction. And it is worth affirming that a solid education in the natural sciences is not conducive to filling up the emptiness that lies at the heart of the sciences with stale magic tricks. Instead, a more suitable form of reason is sought—one capable of doing justice to this conspicuous void, but without the aid of obscurantism.

1929

Technology and Ghostly Apparitions

There is much evil to be feared in today's world. But the particular dread evoked by ghosts has become rare. Few can boast of uncanny experiences, despite the popularity of such stories. Life runs its course by way of the familiar; exceptions mostly are shown to be tricks and illusions.

Yet, as we know, earlier times perceived themselves as unimaginably haunted. Every third peasant had his goblin in the house; in every corner, there was fear of the other world. Demons pressed and crowded in the walls at night, occasionally thrusting out an eye or a tongue—only prayers could prevent the entire demon from emerging. The woods were inhabited by spirits both wild and gentle, while headless men waited at the crossroads; elsewhere, moss-women were pursued by the devil. Even in the cities, there were night-specters, often of a most curious kind: the chained horse in Frankfurt, for example, or the fiery owl in Worms. Fables and legends are full of such reports—their effect is all the more astounding because, with all their superstition, they are recited as simply and with as much conviction as any other public announcement or complaint. Hebbel[35] distilled this quite humorously in his story "The Two Vagabonds": "There was no hut so wretched that it was not visited from time to time by a ghost or a dead person, sighing for salvation; no mountain so small that its clefts did not harbor some spirit." Grimm's peasant is not surprised when he meets a moss-woman who asks him for protection against the devil; he says only that "These spirits are none of my concern." And he is not surprised the next day when he finds one quarter of the moss-woman hanging from the barn door, apparently as his share of the devil's prey; he feels only a sober and realistic fear. And even if he was nothing more than an ignorant peasant—and, in addition to that, noth-