

## ***Information:*** **Notes Toward a Critical History**

### **Introduction**

“When you take a word in your mouth you must realize that you have not taken a tool that can be thrown aside if it will not do the job, but you are fixed in a direction of thought that comes from afar and stretches beyond you” (Hans-Georg Gadamer 1982, 496).

Our words have a life of their own, though it is our life too. As we speak, blithely thinking that we are using a glassy medium for expressing our unique thoughts and experiences, language conspires against us and the pleasure we take in our own originality. Words have their rhymes and reasons which speak through us in many voices—the voices of others we love or fear, of the dreams and desires that loosely compose our selves, of ancestors we never knew nor met. Words too have their histories and their longings, which leave their hieroglyphic marks everywhere. The echoes of past ecstasies, and despairs, resound in human talk, though they are usually muffled and we usually oblivious.

Such a conception of language is often resisted because it seems to conjure the specter of animism, something that moderns, being more comfortable in the sunlight than the moonlight, have worked so dilligently to banish. It seems to make language into a netherworld populated by the ghosts of departed ancestors; it seems to make us into beings possessed by demons or angels instead of ourselves. It violates our sense of being the masters of language and of language as a tool, a symbolic system for transmitting information. It is the information that matters, we assure ourselves, not the words. When words push back against us and our intentions, we tell ourselves that this is merely an unusual case, a temporary setback to the clean communication of information.

The concept of *information* thus invites us to contemplate the annihilation of language, or at least to imagine its transformation into a transparent system of thought transference. Part of its great cultural power in the late twentieth century is that it presents a clear solution to the thorny problem of regulating of human relations: eliminate noise, increase information-exchange. *Information* is a term central to the discourse of communication research (Paisley 1984), to say nothing of the reigning institutions of (post?) industrial society, and has even been proposed by some pundits as the chief attribute of our age. What kind of sense can we make of this omnipresent new idol?

This essay aims to treat *information* in the way that it does not want to be treated: as a word which has a history full of inversions and compromises. *Information* is a term that does not like history. Dretske (1981), for example, opines: "In the beginning there was information. The word came later." Beniger (1986) similarly takes information to be equiprimordial with life itself: he locates its emergence in the primordial soup of self-replicating proteins. Such views effectively take information out of history and in so doing neglect the history and grounds of their own modes of discourse. *Information* is, after all, a word with a history: it is a cultural invention that has come to prominence at a certain point in time, in a specific constellation of interests. Once that history is grasped, information clearly shows itself, contra Dretske, not to be a fit successor to the Word.

This essay assumes, and hopes also to show, that the English language, to use Wittgenstein's metaphor, is an extraordinarily diverse city—with close garrets and dusty antique shops and faceless skyscrapers and grimy kiosks, suburbs ever expanding at the edges. Words have many and conflicting senses, sometimes outright opposing ones (*cleave*: to divide, to join). The senses of words hang together less like logical propositions than like inhabitants of a house or city. Not logic but life, in Wittgenstein's great insight, governs the structure and coherence of discourse. The meaning of a given "language-game" comes from the "forms of life" with which it is "interwoven." Some strings of sentences that will be natural and intelligible in some contexts will be opaque or outlandish in others. Or, such strings may become fixed as a standard part of the language though the forms of life which once undergirded them have long since shifted, dissolved, or migrated. As the forms of life change, so must the tissues of sense in words, the language-games. The story of *information* is just such a one of dissolving and migrating forms of life.

In this brief essay, I cannot hope to give *information* the detailed treatment exemplified by such masters of the history of ideas as Lovejoy (1966/1933), Spitzer (1948) and Fleming (1967). Rather, I hope to illuminate the shape of the historical odyssey, and thereby the character, of a word used all too uncircumspectly in contemporary discourse. The term developed through four main forms of life, traveling from the late medieval Schools through the essays of the British empiricists to the statistical data of state bureaucracies and today's computer technology. The shifts in sense it undergoes are profound and dizzying, and yet in each case there is a sort of logic as to how one form of life, one cluster of senses, gives way to another.

## I

"Concepts, like individuals, have their histories and are just as incapable of withstanding the ravages of time as are individuals. But in and through all this they retain a kind of homesickness for the scenes of their childhood" (Søren Kierkegaard 1965/1841, 47).

The term *information* enters English via Latin and is first attested in the fourteenth century. From the Latin *informare* (to instruct) and *informatio* (idea, instruction, concept, doctrine), came a cluster of senses—*information* as *an item of new knowledge*—that more or less still prevails. But in the environment fashioned by Aristotle's disciples in the late middle ages—preeminently Thomas Aquinas—*informatio* and *information* were used in a broader sense to account for the way that the universe is ordered. According to their reading of Aristotle, the universe of matter is given shape and identity by the forms or essences that imbue it. The intelligibility of material objects owes to the forms that *in-form*

them, shaping them from within. This doctrine, which was later dubbed *hylomorphism* (from Aristotle's *hyle*, or matter, and *morphe*, or form), served as a master principle in much late medieval religion and science. As Jacob (1973, 20) writes, "In the sixteenth century, each mundane object, each plant and each animal can always be described as a particular combination of matter and form. Matter always consists in the same four elements. An object is thus characterized by form alone. . . . [W]hen an object is created, it is the form that is created. When the object perishes, only the form disappears, not the matter . . ." *Information* was a term that took part in a vocabulary that described how matter was imbued with the intelligible order of forms. It belonged to a social world very different from our own, one still "enchanted" and governed by complex networks of similitudes, resemblances, and correspondences (Foucault 1970, 17-44; Hacking 1975, 39ff; Toulmin 1982, 224-5). Even when *information* was used in the sense of giving someone a report, it belonged to a world of animated essences and living forms quite divergent from our own.

Some seventeenth-century examples, all cited in the *Oxford English Dictionary*, illustrate this divergence and *information*'s original concern with order and structure. A character in a play by George Chapman (1961/1605, 105), answering a companion's laments about the "faithlessness of women," delivers an elaborate conceit comparing love to the sun:

I tell thee Love is Nature's second sun;  
 Causing a spring of virtue where he shines,  
 And as without the sun, the world's great eye,  
 All colours, all beauties, both of Art and Nature,  
 Are given in vain to men, so without love,  
 All beauties bred in women are vain;  
 All virtues born in men lie buried,  
 For love informs them as the sun doth colors . . .

Chapman provides, in passing, hylomorphic accounts of vegetation, astronomy, color, love, virtue, and beauty, showing in each case how the material in question is made vital by something without it that *informs* it. This work of informing has nothing to do with gaining information in today's sense, but in receiving the energizing sources of life. The passage recalls Aquinas's notion that living faith (*fides formata*) must be "informed" by charity, in distinction to *fides informis* (dead or unformed faith, the *in* here serving as a negative). In *Paradise Lost*, Milton surveys the solar system from the new Galilean perspective, and speaks of the planets as "all alike inform'd/With radiant light, as glowing Iron with fire" (Milton 1968/1674, 115; Book III, line 593). As the fire's heat "informs" a fireplace poker, so the sun's light holds the planets in orbit in a sort of solar magnetism, keeping them well-ordered and in balance (Milton wrote *Paradise Lost* without knowing Newton's description of universal gravitation). Perhaps the clearest example is Sir Thomas Browne's description (1981/1646, 441) of the fabrication of Eve: "there was a seminality and contracted Adam in the rib, which by the information of a soul, was individuated into Eve." Browne reflects the genetic theory of his times (Jacob, 1973): a homuncular Adam in the rib became Eve when *informed* or animated by a soul. Clearly this *information* has nothing to do with gaining facts, and everything to do with the embodiment of form. Perhaps we could best translate the early meaning of *information* with a term such as *morphogenesis*, taken broadly as the origin and evolution of forms.

Some words in English still preserve the sense of the infusion of form, mainly verbs: *endow*, *imbue*, *influence*, *instill*, *infuse*, *impress*, for example. The verb

*inform* still has a hylomorphic sense, being used in the sense of imparting form or sense to a set of materials, while *information* has lost any connection to this origin, save in the phrase “for your information,” which originally meant more “for your good” than “for your knowledge.” In the scenes of its childhood, *information* had to do, it seems, with the active shaping of the world and with the conferral of form on matter.

## II

“If mine were the privilege of choosing, from among the Immortals, a patron saint of Communication, I should undoubtedly ask for twins—*gemini*, John Locke and David Hume” (Cherry 1955, 45).

In the feverish demolition of medieval institutions in the seventeenth and eighteenth centuries, the notion that *information* consisted in the activity or process of endowing some material entity with form remained largely unchanged. But the notion that the universe was ordered by forms fell into disrepute, and the context of this in-forming shifted from matter to mind. Both changes inaugurated a massive inversion in the meaning of *information*.

The intellectual revolution in the early modern period can be described as three parallel assaults on the idea that the universe had any underlying “form” or set of “forms”: in psychology, the removal of spirits from bodies; in politics, an attack on the holiness of the church and the necessity of the crown; and in metaphysics, the denial of “intelligible essences” (Unger, 1975). In place of spirits or souls came minds, egos, or *cogitos*; in place of a divinely instituted social order came a huge but fragile Leviathan, both arbitrary and inescapable; in place of “direct perception” came “perceptions” and “impressions” in all their opacity, density, and potential deception—what Francis Bacon called “the uncertain light of the sense.”

The shift away from metaphysical forms to the evidence of the senses—to empiricism—was decisive in shifting the meaning of *information*. This slide in sense can be recognized in Bacon’s *Great Instauration* (1967/1620, 17), the manifesto of modern science. Bacon criticizes the logicians of his day for receiving “as conclusive the immediate informations of the sense . . .” Instead, those “informations” must be subjected, according to Bacon, to a sure plan that will sort the true from the false. Though Bacon’s usage may not appear irreconcilable with our own, the inverted pluralization should tip us off that he does not completely share our prejudices (we would say “the information of the senses”). In fact, this locution exemplifies a perfectly hylomorphic notion of the workings of the senses: they are a kind of matter (wax being a favorite empiricist instance) on which objects of the world may leave their shapes or stamps. What is interesting here is that the site of *information* is being shifted from the world at large to the human mind and senses. This shift requires no break with scholastic notions of mind or nature.

Later empiricists, however, did seek and effect such a break (and sometimes faulted Bacon for being mired in scholastic terms). Once adopted in empiricist discourse, *information* could not help but drift far from its scholastic origins. For David Hume, for example, a term like “impression” was a cold term stripped free of metaphysical baggage. It had little residual metaphysical force as a process of conferring form through pressure. *Information* was readily deployed in empiricist philosophy (though it played a less important role than other words such as *impression* and *idea*) because it seemed to describe the mechanics of sensation: objects in the world in-form the senses. But sensation is entirely different from “form”—the one is sensual, the other intellectual; the one is

subjective, the other objective. My sensation of things is fleeting, elusive, and idiosyncratic. For Hume, especially, sensory experience is a swirl of impressions cut off from any sure link to the real world. The “doctrine of ideas,” developed initially by Descartes, was central to early modern philosophy, both rationalist and empiricist. Abandoning the “direct perception” of the scholastics—the immediate communion of Intellect and Nature—Descartes interposed “ideas” between the two. An “idea” was something present to the mind, an image, copy, or representation, with a problematic relation to real things in the world. For empiricists (like Locke), the stream of ideas was the raw material from which genuine knowledge could be built; for rationalists (like Descartes), it was a veil of illusion, to be pierced by logic and reason.

Classical empiricism has the particular philosophical and practical problem of reconciling its urge for scientific, rational knowledge with its celebration of the sensory flux. Once the universe is sucked dry of intelligible essences or forms, how is one to account for legitimate knowledge without recourse to objective principles of intellectual or cosmic order? Without forms or some other ordering device, experience becomes chaotic, scattered, plural, and profuse. The classic solution is John Locke’s (1975/1690): to muddle through, persistently and patiently. Another answer is to deny, or rather, to suspend, the quest for such ordering principles altogether. Hume’s skepticism (1978/1739) is a good example. He found mental life to be a noisy theatre of sensation without any possible grounding or bottom. He granted that when he played backgammon and most other times, the world seemed substantial enough. But he simply found himself at a loss to account philosophically for the existence of the world or for certain knowledge of it. Another strategy is to locate the sources of order not in the universe, but in the human mind. Kant’s *Critique of Pure Reason* (1974/1781) is a good example (Kant famously claimed to have been roused from a “dogmatic slumber” by reading Hume). Kant both culminated and destroyed classic empiricism: he solved its problems and put it out of business, putting idealism on the map for an era. He redirected the quest for order by placing the sources of intellectual organization in the universal, a priori structures of the human mind. The mind ceases to be matter in-formed (by objects or by the senses), instead becoming the repository of forms that shape and order the manifold material of sensation. David Ritchie (in response to an early draft of this paper) has felicitously called Kant’s transcendental notion of mind “outformation” in contrast to the empiricist notion of mind as “information.”

In any case, the empiricist problematic was how the mind is informed by sensations of the world. At first *informed* meant *shaped by*; later it came to mean *received reports from*. As its site of action drifted from cosmos to consciousness, the term’s sense shifted from unities (Aristotle’s forms) to units (of sensation). *Information* came less and less to refer to internal ordering or formation, since empiricism allowed for no preexisting intellectual forms outside of sensation itself. Instead, *information* came to refer to the fragmentary, fluctuating, haphazard stuff of sense. *Information*, like the early modern world view more generally, shifted from a divinely ordered cosmos to a system governed by the motion of corpuscles. Under the tutelage of empiricism, *information* gradually moved from structure to stuff, from form to substance, from intellectual order to sensory impulses.

### III

1770: "The science, that is called statistics, teaches us what is the political arrangement of all the modern states in the known world" (English translation of Bielefeld's *Elements of Universal Erudition*, 1770, cited in Burchfield 1986, 494).

1911: "The Statistical Method . . . is a scientific procedure (1) whereby certain phenomena of aggregation not perceptible to the senses are rendered perceptible to the intellect, and (2) furnishing rules for the correct performance of the quantitative observation of these phenomena" (Hooper 1911, 808).

The empiricism of the seventeenth and eighteenth centuries took it for granted that the site of *in-forma-tion* was an individual person's senses or mind. Where else or who else (save God) could be a knower? Between the middle of the eighteenth and the middle of the nineteenth centuries, there arose a new kind of empiricism, no longer bound by the scale of the human body. The state became a knower; bureaucracy its senses; statistics its information.

Bureaucracy, to be sure, is as old as civilization. Any large-scale polity requires some kind of monitoring. (King David took a census: 2 Sam. 24:1 Chron. 21. His empiricism was apparently taken as a sign of that he distrusted God to bless his kingdom with a growing population.) But the scale and intensity of bureaucratic growth over the last two hundred years is quite unprecedented in human history. And the essence of bureaucracy is information: here we come to a sense of the term that is completely ours and requires neither mind-stretching nor italics. But how did the term migrate from empiricism to bureaucracy?

We gain a clue from the history of *statistics*, as a term and a practice. In the eighteenth century, *statistics* (which was translated, as in the quote above, from the German term *Statistik*) was the name for the comparative (and often, competitive) study of *states*. How did it happen that the study of states became the science of making imperceptible aggregates perceptible in numerical arrays? The scale of the modern state presents its managers and citizens with a problem: it is out of sight and out of grasp. It must be made visible. Anderson (1983) quite brilliantly argues that modern nation states are "imagined communities." He shows how novels and newspapers, whose flowering as forms of communication coincides with the rise of modern states in the eighteenth century, provided some of the means by which people could envision a vast community of fellow nationals all intimately linked at a distance. These forms give people a panoramic *tour d'horizon* of a world far too vast for mortal eyes. They are fine for giving citizens a vision of what they belong to. But rulers don't want to rule over an imaginary state: they need to make policy, control populations, tax incomes, raise armies. They need facts. And so, statistics arose as the study of something too large to be perceptible—states and their climates, their rates of birth, marriage, death, crime, their economies, and so on—and secondly, as a set of techniques for making those processes visible and interpretable. Statistics, like newspapers, novels, and encyclopedias, have the aim of representing entities too large for an empiricism based on the individual's senses. They are a tool for rendering the invisible visible, for making that which one could formerly only imagine into something factual and manageable. (That *population* is still used as a technical term for all aggregates testifies to the state origins of statistics, as does the very word.) Providing societies with such a panoramic vision is today one of the major tasks of the news media (which traffic, of course, in "information"). The use of multiple cameras so that the TV

viewer can be “everywhere at once” (Katz and Dayan 1985) is a form of vision already implicit in the structure of such eighteenth-century forms of social representation as statistics, newspapers, novels, and encyclopedias.

People who, thanks to statistics, “see” something intellectually they could not see sensually, are put in a curious position. They know something that they can never experience for themselves. They have a kind of knowledge that no mortal can have. Statistics offer a kind of gnosis, a mystic transcendence of individuality, a tasting of the forbidden fruit of knowledge. But what a strange and ironically modern kind of gnosis! It is not a mystic insight into the nature of the universe, but a cross-sectional glimpse of a population’s behaviors at a single moment. The actuarial table is a kind of degraded mysticism, a form of secular omniscience (checked, as always, by probabilities). This new kind of knowledge—knowledge that absolves individuals from the claims of deixis, of existing at one place and at one moment—is of course none other than information. Information is knowledge with the human body taken out of it. *Information*, which in empiricism had meant the experience of an individual, with statistics came to mean the experience of the state, insofar as the state can be said to have experience. Implicit in statistics is a kind of knower not subject to mortal limits. The nation poses starkly the problem of a collective subject of knowledge (Khoo, 1988). Statistical data (information) are of course gathered by mortals, but the pooling and analysis of them creates an implied-I that is disembodied and all-seeing. Information is a secular return of the Augustinian God, a dispersed intelligence whose center is everywhere and whose circumference is nowhere, sustaining and giving order to the world. Computers do efficiently and elegantly what the state already long was doing: they make vast invisible aggregates intelligible and manipulable. To use computer language, the “software”—the programs and practices—was already in place in the state long before the “hardware”—the chips and circuits—was technologically possible. The computer existed as a practice before it existed as a machine (Mumford 1970, 273-5).

The computer is a child of the state. The *Oxford English Dictionary*’s recent definition of *information* as facts or knowledge “separated from, or without implication or reference to a person informed” is not an artifact of computers. Statistics long functioned as knowledge processed by an inanimate, unembodied knower. Whereas in empiricism, *information* was nearly synonymous with *sense experience*, it comes with the growth of bureaucracies to mean *knowledge beyond the range of one’s experience*. In the eighteenth century *information* might be used to mean “other men’s experience” (Littlebury 1737, vii), but now it refers to the possible experience of no body. The rise of information as a form of knowledge, experience, and narrative is one part of the explicit alienation of human scales and proportions and of the disappearance of death as a form of meaningful closure (Benjamin, 1968/1936). One can quite accurately predict, statistically, that about 150 people will die on American roads this day. But the meaning of death as a structuring principle of those lives as the people experienced them falls through the cracks in a statistical model. Stalin recognized this in his chillingly telling comment that one death is a tragedy, a million deaths a statistic. Information is a form of knowledge that rearranges the significance of everyday realities, sapping them of substance. As Norbert Wiener recognized (1948, 27), “the first industrial revolution, the revolution of the ‘dark satanic mills,’ was the devaluation of the human arm by the competition of machinery. . . . The [second] industrial revolution is similarly bound to devalue the human brain, at least in its simpler and more routine

functions." The ability to endow one's routines with significance, the art of affecting the minutiae of everyday life, is the arena in which the meaning or despair of life gets worked out for most of the world's inhabitants. A complete devaluation of "uninformative" resistances and habits in everyday life would be a formula for emptiness, however wonderful the elimination of drudgery.

That information is a form of knowledge alienated from human bodily experience is rarely recognized by theorists of education. E. D. Hirsch's recent best-seller, *Cultural Literacy: What Every American Needs to Know* (1987), is a striking example of the grotesque results that come from thinking of education or knowledge in terms of information. *Information* is a term central to his argument: "culturally literate" people possess certain pieces of information that others do not (and he and his collaborators kindly provide us with a list of "information" that culturally literate Americans possess). But consider the strange title of his book. Once "cultural literacy" would have been taken as a ridiculous redundancy: to be literate was to be cultured. Now literacy has become a name for a skill in handling various forms of information (*computer literacy* being another oxymoronic marriage of terms). Hirsch explicitly views culture as a content area, a pool of information (possession of which will naturally help you "communicate better"). It consists of an objectifiable array of facts, phrases, and allusions which will supposedly save American discourse from its well-known penchant for cheapness. But the cheapening has already taken place in Hirsch's assumption that culture resides in a list rather than a life. To be awake to the possible varieties of human experience, present and historical, is the mark of an educated human being. True knowledge is not to possess information, but to throw it away. It is to run up against the borders of one's own ignorance, to recognize one's mortality and finitude. That is something that a computer cannot do, while a computer, in Hirsch's terms, could quite easily be culturally literate.

In sum, empiricism took the forms out of information, leaving it the chaotic "stuff" of sensory experience. But it remained anchored in the human mind and senses. With state empiricism—statistics—the old scale of the human mind and body is shattered. Information accumulates at rates and in quantities that can be "processed" by no single person. Techniques of "data-reduction" and analysis of central tendency arise to interpret that "information." Information, the "stuff" of sense, qualitatively mutates as it increases in quantity: it becomes objectified, exterior, and alien to human senses. Information ironically comes to be synonymous with noise—that which cannot be processed at present. In the context of the state information becomes a thing, a noun, a reified stuff separable from processes of informing. It shows up in various shapes and sizes—as news, research, data, intelligence, evidence, intellectual property—in different bureaucratic contexts. It still has something to do with forms. But not forms that fill us, but that we fill in: application forms, medical forms, insurance forms, tax forms, records, files, folders, reports, diplomas, billings, and other mounds of bureaucratic paper (not to mention the forms that get filled in about us). Information has traveled a long way from Aristotle's forms to the IRS's.

#### IV

"The human race, which was once in Homer an object of contemplation for the Olympian gods, has become one for itself. Its self-estrangement has reach such a degree that it can experience its own destruction as an aesthetic pleasure of the first order" (Benjamin 1968/1935, 242).



While information was consolidating itself as the basis of state bureaucracy's management of people and property at a distance, a romance was developing around the technologies that transmit and manipulate the commodity. Along with the apparatus went the illusion. Machines in America tend to have an accompanying oversoul (Marx 1964). As Carey has shown (Carey and Quirk 1970; Carey 1983), a long tradition in American thought regards electricity, and the inventions it enables such as the telegraph and the computer, as the harbingers of a utopian new age of social relations. This "rhetoric of the electrical sublime" is operative in much discourse today about information and its technologies, as part of the cultural fund that is being recycled and transformed. As Carey suggests (1983), much of the mystique of the telegraph was due to its part in the reorganization of the social experience of time and space. It starkly articulated the difference between communication and transportation, thus replacing abitrage (the movement of goods) with communication (the movement of "information"), helped to create markets of increasingly large and eventually national scale, led to new notions of simultaneity, working with the railroad to make standardized time possible and necessary, and assaulted regional culture and its popular forms. It also was a instance of an apparently immaterial force having powerful effects. The telegraph moved messages across space without, apparently, having moved anything physical, and thus seemed the latest in a long tradition of angels and divinities who spirit intelligence across vast distances. Communication came to be the movement of immaterial goods, transportation the movement of material goods (Cooley 1894). Telecommunications thus seemed a secularized version of the Great Spirit—while its political-economic power was slowly and ploddingly accumulating, many Americans found its metaphysical resonances more interesting. Spiritualism, the receiving of messages from the dead, was sometimes called "spiritual telegraphy" and was modeled at least in part on the wonders of the telegraph, such as in the "rapping" out of messages, letter by letter. The radio was often regarded as a grand spiritualist messenger system (e.g. Kipling 1902). In the 1930s, American Telegraph and Telephone sponsored a series of pamphlets extolling "the magic of communication," complete with pictures of angels dancing on the telephone lines.

The twentieth century version of the ongoing romance with information technology in America tends less toward religion than to science and, as I will argue, military technology. The catalyst for the contemporary discourse on information is undoubtedly the diffusion of "information theory" and its terms through the American academy after World War Two. Information theory developed as an outcome of the above described "information practice" of state bureaucracy. More specifically, it came from research on telephony at Bell Labs starting in the 1920s, and on cryptography during the war. Shannon's *Mathematical Theory of Communication* (1964/1948) was many things for many people. It gave scientists a fascinating account of information in terms of the old thermodynamic favorite, *entropy*, gave AT&T technical means for "shaving" frequencies and thus economizing by getting more calls on one line, and gave American culture a vocabulary well suited to its new status as world leader in military machinery. It was explicitly a theory of "signals" and not of "significance." Warren Weaver's commentary on Shannon's theory (1964/1949), which was probably read more often than Shannon outside of electrical engineering (Ritchie 1986), insisted that the theory had nothing to do with "meaning," and only with the degrees of freedom one had in choosing signals for one's message. But as the terms diffused through American intellectual life—

and they did at violent speed, as Dahling documents (1957)—these provisos were little heeded. *Information* could not help but take on a substantive sense. Indeed, the theory may have seemed so exciting because it showed how to make something already familiar through the bureaucratic institutions of everyday life into a lofty concept of science and technology. It offered an indirect way to transfigure bureaucracy, to give it a halo.

One consequence of the diffusion of information-theoretic ideas was the rewriting of the great chain of being in informational terms. On the smallest level, where the secrets of life are “coded, stored, and transmitted” we find Watson and Crick, the discoverers of the double helix, writing of DNA as a code containing “genetical information.” Neural synapses are switchboards and nerves are telephone lines (reversing the metaphor: in the nineteenth century, telegraphs and telephones were “nerves”), and the messenger RNA proteins are dubbed “informosomes.” Moving up to physiology, one hears of hormones and enzymes as messages. The human brain is an “information-processor.” In the social world, we hear that marriages will work better when men and women “communicate more” and “share information about their feelings” with each other; that good managers must communicate effectively (i.e., share information) with employees; and internationally, that there must be a new order in the flow of information between states. Finally, a few radio receivers vigilantly await some “information” from the outermost reaches of the universe, in the quest for extraterrestrial intelligence.

The academy is another clear example of the infiltration of the discourse of information. Several specialities define themselves in terms of the production, manipulation, and interpretation of information: computer science, electrical engineering, statistics, expository writing, library science, psycholinguistics, management science, a major portion of economics, journalism, and communication research. The recent interdisciplinary confluence under the name “cognitive science” would not be possible, one senses, without *information* as intellectual connective tissue. Some have gone so far (Beniger 1986), to suggest that all intellectual inquiry into human affairs should redescribe itself in terms of a new trinity of concepts: information, communication, and control. Such schemes are the latest appearance of the dream of unified science that runs from Descartes to Carnap; information has been a stimulant to such dreams, just as geometry, evolution, thermodynamics, statistics, and mathematical physics have been in earlier days.

What kinds of effects does this transmogrification of discursive landscape have? What kinds of things does it allow us to think and say, and what not? One indication can be found in the opening paragraph of a text that did much to make information theory available for interdisciplinary poaching: Weaver’s commentary on Shannon (1964/1949). Consider Weaver’s innocently enthusiastic first paragraph (1964, 1):

The word *communication* will be used here in a very broad sense to include all the procedures by which one mind may affect another. This, of course, involves not only written and oral speech, but also music, the pictorial arts, the theatre, the ballet, and in fact all human behavior. In some connections it may be desirable to use a still broader definition of communication, namely, one which would include the procedures by means of which one mechanism (say automatic equipment to track an airplane and compute its probable future positions) affects another mechanism (say a guided missile chasing this airplane).

This gem is quite typical of the whole movement to informationalize the world. Observe the rhythms of Weaver’s intellectual imperialism. He starts with

the favorite social situation of the empiricists: how does one “mind” affect another? His abstraction is benefitted by his modesty (“all”) and his instrumental view (“procedures”). Then we travel through language, the fine arts, and somehow come out on human behavior (the ride is getting increasingly bumpy). Then Weaver “broadens” his definition by introducing Korean war military technology.

An extraordinary category, this, including music and missiles, speech and servomechanisms. What made this string of sentences, this patch of discourse, intelligible—and exciting—to so many thinkers in the 1950s and even today? What form of life allows these sentences to hang together? (If there had been a conspiracy, which there wasn’t, it would be hard to imagine a neater way to colonize zones of human action such as talk, art, and dance for bureaucratic convenience than through the circulation of the doctrine that human culture is a matter of information.)

Information technology as we know it is the child of war. There is nothing inherently martial in it, but *information’s* language-games in the twentieth century have never strayed far from a mix of management, military, and machines. The two great technologies of the second world war—the computer and the Bomb—share more than a common origin in physical science. They share a common cultural space and symbolism. Information is often spoken of in nuclear terms: its half-life (as it decays like radioactive matter), it explodes if it fissions too fast, its molecular or granular quality. It shares semiotic space with subatomic physics, coming in bits, flashes, bursts, and impulses, and is often treated as mental photons: the minimal quanta of the cognitive stuff.

Both the Bomb and Information, moreover, cater to our pleasure in possible apocalypse, the exhilaration moderns (so used to the thrill of the new) feel in contemplating self-destruction. The end of the quest for novelty is death, the biggest bang of them all. Berman (1982) persuasively portrays modernity as the experience of everything solid melting into air. The Bomb is a means of accelerating the turnover in the realm of matter; information, of intellect. Both help to constantly revolutionize material and intellectual means of production. Both appeal to the love of absolute novelty, to the longing for those fresh beginnings and frontiers of various sorts that America specializes in. Information stands at the frontier of knowledge, while the Bomb sits at the outer edge of human history. Both are means for making the future different from the past. One stands at the latest, and the other at the last, moment of history.

How can information be compared with atomic weaponry? How can it be accused of being a means for wiping out the past? First, information (like its ancestor, sensation) inexorably decays. It resides in the “experiences” of the knowing subject, not in a fixed form in the world (it has been utterly dematerialized). Instead, information’s value is given in relation to time (its freshness or staleness) and its accuracy. New “information” does not enlarge or transform old information, but makes it obsolete. Information belongs to a very different economy than texts, which preserve meaning across all the ravages of time. When a library is thought of as containing information, then one has set up a discourse in which the obsolescence of texts is natural (anything older than ten years is worthless, said one teacher of mine). As Wallace Stevens wrote, “Beauty is momentary in the mind/The fitful tracing of a portal/But in the flesh it is immortal.” Perception is fleeting and variable, the tossed scenes one sees through the portal of a ship; while inscribed in some fleshly or material form—a text (Ricoeur, 1971)—it lasts. If human culture consists solely of information, it is made of an extraordinarily crumbly, granular, and short-lived stuff (Peters

1987). The resistances of texts to interpretation, and their power to engender many and conflicting readings, evaporates when they become information, the latest sensation in the eyes of the world brain. Information lacks history: it belongs only to the present moment and risks being made obsolete in the next.

Second, information minimizes the past as an influence on the present through its in-built ideology of progress. Information is the stuff of science, and science is (rightly) where this doctrine has taken strongest root. Max Weber (1946/1919, 138) suggested that scientist's greatest honor is to have his or her work outdated: "In science, each of us knows that what he has accomplished will be antiquated in ten, twenty, fifty years. That is the fate to which science is subjected; it is the very *meaning* of scientific work . . . Every scientific 'fulfillment' raises new 'questions'; it *asks* to be surpassed and outdated. Whoever wishes to serve science has to resign himself to this fact." Scientists who have learned their Protestant lessons of ascetism and self-denial sufficiently well will thus rejoice in the inevitable irrelevance of their work. No one can be immortal, but maybe each of us can at least be famous for fifteen minutes. Information inhabits a time zone which is empty and homogeneous, not open to the secret affinities between the present and past ages (Benjamin, 1968/1940). It is a strategy for detaching ourselves from the claims the past makes on us.

If one doubts the shared cultural space of information and nuclear war, consider an ad run by AT&T, one of the chief publicizers of the arrival of the "Information Age" (found, e.g., in *National Geographic*, May, 1983). The caption announces, "The way we see it, your home will never be the same again." A small boy, with baseball cap and newspaper-delivery bag, stands in front of a simple suburban frame house with a white picket fence (an imagery which places us immediately in the 1950s). The house is empty and nothing is seen save the glowing frame, which radiates a mysterious glow (electricity?) and casts a shadow in the direction of the boy. The sky is blood red, quite unlike any naturally-occurring sunset one is likely to see. Behind the house stands a tree, whose outline uncannily suggests a mushroom cloud. The scene is an education in the pleasures of self-destruction, all in the name of the coming information age. The house will "never be the same again" because it, like the frame houses that got destroyed in 1950s atomic tests, is about to go up in information smoke. AT&T offers a complete revolution in domestic space, with the home now a center of telecommuting, teleshopping, teleliving. No one, significantly, is inside the house in the picture. The ad's capsule narrative is a familiar one in science fiction and disaster movies: a child, away during the invasion or the cataclysm, returns to the wreckage to wonder what happened.

This ad shrewdly picks an imagery that cannot be topped for signalling the completeness and totality of the information revolution: nuclear disaster. But it also reveals the truth of the Information Age: centralization of world control in the computer-cable-satellite communications networks used by finance, commerce, and defense. It's no secret that much of the "information" that circulates about the globe is military, traveling on the same lines, computers, and satellites that are supposed to bring in a new age of peace and harmony. As Kittler (1987, 101) notes, the recent effort to replace copper communication lines with optical fibres can be read, at least in part, as an instance of strategic military planning: "Only the substitution of optical fibers for conducting cables can accommodate the enormous rates and volumes of bits that are presupposed, produced, and celebrated by electronic warfare." Moreover, he adds, a communications network of optical fibers will not be crippled when the Bombs go off, unlike one based on copper. The system, at least, will survive.

The concept of *information* does tantalize through its apparent ability to unify questions about mind, language, culture, and technology. It is both a key to the universe intellectually and a valuable commodity when making decisions in the modern world. But information does not inform us of its history, nor of its embeddedness in state and military apparatuses, nor of the direction of thought we are predestined to reenact when we use the word. Perhaps we are indeed on the brink of an information age, but whether we ought to rejoice or mourn is an open question. Perhaps letting history in-form us intelligently would be the genuine information revolution.

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