

F I V E

OF IDEAS AND DATA



IDEAS COME FIRST



In raising these questions about the place of the computer in our schools, it is not my purpose to question the value of information in and of itself. For better or worse, our technological civilization needs its data the way the Romans needed their roads and the Egyptians of the Old Kingdom needed the Nile flood. To a significant degree, I share that need. As a writer and teacher, I must be part of the 5 to 10 percent of our society which has a steady professional appetite for reliable, up-to-date information. I have long since learned to value the services of a good reference library equipped with a well-connected computer.

Nor do I want to deny that the computer is a superior means of storing and retrieving data. There is nothing sacred about the typed or printed page when it comes to keeping records; if there is a faster way to find facts and manipulate them, we are lucky to have it. Just as the computer displaced the slide rule as a calculating device, it has every right to oust the archive, the filing cabinet, the reference book, if it can prove itself cheaper and more efficient.

But I do want to insist that information, even when it moves at the speed of light, is no more than it has ever been: discrete little bundles of fact, sometimes useful, sometimes trivial, and never the substance of thought. I offer this modest, common-sense notion of information in deliberate contradiction to the computer enthusiasts

and information theorists who have suggested far more extravagant definitions. In the course of this chapter and the next, as this critique unfolds, it will be my purpose to challenge these ambitious efforts to extend the meaning of information to nearly global proportions. That project, I believe, can only end by distorting the natural order of intellectual priorities. And insofar as educators acquiesce in that distortion and agree to invest more of their limited resources in information technology, they may be undermining their students' ability to think significantly.

That is the great mischief done by the data merchants, the futurologists, and those in the schools who believe that computer literacy is the educational wave of the future: they lose sight of the paramount truth that *the mind thinks with ideas, not with information*. Information may helpfully illustrate or decorate an idea; it may, where it works under the guidance of a contrasting idea, help to call other ideas into question. But information does not create ideas; by itself, it does not validate or invalidate them. An idea can only be generated, revised, or unseated by another idea. A culture survives by the power, plasticity, and fertility of its ideas. Ideas come first, because ideas define, contain, and eventually produce information. The principal task of education, therefore, is to teach young minds how to deal with ideas: how to evaluate them, extend them, adapt them to new uses. This can be done with the use of very little information, perhaps none at all. It certainly does not require data processing machinery of any kind. An excess of information may actually crowd out ideas, leaving the mind (young minds especially) distracted by sterile, disconnected facts, lost among shapeless heaps of data.

It may help at this point to take some time for fundamentals.

The relationship of ideas to information is what we call a *generalization*. Generalizing might be seen as the basic action of intelligence; it takes two forms. *First*, when confronted with a vast shapeless welter of facts (whether in the form of personal perceptions or secondhand reports), the mind seeks for a sensible, connecting pattern. *Second*, when confronted with very few facts, the mind seeks to create a pattern by enlarging upon the little it has and pointing it in the direction of a conclusion. The result in either case is some general statement which is not in the particulars, but has been imposed upon them by the imagination. Perhaps, after more facts are gathered, the pattern falls apart or yields to another, more

convincing possibility. Learning to let go of an inadequate idea in favor of a better one is part of a good education in ideas.

Generalizations may take place at many levels. At the lowest level, they are formulated among many densely packed and obvious facts. These are cautious generalizations, perhaps even approaching the dull certainty of a truism. At another level, where the information grows thinner and more scattered, the facts less sharp and certain, we have riskier generalizations which take on the nature of a guess or hunch. In science, where hunches must be given formal rigor, this is where we find theories and hypotheses about the physical world, ideas that are on trial, awaiting more evidence to strengthen, modify, or subvert them. This is also the level at which we find the sort of hazardous generalizations we may regard as either brilliant insights or reckless prejudices, depending upon our critical response: sweeping statements perhaps asserted as unassailable truths, but based upon very few instances.

Generalizations exist, then, along a spectrum of information that stretches from abundance to near absence. As we pass along that spectrum, moving away from a secure surplus of facts, ideas tend to grow more unstable, therefore more daring, therefore more controversial. When I observe that women have been the homemakers and childminders in human society, I make a safe but uninteresting generalization that embraces a great many data about social systems past and present. But suppose I go on to say, "And whenever women leave the home and forsake their primary function as housewives, morals decline and society crumbles." Now I may be hard pressed to give more than a few questionable examples of the conclusion I offer. It is a risky generalization, a weak idea.

In Rorschach psychological testing, the subject is presented with a meaningless arrangement of blots or marks on a page. There may be many marks or there may be few, but in either case they suggest no sensible image. Then, after one has gazed at them for a while, the marks may suddenly take on a form which becomes absolutely clear. But where is this image? Not in the marks, obviously. The eye, searching for a sensible pattern, has projected it into the material; it has imposed a meaning upon the meaningless. Similarly in Gestalt psychology, one may be confronted with a specially contrived perceptual image: an ambiguous arrangement of marks which seems at first to be one thing but then shifts to become another. Which is the "true" image? The eye is free to choose between them, for they are

both truly there. In both cases—the Rorschach blots and the Gestalt figure—the pattern is in the eye of the beholder; the sensory material simply elicits it. The relationship of ideas to facts is much like this. The facts are the scattered, possibly ambiguous marks; the mind orders them one way or another by conforming them to a pattern of its own invention. *Ideas are integrating patterns* which satisfy the mind when it asks the question, What does this mean? What is this all about?

But, of course, an answer that satisfies me may not satisfy you. We may see different patterns in the same collection of facts. And then we disagree and seek to persuade one another that one or the other of these patterns is superior, meaning that it does more justice to the facts at hand. The argument may focus on this fact or that, so that we will seem to be disagreeing about particular facts—as to whether they really *are* facts, or as to their relative importance. But even then, we are probably disagreeing about ideas. For as I shall suggest further on, facts are themselves the creations of ideas.

Those who would grant information a high intellectual priority often like to assume that facts, all by themselves, can jar and unseat ideas. But that is rarely the case, except perhaps in certain turbulent periods when the general idea of “being skeptical” and “questioning authority” is in the air and attaches itself to any dissenting, new item that comes along. Otherwise, in the absence of a well-formulated, intellectually attractive, new idea, it is remarkable how much in the way of dissonance and contradiction a dominant idea can absorb. There are classic cases of this even in the sciences. The Ptolemaic cosmology that prevailed in ancient times and during the Middle Ages had been compromised by countless contradictory observations over many generations. Still, it was an internally coherent, intellectually pleasing idea; therefore, keen minds stood by the familiar old system. Where there seemed to be any conflict, they simply adjusted and elaborated the idea, or restructured the observations in order to make them fit. If observations could not be made to fit, they might be allowed to stand along the cultural sidelines as curiosities, exceptions, freaks of nature. It was not until a highly imaginative constellation of ideas about celestial and terrestrial dynamics, replete with new concepts of gravitation, inertia, momentum, and matter, was created that the old system was retired. Through the eighteenth and nineteenth centuries, similar strategies of adjustment were used to

save other inherited scientific ideas in the fields of chemistry, geology, and biology. None of these gave way until whole new paradigms were invented to replace them, sometimes with relatively few facts initially to support them. The minds that clung to the old concepts were not necessarily being stubborn or benighted; they simply needed a better idea to take hold of.

THE MASTER IDEAS



If there is an art of thinking which we would teach the young, it has much to do with showing how the mind may move along the spectrum of information, discriminating solid generalizations from hunches, hypotheses from reckless prejudices. But for our purposes here, I want to move to the far end of the spectrum, to that extreme point where the facts, growing thinner and thinner, finally vanish altogether. What do we find once we step beyond that point into the zone where facts are wholly absent?

There we discover the riskiest ideas of all. Yet they may also be the richest and most fruitful. For there we find what might be called the *master ideas*—the great moral, religious, and metaphysical teachings which are the foundations of culture. Most of the ideas that occupy our thinking from moment to moment are not master ideas; they are more modest generalizations. But from this point forward I will be emphasizing master ideas because they are always there in some form at the foundation of the mind, molding our thoughts below the level of awareness. I want to focus upon them because they bear a peculiarly revealing relationship to information, which is our main subject of discussion. *Master ideas are based on no information whatever.* I will be using them, therefore, to emphasize the radical difference between ideas and data which the cult of information has done so much to obscure.

Let us take one of the master ideas of our society as an example: *All men are created equal.*

The power of this familiar idea will not be lost on any of us. From it, generations of legal and philosophical controversy have arisen, political movements and revolutions have taken their course.

It is an idea that has shaped our culture in ways that touch each of us intimately; it is part, perhaps the most important part, of our personal identity.

But where did this idea come from? Obviously not from some body of facts. Those who created the idea possessed no more information about the world than their ancestors, who would, doubtless, have been shocked by such a pronouncement. They possessed far less information about the world than we in the late twentieth century may feel is necessary to support such a sweeping, universal statement about human nature. Nevertheless, those who shed their blood over the generations to defend that assertion (or to oppose it) did not do so on the basis of any data presented to them. The idea has no relationship whatever to information. One would be hard pressed even to imagine a line of research that might prove or disprove it. Indeed, where such research has been attempted (for example by inveterate IQ theorists), the result, as their critics are always quick to point out, is a hopeless distraction from the real meaning of the idea, which has nothing to do with measurements or findings, facts or figures of any kind. The idea of human equality is a statement about the essential worth of people in the eyes of their fellows. At a certain juncture in history, this idea arose in the minds of a few morally impassioned thinkers as a defiantly compassionate response to conditions of gross injustice that could no longer be accepted as tolerable. It spread from the few to the many; finding the same insurgent response in the multitude, it soon became the battle cry of an era. So it is with all master ideas. They are born, not from data, but from absolute conviction that catches fire in the mind of one, of a few, then of many as the ideas spread to other lives where enough of the same experience can be found waiting to be ignited.

Here are some more ideas, some of them master ideas, each of which, though condensed in form, has been the theme of countless variations in the philosophy, religious belief, literature, and jurisprudence of human society:

Jesus died for our sins.

The Tao that can be named is not the true Tao.

Man is a rational animal.

Man is a fallen creature.

Man is the measure of all things.

The mind is a blank sheet of paper.

The mind is governed by unconscious instincts.

The mind is a collection of inherited archetypes.

God is love.

God is dead.

Life is a pilgrimage.

Life is a miracle.

Life is a meaningless absurdity.

At the heart of every culture we find a core of ideas like these, some old, some new, some rising to prominence, some declining into obsolescence. Because those I list here in terse formulations are verbal ideas, they might easily be mistaken for intended statements of fact. They have the same linguistic form as a point of information, like “George Washington was the first president of the United States.” But of course they are not facts, any more than a painting by Rembrandt is a fact, or a sonata by Beethoven, or a dance by Martha Graham. For these too are ideas; they are integrating patterns meant to declare the meaning of things as human beings have discovered it by way of revelation, sudden insight, or the slow growth of wisdom over a lifetime. Where do these patterns come from? The imagination creates them from *experience*. Just as ideas order information, they also order the wild flux of experience as it streams through us in the course of life.

This is the point Fritz Machlup makes when he observes a striking difference between “information” and “knowledge.” (He is using “knowledge” here in exactly the same way I am using “idea”—as an integrating pattern.) “Information” he tells us, “is acquired by being told, whereas knowledge can be acquired by thinking.”

Any kind of experience—accidental impressions, observations, and even “inner experience” not induced by stimuli received from the environment—may initiate cognitive processes leading to changes in a person’s knowledge. Thus, *new knowledge can be acquired without new information being*

received. (That this statement refers to subjective knowledge goes without saying; but there is no such thing as objective knowledge that was not previously somebody's subjective knowledge.)¹

Ideas, then—and especially master ideas—give order to experience. They may do this in deep or shallow ways; they may do it nobly or savagely. Not all ideas are humane; some, which bid to become master ideas and may succeed, are dangerous, vile, destructive. Hitler's *Mein Kampf* is a book filled with toxic ideas that were born of vengefulness and resentment. Yet they became, for a brief interval, the master ideas of one troubled society. No one who ever read that book and hated it did so because they thought the author had gotten some of his facts wrong; no one who ever read it and loved it cared about the accuracy of its information. The appeal of the book, whether accepted or rejected, was pitched at a different level of the mind.

Here are some more ideas that, at least in my view, are just as toxic:

Society is the war of each against all.

Self-interest is the only reliable human motivation.

Let justice be done though the heavens fall.

The only good Indian is a dead Indian.

Nice guys finish last.

The end justifies the means.

My country right or wrong.

It is precisely because some ideas—many ideas—are brutal and deadly that we need to learn how to deal with them adroitly. An idea takes us into people's minds, ushers us through their experience. Understanding an idea means understanding the lives of those who created and championed it. It means knowing their peculiar sources of inspiration, their limits, their vulnerabilities and blind spots. What our schools must offer the young is an education that lets them make that journey through another mind in the light of other ideas, including some that they have fashioned for themselves from their own

experience. The mind that owns few ideas is apt to be crabbed and narrow, ungenerous and defensive in its judgments. “Nothing is more dangerous than an idea,” Emil Chartier once said, “when it is the only one we have.”

On the other hand, the mind that is gifted with many ideas is equipped to make its evaluations more gracefully. It is open and welcoming to its own experience, yet capable of comparing that experience discriminately with the lives of others, and so choosing its convictions with care and courtesy.

EXPERIENCE, MEMORY, INSIGHT



One of the major liabilities of the data processing model of thought is the way in which it coarsens subtle distinctions in the anatomy of the mind. The model may do this legitimately in order to simplify for analytical purposes; all scientific models do that. But there is always the danger—and many computer scientists have run afoul of it—that the model will become reified and be taken seriously. When that happens on the part of experts who should know better, it can actually falsify what we know (or should know) about the way our own minds work.

Take, for example, the significant interplay between experience, memory, and ideas, which is the basis of all thought. I have been using the word *experience* here to refer to the stream of life as it molds the personality from moment to moment. I use the word as I believe most artists would use it; more specifically, it is experience as it would be reflected in the literary technique called stream of consciousness.

Experience in this sense is the raw material from which moral, metaphysical, and religious ideas are fashioned by the mind in search of meaning. This may seem like an imprecise definition, especially to those of an empiricist inclination. In the empiricist tradition “experience” has come to be the equivalent of information. It is the sensory data which we collect in neat, well-packaged portions to test propositions about the world in a strictly logical way. When the empiricist philosophers of the seventeenth and eighteenth centuries defined experience in this way, they were in search of a form of

knowledge that would serve as an alternative to statements that were meant to be accepted on the basis of authority, hearsay, tradition, revelation, or pure introspective reasoning. Experience was intended to be that kind of knowledge which was firsthand and personally tested. It was also meant to be available for inspection by others through *their* experience. Hence, it was *public* knowledge and, as such, free of obfuscation or manipulation. This, so the empiricists argued, was really the only kind of knowledge worth having. Unless all the rest could be verified by experience, it probably did not deserve to be regarded as knowledge at all.

But experience of the kind the empiricists were after is actually of a very special, highly contrived variety. Modeled upon laboratory experimentation or well-documented, professional research, it exists almost nowhere except in the world of science—or possibly as evidence in a court of law. We do not normally collect much experience of this sort. Rather, we ordinarily take in the flow of events as life presents it—unplanned, unstructured, fragmentary, dissonant. The turbulent stream passes into memory where it settles out into things vividly remembered, half remembered, mixed, mingled, compounded. From this compost of remembered events, we somehow cultivate our private garden of certainties and convictions, our rough rules-of-thumb, our likes and dislikes, our tastes and intuitions and articles of faith.

Memory is the key factor here; it is the register of experience where the flux of daily life is shaped into the signposts and standards of conduct. Computers, we are told, also have “memories,” in which they store information. But computer memory is no more like human memory than the teeth of a saw are like human teeth; these are loose metaphors that embrace more differences than similarities. It is not the least of its liabilities that the cult of information obscures this distinction, to the point of suggesting that computer memory is superior because it remembers so much more. This is precisely to misinterpret what experience is and how it generates ideas. Computers “remember” things in the form of discrete entries: the input of quantities, graphics, words, etc. Each item is separable, perhaps designated by a unique address or file name, and all of it subject to total recall. Unless the machine malfunctions, it can regurgitate everything it has stored exactly as it was entered, whether a single number or a lengthy document. That is what we expect of the machine.

Human memory, on the other hand, is the invisible psychic ad-

hesive that holds our identity together from moment to moment. This makes it a radically different phenomenon from computer memory. For one thing, it is fluid rather than granular, more like a wave than a particle. Like a wave, it spreads through the mind, puddling up here and there in odd personal associations that may be of the most inexplicable kind. It flows not only through the mind, but through the emotions, the senses, the body. We remember things as no computer can—in our muscles and reflexes: how to swim, play an instrument, use a tool. These stored experiences lodge below the level of awareness and articulation so that there is no way to tell someone how we drive a car or paint a picture. We don't actually "know" ourselves. In an old bit of folk wisdom, the daughter asks her mother how she bakes such a good apple pie. The mother, stymied, replies: "First I wash my hands. Then I put on a clean apron. Then I go into the kitchen and bake a good apple pie."

Moreover, where we deal with remembered experience, there is rarely total recall. Experiences may be there, deeply buried in our brain and organism, but they are mostly beyond recollection. Our memory is rigorously selective, always ready to focus on what matters to us. It edits and compacts experience, represses and forgets—and it does this in ways we may never fully understand. As we live through each present moment, something immediately before us may connect with experiences that call up vivid sensory associations, pains, pleasures; these in turn may make us laugh, they may leave us sad, they may bring us to the point of nausea or deep trauma. Some of what we have experienced and stored away in memory may derive from our speechless childhood; some may be phantoms of prenatal recollection. Much is drawn from private fantasies never reported to anyone, hardly admitted to ourselves.

We may say that we remember what "interests" us; but we may also perversely conceal or recompose things that are too threatening to face. The recollections we retain are mysteriously selected, enigmatically patterned in memory. There are hot bright spots filled with rich and potent associations; there are shadowed corners which may only emerge vividly in dreams or hallucinations; there are odd, quirky zones that delight to fill up with seemingly useless, chaotic remnants—things we remember without knowing why, even items (insistent song lyrics, irritating advertising jingles) we would just as soon erase if we could . . . but we can't. If we could draw a full anatomy of memory in all its elusive variety, we would have the

secret of human nature itself. The shape of memory is quite simply the shape of our lives; it is the self-portrait we paint from all we have experienced. It is not the computer scientist but a literary artist like Vladimir Nabokov who can tell us most about the strange dynamics of experience. He writes:

A passerby whistles a tune at the exact moment that you notice the reflection of a branch in a puddle which in its turn and simultaneously recalls a combination of damp leaves and excited birds in some old garden, and the old friend, long dead, suddenly steps out of the past, smiling and closing his dripping umbrella. The whole thing lasts one radiant second and the motion of impressions and images is so swift that you cannot check the exact laws which attend their recognition, formation, and fusion. . . . It is like a jigsaw puzzle that instantly comes together in your brain with the brain itself unable to observe how and why the pieces fit, and you experience a shuddering sensation of wild magic.²

Experience, as Nabokov describes it here, is more like a stew than a filing system. The ingredients of a lifetime mix and mingle to produce unanticipated flavors. Sometimes a single piquant component—a moment of joy, a great sorrow, a remembered triumph or defeat—overpowers all the rest. In time, this stew boils down to a rich residue of feelings, general impressions, habits, expectations. Then, in just the right circumstance—but who can say what this will be?—that residue bubbles up into a well-formed insight about life which we may speak or paint or dance or play out for the world to know. And this becomes, whether articulately or as an unspoken existential gesture, an *idea*. Certainly, this has much to do with the climate of opinion in which we find ourselves, the traditions we share, the autobiographical momentum of our lives. But how these will combine in any given mind at any given moment and what they will produce is wholly beyond prediction. The stew of personal experience is too thick, too filled with unidentifiable elements mixed in obscure proportions. What emerges from the concoction can be genuinely astonishing. Which is only to observe what all culture tells us about ourselves: that we are capable of true originality. History teems with such marvelous examples of invention and startling con-

version. Paul of Tarsus struck blind on the road to Damascus rises from the trauma to become the disciple of a savior he had never met and whose followers he had persecuted; Tolstoy, falling into an episode of suicidal depression, disowns his literary masterworks and strives to become an ascetic hermit; Gandhi, driven from the white-only compartment of a South African train, renounces his promising legal career to don a loincloth and become the crusading mahatma of his people. This is experience at work, mysteriously shaping new ideas about life in the depths of the soul.

So too all of us, as we bear witness to the emerging convictions of others, confront what they say and do with the full force of our experience. If there is a confirming resonance within us, it may be because our lives have overlapped those we encounter. But it may also be that the power of the encounter in itself—then and there in a single moment—shatters the convictions of a lifetime, and we have the sense of beginning anew, of being reborn. For there are such instances of people being unmade and remade by charismatic confrontation and the pressures of crisis. It may even be the case that these gifts of originality and sudden conversion play a crucial evolutionary role in the growth of culture. Perhaps this volatility of mind is what saves human society from the changeless rigidity of the other social animals, the ants, the bees, the beasts of the pack and the herd. We are gifted as a species with a crowning tangle of electrochemical cells which has become an idea-maker. So spontaneously does this brain of ours make ideas and play with ideas that we cannot say much more about them than that they are there, shaping our perceptions, opening up possibilities. From moment to moment, human beings find new things to think and do and be: ideas that erupt seemingly from out of nowhere. We are remarkably plastic and adaptable animals, and the range of our cultural creativity seems unlimited. It would be a great loss if, by cheapening our conception of experience, memory, and insight, the cult of information blunted these creative powers.

There are computer scientists who seem well on their way toward doing that, however. They believe they can simulate our originality on the computer by working out programs that include a randomizing element. (The Logo program for poetry which we reviewed in the previous chapter is an example of this.) Because this makes the output of the program unpredictable, it has been identified as “cre-

ative.” But there is all the difference in the world between such contrived randomness and true originality. Again, the data processing model works to obscure the distinction. In the human mind, an original idea has a living meaning; it connects with experience and produces conviction. What the computer produces is “originality” at about the level of a muscular spasm; it is unpredictable, but hardly meaningful.

Of course, there are other forms of experience that come to us more neatly packaged and labeled: things learned by rote or memorized verbatim, precise instructions, procedures, names, addresses, facts, figures, directions. What such experiences leave behind is much like what fills computer memory: *information* in the proper sense of the term. Our psychological vocabulary does not clearly distinguish these different levels and textures of memory; we have simply the one word for the remembrance of things past. We *remember* a phone number; we *remember* an episode of traumatic suffering that changed our lives. To sweep these different orders of experience under the rubric *information* can only contribute to cheapening the quality of life.

“The heart has its reasons,” Pascal tells us, “which reason cannot know.” I would take this to mean that the minds of people are filled with ideas which well up from deep springs of mixed and muddled experience. Yet these ideas, hazy, ambiguous, contradictory as they may be, can be, for better or worse, the stuff of strong conviction. In a debate that involves such “reasons,” information is rarely of much use. Instead, we must test and sample in the light of our own convictions, seeking the experience that underlies the idea. We must do what I dare say you are doing now as you read these words, which are convictions of mine presented for your consideration. You pause, you reflect, probing to discover what my moral and philosophical loyalties might be. As you try to get the *feel* of the ideas I offer, you cast about in your recollections to see if you can find there an echo of the experiences I draw upon. You may loiter more over nuances and shades of meaning than over matters of fact. Here and there you may detect distant implications or hidden assumptions that you may or may not care to endorse. Possibly you sense that some of your fondest values are challenged and you hasten to defend them.

There is no telling how this critical rumination will turn out, but one thing should be obvious: none of this is “data processing.” It is the give and take of dialogue between two minds, each drawing upon

its own experience. It is the play of ideas, and all the information in all the data bases in the world will not decide the issues that may stand disputed between us.

THE EMPIRICIST GAMBIT



Once they focus on the matter, many people will find the primacy of ideas so obvious that they may wonder why it has to be raised as a bone of contention at all. How have the computer scientists managed to subordinate ideas to data so persuasively? This is an intriguing historical question to which we might do well to give some attention.

Earlier in this chapter, I made reference to the empiricist school of philosophy and the way in which it has chosen to reinterpret the meaning of experience. Let us return for a moment to the impact of empiricism upon Western philosophy, for it plays a significant role in the cult of information.

Some four centuries ago, in that turbulent transitional zone that leads from the Renaissance to the modern period, the realm of knowledge in the Western world was a relatively small island of certainty surrounded by a sea of accepted mystery. At its far, unfathomable reaches, that sea merged with the mind of God, the contents of which might only be approached by an act of faith. On the island, the major bodies of thought were the scriptures, the works of the Church fathers, a handful of surviving Greek and Roman masters, and possibly a small select group of Jewish and Arab thinkers. Over several centuries of the medieval period, these sources had been worked up, often by way of brilliant elaborations, into an august repertory of knowledge that was held to answer all the questions the human mind could expect to have answered.

In such a culture, there is no such category as “information”; facts count for very little where whatever can be known is already known and has been assimilated to well-known truths. Instead of information there is confabulation: constant, sometimes inspired play with familiar ideas that are extended, combined, reshaped. By the latter part of the sixteenth century, this intellectual style was becoming more and more incompatible with the social and economic dynamism of Western society. For one thing—a dramatic thing—

new worlds were being discovered, whole continents and cultures that were unaccounted for by any existing authority. These were *discoveries*. And if there could be geographical discoveries, then why not new worlds of the mind as well? Francis Bacon used just that comparison to justify his restless quest for a “New Philosophy.” He, Descartes, Galileo, Giordano Bruno were among the first to match their culture’s expansive passion for physical discovery with a corresponding intellectual daring.

These seminal minds of the seventeenth century hit upon an exciting cultural project. Their proposition was this: Let us devise a kind of inquiry which will have the power to discover *new things* about the world—about its forces, and structures, and phenomena. This will be a way of thinking that will be the equivalent of the great voyages of discovery that have found new worlds across the seas. This style of inquiry, they decided, should involve rigorous, well-targeted interrogation of nature by close observation and experimentation. It should be undertaken in a spirit of total objectivity, avoiding all assumptions and presuppositions. It should simply try to see things as they really are. The result of this new method will be a growing body of solid, reliable facts, usually measurements, which have heretofore been overlooked. Then, if an observer sets about scrupulously collecting these facts, they will eventually speak for themselves, shaping themselves into great truths as vast in their scope as the size of the whole universe.

We can now recognize this method (the *novum organum*, as Bacon called it) as the distant beginning of the modern scientific world view. No one can fail to appreciate its historical contribution; but we also have enough historical perspective to know how very misconceived that method was. In its narrow focus on facts, it left out of account the crucial importance of theoretical imagination, hypothesis, speculation, and inspired guesswork—without which science would not have had its revolutionary impact. Looking back from our vantage point, we can clearly see theoretical imagination at work in the minds of Galileo, Newton, Kepler, Boyle, Hook, contours of thought which were there but which they were too close to notice. We have learned that great scientific breakthroughs are never assembled piecemeal from lint-picking research. At times, limited, fine-grained investigation may succeed in raising important doubts about a scientific theory; but it must at least have that theory before it as a target or a baseline. Without some master idea that

serves that function, one would not know where to begin looking for facts. Science is structured inquiry, and the structures that guide its progress are ideas.

There was, however, a good reason why the founding fathers of modern science should have erred in the direction of overvaluing facts at the expense of ideas. In Galileo's day, the dominant ideas about nature were derived from a few sacrosanct authorities—either Christian theology or Aristotle. In order to free themselves from this increasingly restrictive heritage of tired, old ideas, these daring minds were moved to call *ideas themselves* into question. So they recommended a new point of departure, one which seemed innocuously neutral and therefore strategically inoffensive to the cultural authorities of the day: they would concentrate their attention on the clear-cut indisputable facts of common experience—the weights and sizes and temperatures of things. Facts first, they insisted. Ideas later. And this proved to be a persuasive approach. It brought to light any number of terrestrial and astronomical novelties that could not be adequately explained by Aristotle, the Bible, the Church fathers—or perhaps had never been noticed by them at all. If the mission of the early empiricists is viewed in its historical context, it can be recognized as a clever philosophical gambit whose purpose was to break down ethnocentric barriers and ecclesiastical authority. In this, it finally succeeded. By encouraging a bold skepticism about all inherited ideas, it liberated the restricted intellectual energies of Western society. Its connection with the birth of modern science will always endow it with a special status.

The trouble is, the very success of the empiricists has helped to embed a certain fiercely reductionistic conception of knowledge in our culture, one that drastically undervalues the role of the imagination in the creation of ideas, and of ideas in the creation of knowledge, even in the sciences. In our time, minds loyal to the empiricist love of fact have seized upon the computer as a model of the mind at work storing up data, shuffling them about, producing knowledge, and potentially doing it better than its human original. Those who see the world more or less in this way represent one pole in an argument which had already been joined in the days of Plato, Aristotle, and Democritus. Which is more “real,” things or the ideas we have of things? Does knowledge begin in the senses or in the mind?

It is hardly my intention to try to adjudicate that argument here. I only wish to emphasize that the data processing model of the mind

is not some purely objective “finding” of contemporary science. It grows from a definite philosophical commitment; it represents one side in an ancient debate, still with us and still unsettled. The empiricist side of that debate deserves to be respected for the rich contribution it has made to our philosophical heritage. We would not want to do without it. But I have found it interesting, whenever I am in the company of those who hold a rigorously empirical position, to remind them of a paradox: their viewpoint is itself an *idea*. It is an idea about ideas . . . and about knowledge, experience, and truth. As such, it is not based on fact or information, because it is this very idea which defines information in the first place. There is ultimately no way around ideas, then. They are what the mind thinks with, even when it is attacking the primacy of ideas.

For that matter, the computer is also an idea, just as all machines are. It is an idea about number, and classification, and relationship—all realized in the form of a physical invention. The proposition that the mind thinks like a computer is an idea about the mind, one that many philosophers have taken up and debated. And like every idea, this idea also can be *gotten outside of*, looked at from a distance, and called into question. The mind, unlike any computer anyone has even imagined building, is gifted with the power of irrepressible self-transcendence. It is the greatest of all escape artists, constantly eluding its own efforts at self-comprehension. It can form ideas about its own ideas, including its ideas about itself. But having done that, it has already occupied new ground; in its next effort to understand its own nature, it will have to reach out still further. This inability of the mind to capture its own nature is precisely what makes it impossible to invent a machine that will be the mind’s equal, let alone its successor. The computer can only be one more idea in the imagination of its creator. Our very capacity to make jokes about computers, to spoof and mock them, arises from our intellectual distance from them. If there is anything that frustrates the technician’s talent, it is open-ended potentiality.

 NO IDEAS, NO INFORMATION



From the viewpoint of the strict, doctrinaire empiricism which lingers on in the cult of information, the facts speak for themselves. Accumulate enough of them, and they will conveniently take the shape of knowledge. But how do we recognize a fact when we see one? Presumably, a fact is not a mental figment or an illusion; it is some small, compact particle of truth. But to collect such particles in the first place, we have to know what to look for. There has to be the idea of a fact.

The empiricists were right to believe that facts and ideas are significantly connected, but they inverted the relationship. *Ideas create information*, not the other way around. Every fact grows from an idea; it is the answer to a question we could not ask in the first place if an idea had not been invented which isolated some portion of the world, made it important, focused our attention, and stimulated inquiry.

Sometimes an idea becomes so commonplace, so much a part of the cultural consensus, that it sinks out of awareness, becoming an invisible thread in the fabric of thought. Then we ask and answer questions, collecting information without reflecting upon the underlying idea that makes this possible. The idea becomes as subliminal as the grammar that governs our language each time we speak.

Take an example. The time of day, the date. These are among the simplest, least ambiguous facts. We may be right or wrong about them, but we know they are subject to a straightforward true or false decision. It is either 2:15 P.M. in our time zone, or it is not. It is either March 10, or it is not. This is information at its most irreducible level.

Yet behind these simple facts, there lies an immensely rich idea: the idea of time as a regular and cyclical rhythm of the cosmos. Somewhere in the distant past, a human mind invented this elegant concept, perhaps out of some rhapsodic or poetic contemplation of the bewilderingly congested universe. That mind decided the seemingly shapeless flow of time can be ordered in circles, the circles can be divided into equal intervals, the intervals can be counted. From this insight, imposed by the imagination on the flux of experience,

we derive the clock and the calendar, the minutes, days, months, seasons we can now deal with as simple facts.

Most of our master ideas about nature and human nature, logic and value eventually become so nearly subliminal that we rarely reflect upon them as human inventions, artifacts of the mind. We take them for granted as part of the cultural heritage. We live off the top of these ideas, harvesting facts from their surface. Similarly, historical facts exist as the outcroppings of buried interpretive or mythic insights which make sense of, give order to the jumbled folk memory of the past. We pick up a reference book or log on to a data base and ask for some simple information. When was the Declaration of Independence signed and who signed it? Facts. But behind those facts there lies a major cultural paradigm. We date the past (not all societies do) because we inherit a Judeo-Christian view of the world which tells us that the world was created in time and that it is getting somewhere in the process of history. We commemorate the names of people who “made history” because (along other lines) we inherit a dynamic, human-centered vision of life which convinces us that the efforts of people are important, and this leads us to believe that worthwhile things can be accomplished by human action.

When we ask for such simple points of historical information, all this stands behind the facts we get back as an answer. We ask and we answer the questions within encompassing ideas about history which have become as familiar to us as the air we breathe. But they are nonetheless human creations, each capable of being questioned, doubted, altered. The dramatic turning points in culture happen at just that point—where new idea rises up against old idea and judgment must be made.

What happens, then, when we blur the distinction between ideas and information and teach children that information processing is the basis of thought? Or when we set about building an “information economy” which spends more and more of its resources accumulating and processing facts? For one thing, we bury even deeper the substructures of ideas on which information stands, placing them further from critical reflection. For example, we begin to pay more attention to “economic indicators”—which are always convenient, simple-looking numbers—than to the assumptions about work, wealth, and well-being which underlie economic policy. Indeed, our orthodox economic science is awash in a flood of statistical figments

that serve mainly to obfuscate basic questions of value, purpose, and justice. What contribution has the computer made to this situation? It has raised the flood level, pouring out misleading and distracting information from every government agency and corporate boardroom. But even more ironically, the hard focus on information which the computer encourages must in time have the effect of crowding out new ideas, which are the intellectual source that generates facts.

In the long run, no ideas, no information.