CHAPTER 16

Memory and the Individual Soul: Against Silly Reductionism

Science cannot solve the ultimate mystery of Nature. And it is because in the last analysis we ourselves are part of the mystery we are trying to solve.

Max Planck

If I had to live over again, I'd live over a delicatessen.

—Woody Allen

From the last quarter of the seventeenth century to the last decade of the eighteenth, an explosion of creativity called the Enlightenment changed the history of ideas. Its reigning views were many, but above all it was dedicated to reason, to science, and to human freedom and individuality. Its underlying science was physics, the system of Newton, and its philosophy of society was, in large measure, that of Locke. Yet the Enlightenment ideas of causality and determinism, along with its mechanistic view of science, undermined hopes for a theory of human action based on freedom. If we are determined by natural forces—by mechanism—we cannot easily put together a consistent picture in which a free individual makes moral choices. Moreover, while the ideas of the Enlightenment paid much attention to the role of reason and culture in such choices, there was no general notion of how deeply the minds of all humans (including those of "reasonable" human beings—that is, the "cultured") were influenced by unconscious forces and by emotion.

Whatever forms it took at various times and places, the overriding Enlightenment view was a secular one that forged many of the ideas underlying modern democracy. But despite its valuable heritage, the Enlightenment is over. The first great blow to its ideas came with Hume's damaging attacks on both rationalism and the notion of human progress as linked to natural science. Its major fault was its inability to create an adequate scientific description of a human individual to accompany its description of a machinelike universe. Its social failure was its inability to go beyond the concept of a society composed of self-seeking, commercially successful individuals with a shallow view of "humanism." Certainly, Enlightenment thinkers attempted to provide us with a larger, more inspiring view of ourselves. But its science was a mechanistic physics and it had no body of data or ideas with which to link the world, the mind, and society in the style of scientific reason to which it aspired. Whatever the Enlightenment's failures and inconsistencies, however, it left us with high hopes for the place of the individual in society.

Can we expect to do better with a sound scientific view of mind? In this chapter I hope to show that the kind of reductionism that doomed the thinkers of the Enlightenment is confuted by evidence that has emerged both from modern neuroscience and from modern physics. I have argued that a person is not explainable in molecular, field theoretical, or physiological terms alone. To reduce a theory of an individual's behavior to a theory of molecular interactions is simply silly, a point made clear when one considers how many different levels of physical, biological, and social interactions must be put into place before higher-order consciousness emerges. The brain is made up of 10^{11} cells with at least 10^{15} connections. Each cell has a fantastically intricate regulatory biochemistry constrained by particular sets of genes. These cells come together during morphogenesis and exchange signals in a place-dependent fashion to make a body and a brain with enormous numbers of control loops, all obeying the homeostatic mechanisms that govern survival. Selection on neuronal repertoires leads to changes in myriad synapses as cells die or differentiate. An animal's survival and motion in the world allow perceptual and conceptual categorization to occur continually in global mappings. Memory dynamically interacts with perceptual categorization by reentry. Learning involving the connection of categorization to value (in its most subtle form within a speech community) links symbolic and semantic abilities to conceptual centers that already provide embodied structures for the building of meaning.

A calculation of the significant molecular combinations of such a sequence of events, even in identical twins, is almost impossible, and in any

case, useless. The mappings are many—many, and the processes are individual and irreversible. I wonder what Enlightenment humanists would have made of all this. Diderot, who as we saw in chapter 3 speculated about the nervous system of his friend in *Le Rêve de d'Alembert*, might have been pleased. Diderot's view of human consciousness opened up the possibility that to be human was to go beyond mere physics.

I have taken the position that there can be no complete science, and certainly no science of human beings, until consciousness is explained in biological terms. Given our view of higher-order consciousness, this also means an account that explains the bases of how we attain personhood or selfhood. By selfhood I mean not just the individuality that emerges from genetics or immunology, but the personal individuality that emerges from developmental and social interactions.

Selfhood is of critical philosophical importance. Some of the problems related to it may be sharpened by the selectionist view I have taken on the matter of mind. Please remember, however, that no scientific theory of an individual self can be given (our qualia assumption). Nonetheless, I believe that we can progress toward a more complete notion of the free individual, a notion that is essential to any philosophical theory concerned with human values.

The issues I want to deal with are concerned with the relationship between consciousness and time, with the individual and the historical aspects of memory, and with whether our view of the thinking conscious subject alters our notion of causality. I also want to discuss briefly the connection between emotions and our ideas of embodied meaning. All of these issues ultimately bear upon the matter of free will and therefore upon morality under mortal conditions.

According to the extended TNGS, memory is the key element in consciousness, which is bound up with continuity and different time scales. There is a definite temporal element in perceptual categorization, and a more extended one in setting up a conceptually based memory. The physical movements of an animal drive its perceptual categorization, and the creation of its long-term memory depends on temporal transactions in its hippocampus. As we have seen, the Jamesian properties of consciousness may be derived from the workings of such elements. But in human beings, primary consciousness and higher-order consciousness coexist, and they each have different relations to time. The sense of time past in higher-order consciousness is a *conceptual* matter, having to do with previous orderings of categories in relation to an immediate present driven by primary consciousness. Higher-order consciousness is based not on ongoing experience, as is primary consciousness, but on the ability to model

the past and the future. At whatever scale, the sense of time is first and foremost a conscious event.

The ideas of consciousness and "experienced" time are therefore closely intertwined. It is revealing to compare the definition of William James, who stated that consciousness is something the meaning of which "we know as long as no one asks us to define it," with the reflections of St. Augustine, who wrote in his *Confessions*, "What then is time? If no one asks me, I know what it is. If I wish to explain to him who asks me, I do not know." The notion of continuity in personal, historical, and institutional time was a central one in Augustine's thought.

Time involves succession. An intriguing suggestion about the connection between time and the idea of numbers has come from L. E. J. Brouwer, a proponent of intuitionism in mathematics. He suggests that all mathematical elements (and particularly the sequence of natural numbers) come from what he calls "two-icity." Two-icity is the contrast between ongoing conscious experience (with primary consciousness as a large element) and the direct awareness of past experience (requiring higher-order consciousness). What is intriguing about this is that it suggests that one's concept of a number may arise not simply from perceiving sets of things in the outside world. It may also come from inside—from the intuition of two-ness or two-icity plus continuity. By recursion, one may come to the notion of natural numbers.

Whatever the origins of such abstractions, the personal sense of the sacred, the sense of mystery, and the sense of ordering and continuity all have connections to temporal continuity as we experience it. We experience it as individuals, each in a somewhat different way.

Indeed, the flux of categorization, whether in primary or higher-order consciousness, is an individual and irreversible one. It is a history. Memory grows in one direction; with verbal means, the sense of duration is yet another form of categorization. This view of time is distinguishable from the relativistic notion of clock time used by physicists, which is, in the microscopic sense, reversible. Aside from the variation and irreversibility of *macroscopic* physical events recognized by physicists, a deep reason for the irreversibility of individually experienced time lies in the nature of selective systems. In such systems, the emergence of pattern is *ex post facto*. Given the diversity of the repertoires of the brain, it is extremely unlikely that any two selective events, even apparently identical ones, would have identical consequences. Each individual is not only subject, like all material systems, to the second law of thermodynamics, but also to a multilayered set of irreversible selectional events in his or her perception and memory. Indeed, selective systems are by their nature irreversible.

This "double exposure" of a person—to real-world alterations affecting nonintentional objects as well as to individual historical alterations in his or her memory as an intentional subject—has important consequences. The flux of categorizations in a selective system leading to memory and consciousness alters the ordinary relations of causation as described by physicists. A person, like a thing, exists on a world line in four-dimensional spacetime. But because individual human beings have intentionality, memory, and consciousness, they can sample patterns at one point on that line and on the basis of their personal histories subject them to plans at other points on that world line. They can then enact these plans, altering the causal relations of objects in a definite way according to the structures of their memories. It is as if one piece of spacetime could slip and map onto another piece. The difference, of course, is that the entire transaction does not involve any unusual piece of physics, but simply the ability to categorize, memorize, and form plans according to a conceptual model. Such an historical alteration of causal chains could not occur in so rich a way in any combination of inanimate nonintentional objects, for they lack the appropriate kind of memory. This is an important point in discriminating biology from physics, an issue I discuss further in chapter 20.

In certain memorial systems, unique historical events at one scale have causal significance at a very different scale. If the sequence of an ancient ancestor's genetic code was altered as a result of that ancestor's travels through a swamp (driven, say, by climatic fluctuations), the altered order of nucleotides, if it contributed to fitness, could influence present-day selectional events and animal function. Yet the physical laws governing the actual *chemical* interaction of the genetic elements making up the code (the nucleotides) are deterministic. No deterministic laws at the chemical level could alone, however, explain the *sustained* code change that was initiated and then stabilized over long periods as a result of complex selectional events on whole animals in unique environments.

Memorial events in brains undergoing selectional events are of the same ilk. Because the environment being categorized is full of novelty, because selection is *ex post facto,* and because selection occurs on richly varied historical repertoires in which different structures can produce the same result, many degrees of freedom exist. We may safely conclude that, in a multilevel conscious system, there are even greater degrees of freedom. These observations argue that, for systems that categorize in the manner that brains do, there is macroscopic indeterminacy. Moreover, given our previous arguments about the effects of memory on causality, consciousness permits "time slippage" with planning, and this changes how events come into being.

Even given the success of reductionism in physics, chemistry, and molecular biology, it nonetheless becomes silly reductionism when it is applied exclusively to the matter of the mind. The workings of the mind go beyond Newtonian causation. The workings of higher-order memories go beyond the description of temporal succession in physics. Finally, individual selfhood in society is to some extent an historical accident.

These conclusions bear on the classical riddle of free will and the notion of "soft determinism," or compatibilism, as it was called by James Mill. If what I have said is correct, a human being has a degree of free will. That freedom is not radical, however, and it is curtailed by a number of internal and external events and constraints. This view does not deny the influence of the unconscious on behavior, nor does it underestimate how small biochemical changes or early events can critically shape an individual's development. But it does claim that the strong psychological determinism proposed by Freud does not hold. At the very least, our freedom is in our grammar.

These reflections, and the relationship of our model of consciousness to evolved values bear also on our notion of meaning. Meaning takes shape in terms of concepts that depend on categorizations based on value. It grows with the history of remembered body sensations and mental images. The mixture of events is individual and, in large measure, unpredictable. When, in society, linguistic and semantic capabilities arise and sentences involving metaphor are linked to thought, the capability to create new models of the world grows at an explosive rate. But one must remember that, because of its linkage to value and to the concept of self, this system of meaning is almost never free of affect; it is charged with emotions. This is not the place to discuss emotions, the most complex of mental objects, nor can I dedicate much space to thinking itself. I consider them in the next chapter. But it is useful to mention them here in connection with our discussion of free will and meaning. As philosophers and psychologists have often remarked, the range of human freedom is restricted by the inability of an individual to separate the consequences of thought and emotion.

Human individuals, created through a most improbable sequence of events and severely constrained by their history and morphology, can still indulge in extraordinary imaginative freedom. They are obviously of a different order than nonintentional objects. They are able to refer to the world in a variety of ways. They may imagine plans, propose hopes for the future, and causally affect world events by choice. They are linked in many ways, accidental and otherwise, to their parents, their society, and the past. They possess "selfhood," shored up by emotions and higher-order con-

sciousness. And they are tragic, insofar as they can imagine their own extinction.

Often it is said that modern humans have suffered irreversible losses from several episodes of decentration, beginning with the destruction of earlier cosmologies placing human beings at the center of the universe. The first episode, according to Freud, however, took place when geocentrism was displaced by heliocentrism. The second was when Darwin pointed out the descent of human beings. And the third occurred when the unconscious was shown to have powerful effects on behavior. Well before Darwin and Freud, however, the vision of a Newtonian universe led to a severe fatalism, a view crippling to the societal hopes of Enlightenment thought. Yet we can now see that if new ideas of brain function and consciousness are correct, this fatalistic view is not necessarily justified. The present is not pregnant with a fixed programmed future, and the program is not in our heads. The theories of modern physics and the findings of neuroscience rule out not only a machine model of the world but also such a model of the brain.

We may well hope that if sufficiently general ideas synthesizing the discoveries that emerge from neuroscience are put forth, they may contribute to a second Enlightenment. If such a second coming occurs, its major scientific underpinning will be neuroscience, not physics.

The problem then will be not the existence of souls, for it is clear that each individual person is like no other and is not a machine. The problem will be to accept that individual minds are mortal. Given the secular views of our time, inherited from the first Enlightenment, how can we maintain morality under mortal conditions? Under present machine models of the mind this is a problem of major proportions, for under such models it is easy to reject a human being or to exploit a person as simply another machine. Mechanism now lives next to fanaticism: Societies are in the hands either of the commercially powerful but spiritually empty or, to a lesser extent, in the hands of fanatical zealots under the sway of unscientific myths and emotion. Perhaps when we understand and accept a scientific view of how our mind emerges in the world, a richer view of our nature and more lenient myths will serve us.

How would humankind be affected by beliefs in a brain-based view of how we perceive and are made aware? What would be the result of accepting the ideas that each individual's "spirit" is truly embodied; that it is precious *because* it is mortal and unpredictable in its creativity; that we must take a skeptical view of how much we can know; that understanding the psychic development of the young is crucial; that imagination and tolerance are linked; that we are at least all brothers and sisters at the level of evolutionary values; that while moral problems are universal, individual

instances are necessarily solved, if at all, only by taking local history into account? Can a persuasive morality be established under mortal conditions? This is one of the largest challenges of our time.

What will remain unclear until neuroscience grows more mature is how any of these issues can be linked to our history as individuals in a still-evolving species. In any case, silly reductionism and simple mechanism are out. A theory of action based on the notion of human freedom—just what was missing in the days of the Enlightenment—appears to be receiving more and more support from the scientific facts. We may now examine the connection of these facts to thought itself.

Edelman, Gerald, *Bright Air, Brilliant Fire: On the Matter of the Mind.* BasicBooks, 1992. Used with permission.

I

My Last Afternoon with Uncle Devereux Winslow

1922: the stone porch of my Grandfather's summer house

I

"I won't go with you. I want to stay with Grandpa!"
That's how I threw cold water
on my Mother and Father's
watery martini pipe dreams at Sunday dinner.
. . . Fontainebleau, Mattapoisett, Puget Sound. . . .
Nowhere was anywhere after a summer
at my Grandfather's farm.
Diamond-pointed, athirst and Norman,
its alley of poplars
paraded from Grandmother's rose garden
to a scarey stand of virgin pine,
scrub, and paths forever pioneering.

One afternoon in 1922,
I sat on the stone porch, looking through
screens as black-grained as drifting coal.
Tockytock, tockytock
clumped our Alpine, Edwardian cuckoo clock,

slung with strangled, wooden game.
Our farmer was cementing a root-house under the hill.
One of my hands was cool on a pile
of black earth, the other warm
on a pile of lime. All about me
were the works of my Grandfather's hands:
snapshots of his *Liberty Bell* silver mine;
his high school at *Stukkert am Neckar;*
stogie-brown beams; fools'-gold nuggets;
octagonal red tiles,
sweaty with a secret dank, crummy with ant-stale;
a Rocky Mountain chaise longue,
its legs, shellacked saplings.
A pastel-pale Huckleberry Finn
fished with a broom straw in a basin
hollowed out of a millstone.
Like my Grandfather, the décor
was manly, comfortable,
overbearing, disproportioned.

What were those sunflowers? Pumpkins floating shoulder-high?
It was sunset, Sadie and Nellie
bearing pitchers of ice-tea,
oranges, lemons, mint, and peppermints,
and the jug of shandygaff,
which Grandpa made by blending half and half
yeasty, wheezing homemade sarsaparilla with beer.
The farm, entitled *Char-de-sa*
in the Social Register,
was named for my Grandfather's children:
Charlotte, Devereux, and Sarah.
No one had died there in my lifetime . . .
Only Cinder, our Scottie puppy
paralysed from gobbling toads.
I sat mixing black earth and lime.

II

I was five and a half.
My formal pearl gray shorts
had been worn for three minutes.
My perfection was the Olympian
poise of my models in the imperishable autumn
display windows
of Rogers Peet's boys' store below the State House
in Boston. Distorting drops of water
pinpricked my face in the basin's mirror.
I was a stuffed toucan
with a bibulous, multicolored beak.

III

Up in the air
by the lakeview window in the billiards-room,
lurid in the doldrums of the sunset hour,
my Great Aunt Sarah
was learning *Samson and Delilah.*
She thundered on the keyboard of her dummy piano,
with gauze curtains like a boudoir table,
accordionlike yet soundless.
It had been bought to spare the nerves
of my Grandmother,
tone-deaf, quick as a cricket,
now needing a fourth for "Auction,"
and casting a thirsty eye
on Aunt Sarah, risen like the phoenix
from her bed of troublesome snacks and Tauchnitz classics.

Forty years earlier,
twenty, auburn headed,
grasshopper notes of genius!
Family gossip says Aunt Sarah
tilted her archaic Athenian nose
and jilted an Astor.
Each morning she practiced
on the grand piano at Symphony Hall,
deathlike in the off-season summer—
its naked Greek statues draped with purple
like the saints in Holy Week. . . .
On the recital day, she failed to appear.

IV

I picked with a clean finger nail at the blue anchor
on my sailor blouse washed white as a spinnaker.
What in the world was I wishing?
. . . A sail-colored horse browsing in the bullrushes . . .
A fluff of the west wind puffing
my blouse, kiting me over our seven chimneys,
troubling the waters. . . .
As small as sapphires were the ponds: *Quittacus, Snippituit,*
and *Assawompset,* halved by "the Island,"
where my Uncle's duck blind
floated in a barrage of smoke-clouds.
Double-barrelled shotguns
stuck out like bundles of baby crow-bars.
A single sculler in a camouflaged kayak
was quacking to the decoys. . . .

At the cabin between the waters, 105
the nearest windows were already boarded.
Uncle Devereux was closing camp for the winter.
As if posed for "the engagement photograph,"
he was wearing his severe
war-uniform of a volunteer Canadian officer. 110
Daylight from the doorway riddled his student posters,
tacked helter-skelter on walls as raw as a board-walk.
Mr. Punch, a water melon in hockey tights,
was tossing off a decanter of Scotch.
La Belle France in a red, white and blue toga 115
was accepting the arm of her "protector,"
the ingenu and porcine Edward VII.
The pre-war music hall belles
had goose necks, glorious signatures, beauty-moles,
and coils of hair like rooster tails. 120
The finest poster was two or three young men in khaki kilts
being bushwhacked on the veldt—
They were almost life-size. . . .

My Uncle was dying at twenty-nine.
"You are behaving like children," 125
said my Grandfather,
when my Uncle and Aunt left their three baby daughters,
and sailed for Europe on a last honeymoon . .
I cowered in terror.
I wasn't a child at all— 130
unseen and all-seeing, I was Agrippina
in the Golden House of Nero. . . .

Near me was the white measuring-door
my Grandfather had pencilled with my Uncle's heights.
In 1911, he had stopped growing at just six feet. 135
While I sat on the tiles,
and dug at the anchor on my sailor blouse,
Uncle Devereux stood behind me.
He was as brushed as Bayard, our riding horse.
His face was putty. 140
His blue coat and white trousers
grew sharper and straighter.
His coat was a blue jay's tail,
his trousers were solid cream from the top of the bottle.
He was animated, hierarchical, 145
like a ginger snap man in a clothes-press.
He was dying of the incurable Hodgkin's disease. . . .
My hands were warm, then cool, on the piles
of earth and lime,
a black pile and a white pile. . . . 150
Come winter,
Uncle Devereux would blend to the one color.

Lowell, Robert. "My Last Afternoon with Uncle Devereux Winslow. " *Life Studies.* Farrar, Straus and Giroux, 1968, pp. 59-64. Used by permission.