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SYNTHESIZING SYSTEMS: THE WORK OF ART AND OF SCIENCE IN THE FICTION OF RICHARD POWERS

By

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The purpose of this dissertation is to introduce a general reading audience to the major themes found in the fiction of Richard Powers with an emphasis on his use of science. For Powers, science is something more than the accumulation of technical data and the proliferation of theories developed to explain physical phenomena. It is an evolving body of knowledge which has important insights to contribute into the conditions which ground human experience The close and often detailed discussions of contemporary issues in science which Powers incorporates into his fiction indicate the extent to which he sees science as an inseparable component in any attempt to understand the complexities of human experience.

The common ground Powers uses to link the interests of science and those of fiction into a balanced, if not always harmonious, pursuit of truth is wonder. The limitations placed on science during this century do not undermine the ability of science to influence what we can know. Nor do these limitations diminish the ability of science to inspire wonder. Quite the opposite. For Powers the true wonder of the human intellect rests in our remarkable ability to balance observation and interpretation. What he discovers again and again in his fiction is that science, like literature, is a product of the human imagination, a way to mediate between the world and

our perceptions of it. The recognition that science is a cultural practice--a body of knowledge thoroughly imbued with the practices and prejudices of its historical surroundings--is a necessary first step in mending the rift separating science and literature, head and heart. The greatest insight of twentieth century science may just be the recognition that there are other ways to access the truth. Richard Powers skillful weaving of science and art is a testament that literature offers a unique vantage point from which we might learn something of value about ourselves and the world we inhabit.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

Dissertation Advisor Marilyn May Lombardi

Committee Members

06 OCTOBER 1995
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Finally, I take this opportunity to acknowledge the impact of two extraordinary men who will never see the work they inspired. To Murray Cox I owe a profession and a revived respect for the the ability of words to make a difference. And to my father, Albert Copeland, I owe more than words can

convey. It is to his memory that I dedicate my own efforts to find both truth and beauty in the ordinary substance of every day lives.

Over ambitious projects may be objectionable in many fields, but not in literature. Literature remains alive only if we set ourselves immeasurable goals, far beyond all hope of achievement. Only if poets and writers set themselves tasks that no one else dares imagine will literature continue to have a function. Since science has begun to distrust general explanations and solutions that are not sectorial and specialized, the grand challenge for literature is to be capable of weaving together the various branches of knowledge, the various "code," into a manifold and multifaceted vision of the world.

Italo Calvino
Six Memos for the Next Millennium

But in my perplexity I know that a future will only be possible again when we find an answer and do what, as guests on this orbiting chunk of nature, we owe to one another; namely, stop frightening one another, relieve one another of fear by disarming to the point of nakedness.

Günter Grass
On Writing and Politics, 1967-1983

CHAPTER I

INTRODUCTION

With the publication of his first novel in 1985, Richard Powers became one of those writers that reviewers are constantly telling their audiences to keep an eye on, advice supported by the novel's reception in professional literary circles. Three Farmers on Their Way to a Dance received both the Hilda Rosenthal Foundation Award for Fiction given by the American Academy and Institute of Arts and Letters and The Ernest Hemingway Foundation Award granted by American PEN. The novel was also a finalist in the National Book Critics Circle Award.

Given this reception for a first novel, it is not surprising that the praise in print was lavish. In a radio show for the BBC, A.S. Byatt defended the novel for its "overt thinking," a trait she notes that many of her British colleagues find particularly American and frequently annoying.[1] In an essay for the Yale Review, Maureen Howard invoked images of Thomas Pynchon, J.D. Salinger, and even Nathaniel Hawthorne in order to situate Powers, then in his late twenties, as a writer of substance in contradistinction to the bright light and big city novelists of the eighties.[2] Along similar lines, Elaine Fowler Palencia distinguished Powers's writing from what she calls the "age of post-Vietnam cynicism and of post-structuralist assertions about the death of the author and the end of western logocentrism."[3] She suggested that in

his attempt to unify contemporary experience in the narratives of the novel, Powers not only set himself apart from the pack of postmodern writers characterized by self-referencing irony, but that in so doing, he aligns himself with "that old master of unity, Thomas Mann."

Powers's second novel, Prisoner's Dilemma, also met with critical acclaim and brought an even wider base of comparison to established literary greats. Dan Cryer, in a Newsday review, wrote that "Richard Powers combines Saul Bellow's bent for brainy meditation, Toni Morrison's tender regard for her characters, Stanley Elkin's delight in madcap word play and Robert Stone's uniting of the personal and the political," adding that "Prisoner's Dilemma is a wonderfully original creation and its creator is a fast-rising star in the literary firmament."[4] In an entry for the 1989 edition of Magill's Literary Annual, R. Baird Shuman compares Powers to John Dos Passo and James Joyce, claiming that with this novel Powers "has joined the company of the giants of modern fiction--Thomas Pynchon, Doris Lessing, John Barth, Vladimir Nabokov, Saul Bellow, William Kennedy, and the like."[5] Walter Kirn, in his review of Prisoner's Dilemma for the New York weekly, 7 Day, simply states that Powers is "the writer the 80's have been waiting for and the 90's cannot afford to neglect."[6]

With the publication of The Gold Bug Variations in 1991, Operation Wandering Soul in 1993 and his fifth novel, Galetea 2.2 in June of 1995, Kirn's assessment that Powers would be hailed as a literary tour de force in the 1990's seems to have been accurate. The Gold Bug Variations, the longest and most ambitious of the novels at 638 pages, was named by **Time** as Book of the Year for 1990 and was also a finalist in the National Book

Critics Circle Award. Operation Wandering Soul was a finalist for the National Book Award as well. In addition, Powers has also received the prestigious MacArthur's Fellowship known as the "Genius Award."

Yet, in spite of his apparent success, Richard Powers is still not a name that garners instant recognition in either local bookstores or university gatherings--though it should be noted here that Powers has a stronger following in Europe than he seems to in the United States. The reasons for Powers lack of popularity in the United States are varied and complex. First, he has not been promoted well by his publishers, who are under increasing pressure to saturate the market with one or two best-sellers a season using elaborate book displays, advertising, book signing tours and talk show promotions. Powers, whose first novel is among other things a fierce criticism of the "cult of personality" upon which such promotions depend, has been reluctant even to grant interviews, much less engage in a high-profile marketing scheme. He will not, for instance, autograph copies of Three Farmers because to do so would be a violation of one of the primary motives he had in writing the book, namely to show that a work of art can be more than a static cultural artifact tied irrevocably to the hands of its creator. It also did not help that Powers chose to live abroad in the Netherlands for seven years, creating the erroneous impression among some that he was living the life of the American ex-patriot in Europe who feels contempt for his homeland culture.

Powers spoke more directly to the issue of marketing writers in one of the rare interviews he did grant. (He agreed to interviews attending the publication of The Gold Bug Variations because he said, "its a long, tough

book, and it can use all the help I can give it."[7]) In fending off questions from a Publisher's Weekly reporter about his vital statistics (age, place of birth, education), Powers responded:

> I really don't see what connection all that has with the work. . . .It's not what we should be looking at. All that sort of thing [author publicity] just creates confusion about the nature of the book, deflects attention from what you've done. That's what always seem to happen in this culture: you grab hold of a personality and ignore the work.[8]

His work, however, is no more amenable to marketing than is the author. Powers's novels are dense, difficult, and demanding, a fact that alienates many of his readers. While I have highlighted the positive responses to the novels, there have been a number of reviewers who, even if they liked a particular novel, found Powers's encyclopedic references overwhelming, his characters unconvincing, his plots contrived and confusing, and his essayistic digressions disruptive. In a review of Operation Wandering Soul for the New York Times Book Review, for instance, Meg Wolitzer articulates one of the most common complaints that critics have waged against Powers.[9] "In every mental library," she begins, "there are books that are remembered with admiration and books that are remembered with love." She goes on to explain the former "involve[s] the intricate play of language," while the latter depends "on language to support a host of strong and resonant characters." While she regards Operation Wandering Soul as an admirable insight into the nature and function of narrative in a culture

which thrives on the split between sense and sensibility, Wolitzer finds that such emphasis detracts from the ability of the author to render warm and embracable characters. Yet, all of Powers's fiction is in some way an attempt to avoid precisely the consequences of making such distinctions. In a description of what he was trying to accomplish in The Gold Bug Variations, Powers articulates a position which may be applied to all of his work. What he was trying to do, he says, was "to get those two inimicals, the head and the heart, going at the same time."[10]

The conflict Powers addresses can best be understood as a recasting of a more recent debate: the conflict between science and art. For Powers, repairing the strange rift between the head and the heart becomes another way of explicating the equally odd divorce of art and science which has plagued our educational system since the days of the Matthew Arnold/Thomas Huxley debates of the 1880's. It is not that Powers, in his extensive use of scientific theories, is trying to subordinate literature to science or vice versa. Rather he is relying on an intellectual arsenal frequently ignored by other writers, a choice that unfortunately alienates some readers and arouses open hostility in others. Roy Porter, for example, in a harsh review of The Gold Bug Variations for the Times Literary Supplement dismisses the novel on the grounds that: "Most of us cannot remain high on Scientific American for long."[11] Similarly, a review that appeared in the Sunday Telegraph jokingly warns that because of the long passages involving scientific information "it is suitable only for those who have mastered the art of skim-reading."[12] For these critics, science is better

left in the laboratory or in the professional and popular journals dedicated to the subject.

For Powers, however, science is something more than the accumulation of technical data and the proliferation of theories developed to explain physical phenomena. It is an evolving body of knowledge which has important insights to contribute into the conditions which ground human experience. In the seminal 1882 essay, "Science and Culture," Thomas Huxley argued:

> We cannot know all of the best thoughts and sayings of the Greeks unless we know what they thought about natural phenomena. We cannot fully apprehend their criticism of life unless we understand the extent to which that criticism was affected by scientific conceptions.[13]

Obviously, Huxley's observation is not limited to ancient Greece. His point is simply that there can be no adequate understanding of a culture's ideas or actions without a corresponding and integrated understanding of its scientific conceptions. The close and often detailed discussions of contemporary issues in science which Powers incorporates into his fiction indicate the extent to which he, like Huxley, sees science as an inseparable component in any attempt to understand the complexities of human experience.

It is not surprising then that the world of science appears early and often in Powers's fiction. In the first chapter of his first novel, Three Farmers on Their Way to a Dance, Powers alludes to an early training in physics as he explains why a rotating restaurant remains him of "the last, great

empirical experiment of the nineteenth century" (12). In this novel and in those that follow, Powers moves comfortably through the history of science highlighting issues or anecdotes pertinent to the story at hand. In Three Farmers, for instance, he examines the relationship of object and observer and interpretation in light of the theories derived (in part) from quantum mechanics. Prisoner's Dilemma, whose title is taken from the calculations of game theory, looks for a connection between chaos theory and narrative. The Gold Bug Variations is an entire novel devoted to the implications of cracking the genetic code and the impact of evolutionary biology. In his fourth novel, Operation Wandering Soul, Powers examines the relationship between measurement and interpretation and the dangers of maps unfettered from the territories they seek to describe. And finally, in Galetea 2.2 he directs his attention toward the nature of consciousness and intelligence via neuronets.

While Powers's interest in science is not limited to the twentieth century, it is twentieth century science which provides the context for understanding the connections and associations which he draws between the work of science and the work of fiction. Of particular interest is the way in which the scientific findings throughout this century have undermined the certainty and search for absolute values that characterized the practice of science in the wake of the great scientific revolution of the seventeenth century. Concepts such as Einstein's theories of relativity, Heisenberg's Uncertainty Principle, quantum indeterminacy, and the more recent sciences of chaos and complexity reflect a growing awareness that science itself is an imperfect and imperfectable body of knowledge. It is ironic, perhaps, that the

same century that discovered quantum particles and DNA coding, that developed nuclear weapons and life-saving vaccines, that launched men into space and unearthed prehistoric remains is also the century in which science found itself grappling with the limitations of what it could do. As Powers writes in The Gold Bug Variations:

> Science is not about control. It is about cultivating a perpetual condition of wonder in the face of something that forever grows one step richer and subtler than our latest theory about it. It is about reverence, not mastery. (411)

Wonder is a powerful force in all of Powers fiction. It is also the common ground he uses to link the interests of science and those of fiction into a balanced, if not always harmonious, pursuit of truth. The limitations placed on science during this century do not undermine the ability of science to influence what we can know. Nor do these limitations diminish the ability of science to inspire wonder. Quite the opposite. For Powers the true wonder of the human intellect rests in our remarkable ability to balance observation and interpretation. What he discovers again and again in his fiction is that science, like literature, is a product of the human imagination, a way to mediate between the world and our perceptions of it. The recognition that science is a cultural practice--a body of knowledge thoroughly imbued with the practices and prejudices of its historical surroundings--is a necessary first step in mending the rift separating science and literature, head and heart. The greatest insight of twentieth century science may just be the recognition that there are other ways to access the truth.

In an article published in 1993, Powers suggests that fiction has an obligation and an opportunity to revitalize its function in society. He says:

> "Give me a lever long enough and a place to stand and I can move the world..." I always thought the planet-long lever was the easy part. It's that request for a place away from *this* place that gets tricky. It gets infinitely harder to know a thing when knowing and stating (de facto acts of separation) already alter the thing. Even a heightened awareness of our state of "knowing" is philosophically problematic (a deep recursion lurking in that proposition). Perhaps the knot is at least side-steppable if we admit literature as a form of knowledge? Fiction may, in any case, be one of the only ways into a knowledge of positionality, as it is condemned to partake of the metaphorical process it inevitably describes. The novel is one of those things that must be what it purports to *be* about. It rides the cusp by building it, re-creating it in both emblem and essence. And as such it is definitely one resonant metaphor for the whole metaphorical process at stake here.
>
> Yes I believe in something "Unmediated" out there as well, but I am condemned to mediated means of manipulating or understanding it. The map may not be the place, but we have only the map with which to move about in the place. Maps, rather, constantly changing, or perhaps I need to say varying. Both sides of the two-culture split may right now be coming to richer appreciations of how navigation and cartography are inseparable parts of the same journey. Symbolic understanding is both active and responsive, both empirical and imagined.[14]

The point that Powers is trying to make here is that if the world, or "unmediated" reality, can only be explained or understood in terms of language--whether that language is constructed in pictures, numbers, or letters--then it is important to find mechanisms which explore the veracity of symbolic manipulation. Fiction is such a mechanism. Fiction may never render relativity with the elegance of MC^2, but neither can science position

itself outside of the context of its own experiments. Just as science has a tailored capacity for describing and discerning certain aspects of the world, so, too, fiction offers the unique opportunity to "observe" the consequences of the ways in which human experience is framed. By investing (or reinvesting) fiction with the authority to discover truth, Powers hopes to find a suitable ground for investing literature with moral significance without having to rely on unobtainable ideals, sublime flashes of insight, or inarticulate crevices just beyond the borders of language.

It is significant that Powers finds his most compelling model for asserting the moral imperative for fiction in the workings of chaos theory, a theory that rests on the idea that quantitative fluctuations within a system can affect qualitative changes. The standard analogy used to explain chaos theory is that a butterfly flapping its wings in Iowa may bring about hurricanes in Miami. While the example exaggerates the potential changes fostered by a single event, the general principle behind chaos theory is that small changes within a system may, in fact, generate significant and measurable disturbances within that same system. For Powers, chaos affirms the notion that since thoughts lead to actions, it matters literally what we think.

In defining what he sees as the relationship of literature to chaos theory, Powers offers the following explanation:

> It may well be that chaos theory's lasting contribution to literature will be the creation of a place where one might once again believe in the efficacy of fiction's project--a place where "no war is inevitable until it breaks out," where the individual counts "a lot, I fancy , if he pushes the right way," where we might play the whole hypothetical piece "once more with feeling," For it seems to me that many novels get written on the naive belief that a small seed of words can still create a great stir.[15]

Science and literature may use different languages, but for Powers they say the same thing in patterned variation. Both seek to draw observation and interpretation into a map of the limitless frontiers of human knowledge. Similarly, both science and literature are also tangible expressions of the human capacity for wonder.

The great stir that Powers hopes to create may be slow in coming, but it will, I trust, happen in time. In writing this dissertation, the first book length study of Powers's work, I hope in some way to facilitate an understanding of what it is that Powers is trying to accomplish as a writer. Obviously, there are many avenues to explore in his already substantial body of work. However, I will limit my focus to two primary tasks. The first is to explicate or annotate the scientific theories that pervade Powers's work for an audience who may not be familiar with either the terms or the concepts. In addition to providing at least a general understanding of the issues involved in contemporary science, I would also like to look at Powers's work as an evolving study, a fractal map of where we as a culture have been and where we are now and where to go next. The following chapters will treat each of Powers's works chronologically highlighting both the issues particular to each novel and

those elements which form the common ground on which all of Powers's work is situated.

Three Farmers on Their Way to a Dance is a wonderful introduction, both stylistically and thematically, to Powers's fiction. It is an expansive novel which follows the impact of a photograph on characters in three separate narratives that span the twentieth century. The first narrative tracks the impact of the photograph on the author and includes a first-person critical commentary on a variety of subjects including Walter Benjamin, the history of photography, the life and times of Henry Ford, and the popularity of Sarah Bernhardt. The other two narratives in the novel follow, respectively, the wartime stories of the three young men in the Sander photograph as they make their way through the Great War, and the contemporary life of Peter Mays, a fictional counterpart to the unnamed first person narrator of the first narrative. In addition to multiple narratives, a technique he uses in all of his fiction, Three Farmers also introduces the reader to the major character types, (restless intellectuals) and locations (Europe, the American mid-west and the East Coast) that show up in almost all of Powers's later works. Three Farmers is also an important introduction to issues that Powers will tackle from various vantage points in subsequent novels. What, he wonders, is the function of fiction in this century? Three Farmers examines the failure of both modernism and postmodernism to provide an adequate ground for the moral imperative he believes that fiction has. In a move that will become common in his fiction, he turns to science for help. In quantum physics he finds a mediating value between subject and object, observer and observed, which allows him to view cause and effect as both random and determined.

Prisoner's Dilemma, though no less sweeping in its focus or bold in its invention, is a personal and intimate account of the gulf separating private family histories and global events. This is the story of Eddie Hobson, Sr., a man dying from both the literal and metaphorical fallout of the second World War. It is also the story of his children and of his wife as they try to decode the enigma that Eddie has always been. Just as Three Farmers uses quantum theory to find an alternative to the deadlock of determinism, this is a novel about looking for alternatives, about finding a vantage point which links the little (individual action) to the big (global consequence). Powers finds that alternative in Prisoner's Dilemma in the overlapping patterns and variations of chaos theory.

The Gold Bug Variations, Powers's longest novel and perhaps his most impressive, is a synthesis of the positions he has taken in the first two novels. It is structured around a dual love story that replicates the mobius structure of the double strand of DNA which stands at the heart of this novel. There is the love story of Stuart Ressler and Jeanette Koss, two scientists hot on the trail of the genetic code in 1957, who discover that some codes can never be broken. And there is the love story of Jan O'Deigh and Franklin Todd, contemporary researchers who discover in Stuart Ressler a code desperately in need of breaking. Codes in need of breaking and codes which can never be broken reflect this novel's concern with the paradox of simple complexity, or patterned variation. In Gold Bug, Powers investigates the disconcerting similarity between the coding patterns of DNA and the symphonic structure of Bach's Goldberg Variations. Art and science it seems are "exactly similar." They both use a simple four letter base to evolve into

varying degrees of complexity. In some ways, both Three Farmers and Prisoner's Dilemma are Powers's attempt to find some form of continuity between cause and effect or big and little. In Gold Bug, he finds not so much an answer as a reason to take a step back and appreciate the incalculable odds of human consciousness evolving to the point that one could even ask the question. Gold Bug is ultimately a celebration of human potential--scientific, literary, personal, and social. It is also an ode to the exquisite complexity of both birth and beauty.

In Operation Wandering Soul, Powers examines the darker side of human potential. From the opening pages of this baroque fairy tale about the disappearance of childhood, it is clear that Powers is determined to confront head on the disparity between the best of human thought and the worst of human actions. Though this novel contains elements familiar in Powers's fiction, they are employed here for quite a different effect. Richard Kraft, the disheartened and frightened pediatric surgeon around whom the main narrative is centered, is a man on the verge of breakdown. Unlike Peter Mays or the unnamed narrator in Three Farmers, or Artie Hobson in Prisoner's Dilemma, or Franklin Todd in Gold Bug--typical Powers' characters who share a sense of humor, a sense of wonder, and an insatiable curiosity to understand how things work--Kraft feels impotent to make any sense of the events he witnessed as a child growing up amidst the war in Southeast Asia. This novel also uses multiple narratives, but not for harmony or balance, or patterned variation. Here they more resemble a surgeon's stitches, criss-crossed stories patched together over an open wound. The narrative digressions into children's stories are pasted around

Kraft's experiences on the pediatrics ward of Angel General Hospital and his brief affair with Linda Espera, a physical therapist who wants to mend more than broken bones. The blurring boundaries between Grimm-like fairy tales and the real-time narrative highlight the glaring failure of humanity to nurture its own potential for care. In spite of his efforts to navigate a way beyond the horror, Powers leaves the reader with the devastating conclusion that words will never be able to inspire wonder enough to outpace disaster in this or any other century. His entrance into the narrative at the end of the novel serves only to reinforce the disparity between aesthetic harmony and real world harm.

It is perhaps not surprising that the author who had once heard the music of molecules found himself, in the wake of Operation Wandering Soul, on the verge of giving up on words altogether. However, in a breath-taking rescue of the significance of narrative, Powers's rediscovers his voice in his fifth novel. Galetea 2.2 is a fictional autobiography about starting over. Having covered the twentieth century by way of the major conflicts which have defined it--World Wars I and II, the Cold War, and Vietnam--Powers immerses himself in his own biography, with a bit of help from a neuroscientist named Lentz, and the evolving intelligence of a computer program. The novel is structured around Powers's first-person account of the fictional events in the year following the writing of Operation Wandering Soul and his simultaneous recollection of the major non-fictive events of his adult life: the death of his father, (the source for Prisoner's Dilemma), the death of his mentor, (the source of Gold Bug), the experiences of his brother, (the source of Operation Wandering Soul), and an eleven year relationship, now

ended, with the woman he calls C. (the catalyst for Three Farmers, and of course Galetea, among other things). Galetea is a novel about learning--learning what it means to be alive, learning what it means to be human, learning what it means to love. In this novel, Powers also discovers the necessary reciprocity between living in the present and remembering the past, between fiction and reality, between words and the world. The novel ends with the promise of a return--an affirmation that Powers has tales yet to tell to a world he is unwilling to give up to despair.

In addition to the discussions of the individual novels, I will also pay particular attention to a character or theme--if it can properly be called either--that looms throughout all of Powers's fiction: the twentieth century. An intense mass of conflicting images, the century is a protean antagonist against which characters in each of the novels are constantly trying to define themselves. I have earlier suggested that Powers is particularly attracted to twentieth century science. It might be more accurate to say that he is simply obsessed with the century itself. He begins in Three Farmers with the events leading up to and surrounding the Great War and continues in subsequent novels to examine the century against the backdrop of its major conflicts. Prisoner's Dilemma, for instance, examines the fallout of the atomic bomb and WWII on the cultural imagination, while Gold Bug juxtaposes the Cold War policy of brinkmanship and the race to break the genetic code. Operation Wandering Soul explores the haunting legacy of the war in Southeast Asia. And while there is no global confrontation underpinning the events of Galetea, the novel takes for its subject the failure of this author to narrate some sense into the events of this century.

For Powers, however, the twentieth century is more than just a backdrop for conflict. All centuries, Powers acknowledges in Operation Wandering Soul, are equally colored by the paradox of enlightened achievement and unspeakable cruelty. What distinguishes this century, apart from his participation in it, is the advent of what Powers calls triggering points, or the point at which critical mass transforms quantitative values into qualitative changes. He writes in Three Farmers:

> Trigger points come about when the progress of a system becomes so accelerated, its tools become so adept at self-replicating and self-modifying, that it thrusts an awareness of itself onto itself and reaches the terminal velocity of self-reflection.
>
> Trigger points represent those times when the way a process develops loops back on the process and applies itself to its own source. (81)

The whole of this century is a triggering point. The urgency with which Powers pleads the need for moral action reflects his impending sense that human history is poised on the brink of a qualitative change in the evolution of our species. While acknowledging that any perspective gained is clearly limited and colored by its immersion in this culture, Powers, nevertheless, insists that we must not allow our ability to think through and analyze the changes that have taken place to be overwhelmed by the rapidity and volume of those changes. This accounts for his tireless efforts throughout all of the novels to catalogue and synthesize the major events and ideas of this century. Similarly, Powers's use of multiple narratives throughout his works

reflects his own efforts to use fiction as a way of gaining perspective on these events.

Read collectively, these novels also form an extended meditation on the function of art in the twentieth century and its obligation to grapple with complex issues and images. From his critique in Three Farmers of Walter Benjamin's "The Work of Art in an Age of Mechanical Reproduction" to his discussion of the theory of connectivity in the formation of neuronets in Galetea, Powers wrestles against the haunting possibility that Theodor Adorno might have been right when claiming that there could be no art after Auschwitz. Determined to find a significance for art beyond the hollow, if lovely, resonance of Modernism with its ideas of self-imposed order and the meaningless local celebrations of art as image in postmodernism, Powers looks again and again for a third alternative. He finds it in the world of science, where he sees metaphors at work in wondrous ways. In science he finds the truth he feels art has abandoned. If fiction is to function within society rather than languish selfishly around its fringes, it must rediscover its own ability to inspire wonder. For it is wonder, in Powers's fiction, that is the catalyst for fostering the engagement of his readers to bring about social change.

This need to encourage the participation of the reader in redefining the moral goals of society, the ultimate aim of his work, also helps to explain why Powers, a writer who has taken pains to steer clear of the public limelight, insists on appearing in most of his novels. In Three Farmers, for example, the first-person narrative which begins the novel recounts Powers's encounter with the Sander photograph and his subsequent attempt to try and

determine the significance of the event. In Prisoner's Dilemma, he enters in the penultimate chapter to link his own experiences with those of the family he has fictionalized in order to replicate the resonating patterns and variations of chaos theory. He ends Operation Wandering Soul with a similar entrance into the novel in order to beg the reader to do something, anything, to nurture care in a world numbed by violence. Though he does not actually appear in Gold Bug, it is clear that he informs both the characters of Jan O'Deigh and Franklin Todd. In Galetea, an autobiographical fable, Powers steps out of the shadows of final chapters, the anonymity of an unnamed character, and the veil of a hybrid personality to speak directly to the issue of his participation in his own work.

Fiction is for Powers a way of gaining insight on the events of his life and the events of this century. It is vantage point he needs to lever the world into view and human experience into something more than inevitable loss at its best and horrifying brutality at its worst. Fiction gives him the critical distance he needs to gain this insight. But, he discovers time and again, personal insight is not enough, even if it is shared. Fiction, like the maps which are a central image in his works, should not only detail the lay of the land. Fiction should also be a reader's guide into the potential of redefining and molding our place in history into something better. Powers's personal appearances are reminders that the point of gaining insight--through fiction, through science, through philosophy, or any other way of knowing--is to foster action, to bring about change in *this* world. The mess of living in the twentieth century which he explores in each of the novels is a clear indication that society must find alternative ways of living together. Powers

demands of his reader an exhausting commitment to think through complex issues--scientific, literary, historical, and social. He does so because he believes that "What we cannot bring about in no way excuses us from trying to bring about what we must."[16] For Powers, what we all should strive to bring about is an end to poverty, abuse, inequality, ignorance and the fundamental disrespect for human life which characterizes our contemporary culture. In his first five novels, Richard Powers proves himself to be a conscientious cartographer and an compassionate navigator in a world where hopefully "a small seed of words can still create a great stir."

Notes

[1] A.S. Byatt, rev. of Three Farmers on Their Way to a Dance by Richard Powers, Kaleidoscope, prod. by Edwina Walstencroft, presented by Natalie Wheen for BBC, Radio 4 (2145-2215), 10 March 1988.

[2] Maureen Howard, "Semi-Samizdat and Other Matters", rev. of Three Farmers on Their Way to a Dance, The Yale Review, Winter 1988: 250-251.

[3] Elaine Fowler Palencia, "A Walk Through the Twentieth Century", rev. of Three Farmers on Their Way to a Dance, Illinois Writers Review, Fall 1986: 11.

[4] Dan Cryer, "A Lovably Loony Dad and his Memorable Family", rev. of Prisoner's Dilemma, Newsday TK.

[5] R. Baird Shuman, rev. of Prisoner's Dilemma, Magill's Literary Annual 1989, Vol. 2: 666-667.

[6] Walter Kirn, "Powers' Struggle," rev. of Prisoner's Dilemma, 7 Days: A Week in the Life of New York, 10 August 1988: 51.

[7] John F. Baker, "PW Interviews Richard Powers", Publisher's Weekly 16 August 1991: 37.

[8] Baker 37.

[9] Meg Wolitzer, "The Assault on Children", rev. of Operation Wandering Soul in New York Times Book Review 18 July 1993: 19.

[10] Baker 38.

[11] Roy Porter, "Data for Data's Sake," rev. of The Gold Bug Variations in the Times Literary Supplement 06 May 1992.

[12] Max Davidson, "Love among the Molecules," rev. of The Gold Bug Variations, Sunday Telegraph 10 May 1992.

[13] Thomas Huxley, "Science and Literature," T. H. Huxley, Science and Education: Essays (London, 1893) 134-59. It is important to keep in mind that the original debate between Huxley and Arnold was an amicable disagreement over institutional curriculum. Neither Arnold or Huxley denied the importance of a balanced education. As Huxley's quote suggests, the primary dispute between the two men rests in the priority of abstractions over historical practises. Where Arnold argued for a top-down approach to learning (begin with the Ideal and digress into the particular), Huxley wanted to reverse this process. While the two cultures debate seems to have faded in the wake of the technological advances of the past twenty or so years, there is another way of looking at the debate which has relevance to

educational systems today. Where Arnold was the great champion of tradition and culture as a means of establishing harmony among an increasingly diverse population, Huxley saw an education grounded in science as an individual invitation to discovery. In effect, what Huxley wanted to teach was research.

[14] Janet Stites, "Border-Crossings: A Conversation in Cyberspace," OMNI, November 1993: 113.

[15] Stites 108.

[16] Prisoner's Dilemma, 343.

CHAPTER II

THREE FARMERS ON THEIR WAY TO A DANCE: A READING TOUR OF THE TWENTIETH CENTURY

Each age writes the history of the past anew
with reference to the conditions uppermost in its own time.
Frederick Jackson Turner

Richard Powers, born in 1957, was only twenty-eight when his first novel, Three Farmers on Their Way to a Dance, appeared in print. It is an ambitious novel. The epigraph from Marcel Proust and the subsequent allusions to such literary giants as Thomas Mann, James Joyce, Herman Melville, T.S. Eliot, and Günter Grass, to name only a few, indicate the extent to which Powers is influenced by the writers of "big" books. However, he does not limit his interest in this novel to literary allusions. He also combs through the biographies of Henry Ford, Sara Bernhardt, August Sander, Diego Rivera and others. When he does not find what he is looking for in the individual biographies, he goes back, widens his lens, and sifts through the history of photography, the making of Detroit, the cultural impact of theoretical physics, and the compromising limitations of postmodernism.

In addition to the encyclopedic content, the structure of the novel is similarly ambitious. The triple narratives form a kind of mobius strip of discrete but interlocking stories which replicates the thematic interest in the

interlocking relationships among subject, artist, and viewer. The prose is dense, the language playful, and the puns plentiful. But it is, perhaps, the subject matter which makes Three Farmers such a remarkable first novel.

In a review that appeared in the Chicago Reader, James Hurt remarks that not only is the book an extraordinary first novel, it is also an extraordinarily mature work of fiction for a first novel. He writes:

> Three Farmers on Their Way to a Dance is a startling first novel. Excellent as many first novels are (they have to be to win publication for an unknown writer) their excellences are usually not those of Three Farmers. A disproportionate number of them are growing up novels about the author's family. Few of them could be called ground-breakingly original or dazzlingly accomplished in narrative technique. Three Farmers is both. There have been contrapunctual novels before and there have been self-referential novels. But none has used plots and references to its own fictionality in the same way that Three Farmers does. It is fiercely original in both conception and execution.[1]

While Hurt correctly distinguishes Three Farmers from the "growing up novels about the author's family" in the ordinary sense, this novel can be read as a *bildungsroman* of another sort. For his first novel, Powers chooses nothing less than the coming of age of the twentieth century, a subject he will pursue throughout his fiction.

More specifically, though, Three Farmers is an examination of the failure of art to adequately respond to the complexities of living in this century. Early in the novel he notes: "Now the finest of this century's paintings will never make up for our concurrent botch of everything else. Art

can only hope to be an anesthetic, a placebo" (13) . With this as a starting point, Powers finds himself in the awkward position of having to either reconcile himself to the depressing realization that his work is nothing more than a diversion or he must find some way to give it consequence. Unwilling to accept the former position, he sets out in Three Farmers to recoup the curative power of art. Significantly, he does so by way of an elaborate demonstration.

The first three chapters establish a narrative framework that is repeated throughout the novel. Chapter One, "I Outfit Myself for a Trip to Saint Ives", introduces the reader to an unnamed first person narrator passing time in contemporary Detroit on a layover between Chicago and Boston. Chapter Two, "Westerwald Farmers on Their Way to a Dance, 1914", initiates the title story of the three farmers which appear in the Sanders photograph on the cover of the novel. The third chapter, "Accommodating the Armistice", begins the tale of another contemporary character, Peter Mays, an technical editor for a computer magazine in Boston whose obsession with a mysterious redhead he spots in a Veterans Day parade will bring him face to face with the Westerwald farmers. The same pattern is repeated throughout the novel, every third chapter picking up the narrative initiated by these first three, so that, for instance, Chapter Four is the first person narrative, Chapter Five is the famers's story, and Chapter Six returns to Peter Mays.

As the novel progresses, the three narratives begin to overlap, though each retains throughout the autonomy of its particular historical situation. The photograph is the central connecting point among the three. For the

unnamed narrator, let's call him Powers for the sake of convenience, the photograph represents an initial point of departure. Having stumbled onto the picture of the three young men, Powers tries to explain his reaction:

> I knew at once, though I had never seen it before....The photo caption touched off a memory: *Three farmers on their way to a dance, 1914.* The date sufficed to show that they were not going to their expected dance. I was not going to my expected dance. We would all be taken blindfolded into a field somewhere in this tortured century and made to dance until we'd had enough. Dance until we dropped. (16)

The photograph becomes a point of convergence, a moment in time that spontaneously generates a life of its own. The image of the farmers reaches beyond the frame of the time and place for which it stands as a record, as Powers's searches for a way to identify the farmers. The photograph becomes a mirror for memory, reflecting not so much the way the present archives past experience, but the way in which the past knocks--sometimes loudly, sometimes in barely audible tones--on the door of the present, stubbornly demanding attention.

For the three young men, Hubert, Adolphe and Peter, the photograph holds a less spectacular attraction. Walking in the late afternoon on their way to a May Day dance, the young men encounter a photographer bicycling around the countryside--they do not know that the stranger is August Sanders who is out looking for faces for his book on the archetypes of the twentieth century. As outdoor and informal photography were very much a novelty in 1914, the three are curious. They agree to pose for Sander and

later they buy one copy of the photograph to be passed at intervals among them. The photograph does not alter their lives, but is only one among many moments that comprise the whole. The chance encounter with Sander on the muddy road on that first of May is a minor event in a biography begun *in medius res.*

Peter Mays, too, has an encounter with the photograph, finding it folded in a box of family memorabilia stored in his mother's attic on the South Side of Chicago toward the end of the novel. It was not what he had been looking for. Having unearthed what was for his mother a family scandal of illegitimate birth, Mays finds in the photograph only the resemblance of kin, a face much like his own, standing on a muddy road with a couple of other fellows--a document, "badly beaten and defaced" (246) , of his ancestry. If the picture was not the original object of his search, it does provide Mays with a "sketchy notion of *what* he tried to recover--whether animal, vegetable, or mineral; a place; an idea; or just the ability to experience without irony or acute self-consciousness" (291) .

There are many looping similarities connecting the narratives, most notably Peter Mays's kinship to one of the farmers and the parallels between Mays and Powers (both live in Boston, both are obsessed with tracking down an enigma, both work for computing publications). And there is Mrs. Shreck, a night cleaning woman in the Powers section, who also has a copy of the photograph because one of the figures reminds her of her dead finance and whose own family history strangely echoes that of Peter Mays. The tri-part structure of Three Farmers reflects Powers's interest in forging a similar connection among reader, work, and artist. It is, however, the first of these

narratives that provides the key to understanding the thematic significance of interlocking the three narratives. I will, therefore, concentrate in this chapter primarily on the interests and concerns of the Powers narrative.

The suspicion that the unnamed narrator about whom we are given only sketchy biographic details and whose last name begins with P. is, in fact, Powers is confirmed at the end of the novel when he recounts the inspiration for writing the other narrative sections. Read consecutively, the Powers narrative is essentially an autobiographical account of his two year search for the meaning of his chance encounter with the Sander photograph. This section, however, should not be read as a clever or ironic transgression of fictive borders, nor is this narrative merely an extended authorial aside. His appearance in the novel is intended, rather, as a demonstration of how a work of art--in this case a photograph--qualitatively alters his own life experiences. He learns something from his encounter with the photograph; in fact, he learns quite a bit as he searches for a link between the world which inspired Sander's Man of the Twentieth Century and the one represented by the contemporary theatrical performance, "I Dwell in Possibility." One of the two epigraphs to Three Farmers, states: "Everybody," said Knudsen, explaining the demand for the automobile, "wants to go from A to B sitting down."[2] Point A in this novel is the contemporary world in which Powers finds himself, a world after Auschwitz, a world after Einstein, a world weary with its own sense of modernity. Point B is both the world before the mythic creation of the Twentieth Century and the world beyond it. The Powers section is this author's attempt to get from A to B, though not necessarily sitting down.

FROM A to B

It might have been any city, but it was Detroit that "ambushed me before I could get out of its way" (9) , Powers tells us in the opening paragraph of Three Farmers. It is the mid-eighties and the Grand Trunk Station--"a public semidarkness stinking of urine and history" (9) --is undergoing renovation. The irony that Powers arrives in Detroit by train, that he walks to the Renaissance Center, and that he takes a bus to the Detroit Institute of the Arts suggests that Knudsen may have miscalculated, if only slightly, the universal preference for the automobile. Powers's movements through Detroit are significant for another reason. This city provides a literal backdrop for the architectural showcases of nineteenth century grandeur, modernist abstraction, and postmodern excess represented by the Grand Trunk, the Rivera mural at the Institute, and the Renaissance Center, respectively. Detroit, however, is more famous for its industry than its architecture. Detroit is the town that Henry built, Motor City, the birthplace of the automobile.

In this first chapter, Powers establishes a link between art, or at least architecture, and industry which is important for several reasons. First, Three Farmers is a novel about the need to find an aesthetic alternative to art as a placebo. Before he can determine what can be done, Powers is compelled to investigate what he sees as problems inherent in modernism and postmodernism, the primary aesthetic movements of the twentieth century. In connecting art to industry, Powers is merely establishing a context for his critique, a context he takes for granted. Like many other contemporary

writers, Powers is confronted by the same culture industry which led Theodor Adorno to ask if there could ever be an art after Auschwitz. The question itself is inherently political, as is the answer. In assuming that art has an ethical function it needs to recover or discover, Powers *begins* with the premise that art is a social, and, therefore, political practice. In taking the relationship between art and industry for granted, however, Powers discovers that he has overlooked something critical. "Had I recognized the composite face for what it was," he says of a figure he detects in the Rivera Mural, "I might have saved a year spent in tracking down other leads" (16) . Though he hints at the solution he will come to later, the first chapter and the first third of the Powers section are devoted primarily to figuring out why the Sander photograph is such an enigma--which leads back to Powers's architectural tour of Detroit.

The Grand Trunk station, which Powers describes as "America copying England copying France, copying Rome, copying Greece" (9) is a fitting monument to the success of the Industrial Revolution in transforming industries into empires.[3] The nineteenth century was an era of remarkable invention, not the least of which were the refinements made in the design of the steam engine, which, as I pointed out in the previous chapter, had an enormous impact on the growth and development of thermodynamics. Though the history of the industrial revolution represents a considerable body of scholarship, Friedrich Engles's description of the causes for this revolution in the opening paragraph of The History of the Working Class in England is still one of the most concise:

> The history of the English working classes begins in the second half of the eighteenth century with the invention of the steam engine and of machines for spinning and weaving cotton. It is well known that these inventions gave the impetus to the genesis of an industrial revolution.[4]

The steam engine is in some ways the crowning achievement of nineteenth century ingenuity and is emblematic of an ideology based on man's ability to control nature. Harnessing air to perform work was akin to the alchemist's dream of transforming lead into gold. Magic, however, had nothing to do with the growth of capitalism as a result of the revolutionizing of industry, but the subordination of human labor to the interests of the machine did. In it's grandeur, the Grand Trunk reflects the confidence of this era: confidence in the ability of science to ascertain certain and absolute truth, confidence in the progression of Western culture as it spread its influence across the globe, confidence in the assertion of individual will, and confidence in the perfection of art. The glory days of the Grand Trunk, however, are long gone in a city dedicated to the automobile and mass production. The state of disrepair in which Powers finds the station, whose "opulence left it a mausoleum" (9) , similarly reflects the demise of these concepts in the twentieth century.

Though the Grand Trunk is mentioned only briefly, the aesthetic sensibility which it symbolizes resonates strongly in the novel as the world before mass production. The grandeur of the train station is recapitulated in the stunning array of Great Personalities gathered in the foyer of the new century.

> Nineteen-thirteen was a time richer in Great Personalities than any since the Renaissance. Vienna and Paris--arguably the two best representatives of the warring factions, the one outgoing and monarchical, the other incoming and anarchical--boasted between them Freud, Picasso, Wittgenstein, Proust, Apollinaire, Schonber, Webern, Berg, Gide, Jarry, Debussy, Klimt, Stravinsky, Bernhardt, Mahler, the General Hospital physicians and scientists, Stein, Melies, Krauss, Werfel, and Rousseau, to name only a few, breaking off before the list stales the palette. The era is often described in paraphrased lives of these individuals, a forgivable practice, as the time seems to have seen itself in the same way. It is as if the last gasp of the old way of progress--successive leaps made by individual genius--would only give way to the new era of simultaneity by blowing itself out in one final burst of fecundity. (85-86)

The "triumph of Great Personality" is a pre-war (WW1) phenomena and, like the Grand Trunk, represents the crowning achievement of the revolution that began in the Renaissance, a revolution that established the supremacy of Man--over Nature and over God. The same hubris that prompted the French mathematician and astronomer, Pierre Simon LaPlace, to say that had he been sitting at the right hand of God during the moment of creation he could predict the history of the universe manifests itself in a slightly different manner in the creation of Great Personality.

For Powers, the triumph of Great Personality signals an important shift in attention away from the work, whether that work is science, art, or philosophy. It's success in transforming life into art carries with it the means of its own demise, a conclusion which Powers explicitly draws in his discussion of controversy between the Divine Sarah Bernhardt and the Royal Everyman, King Ubi, otherwise known as Alfred Jarry. It was a battle

between "personality-become-actress and playwright-become-personality" (169) . Sarah's success, and by extension the success of Great Personality in general, depended on an illusion of intimacy, on dissolving the distance between the private and public spheres. Sarah in her notorious coffin, Sarah and her countless lovers, Sarah and her money, her excessive and obscene spending habits--these images became part of her persona. This is the Sarah that the public came to see. But it was Alfred Jarry who "single-handedly raised derangement to the level of religion" (168) . His creation of King Ubi represents the transformation of a critique of the Great Personality into a cult of personality as Jarry began both the object and subject of his work.

The Jarry episode represents for Powers the beginning of a new era of simultaneity: "The great task of Jarry and the avant-garde" he explains, "was to force two things to occupy the same place at the same time: public and private, celebrated and obscure, serious and ludicrous" (169) . It is the same drive for simultaneity which Powers associates with the symbolic importance of the automobile, which once again takes us back to the first chapter.

The Diego Rivera mural at the Institute of the Arts was commissioned by Edsel Ford in 1931 to commemorate the American love affair with the automobile. As Powers notes, it represented "an odd marriage: Edsel Ford, whose father was first among capitalists, in cahoots with Rivera, the notorious revolutionary who secured Trotsky's asylum in Mexico" (13) . Like the mechanical reproduction of art made possible by the invention of photography, the Rivera fresco represents a "chapel to the ultimate social

accomplishment, the assembly Line, a self-reproducing work of art, precise, brilliant, and hard as steel" (14) . What separates Diego and Detroit from Michelangelo and the de Medici, (a comparison that Powers explicitly invites), is literally the product of their invention. Michelangelo paints the origins of life, the moment that God first reached out His arm to bestow upon an unsuspecting matter the Blessing of Being. It is the early Renaissance in Italy, and the de Medici and those of their ilk are hungry for a new beginning--not that mankind had been idle in the years preceding this new age of trade, exploration and the accumulation of tremendous wealth that marked this era. Michelangelo's painting is a visual display of a transfer of Power from God to Man. The Sistine Chapel is ultimately a celebration of Man's ability to assume the mantle of Divinity.

So too, Rivera paints a monumental portrait of the beginnings of a new era similarly marked by expanding trade, invention and yet more accumulation of great wealth and resources. Only this time, it is not God giving birth to mankind, but men performing as handmaidens at the birth of a new thing. The twentieth century did not invent the machine, but for Powers, the machine, under the production of the assembly line, is a new creature, "a mutant offspring, demanding love, resentment, pity, even hope, but refusing to be disowned" (15) . More disturbing still is that in the sensuous exchange between labor and the laborer, the individual becomes part of the process, a cog in the wheel that is itself a work of art, a thing of beauty, an object of value ready to roll off the assembly line leaving humanity trailing far behind. However, by far the most disturbing aspect of the Rivera mural rests in the consequences of transforming industry into image. Later in the novel Powers

argues that history must be understood recursively, effect before cause, so to speak. It is not surprising, therefore, that just prior to his trip to the Institute, he passes through the latest manifestation of industry as art.

Commissioned only three years after the 1967 race riots in Detroit, The Renaissance Center was the brain child of a group of city elders, including Henry Ford II, who banded together to revitalize the city.[5] They hired Atlanta architect, John Portman, to spear-head the development of the river front. The Center that Portman designed is a standing testament to the enormous success of postmodern architecture. The overall structure is actually a composite or integration of several different buildings: the seventy-three story cylindrical Plaza Hotel and four thirty-nine-story octagonal office towers atop a 14-acre concrete podium which houses shops, restaurants and theaters. The scale of the Center is immense, nothing less than a city inside glass.

In an essay explaining his own design theory, John Portman articulates a position familiar in postmodern architecture:

> Architects in the past have tended to concentrate their attention on the building as a static object. I believe dynamics are more important: the dynamics of people, their interaction with spaces and environmental conditions. Architects must learn to understand humanity better so that they can create and environment that is more beneficial to people, more rewarding, more pleasant to experience. I'm naturally interested in the latest structural techniques, in innovative building materials and the technology of my craft; but I am more interested in people. Buildings should serve people, not the other way around. . . .
>
> What I want to do as an architect was to create buildings that are really for people, not a particular class of people, but all people.[6]

What Portman, who made his reputation by redesigning the exclusive and upscale lobbies of the Hyatt Hotel chain, does not say in this essay is that the buildings he designed for all people are also buildings designed specifically for commerce. In an effort to naturalize the process of consumption, Portman uses elements from nature, such as plants and trees in order "make a connection between the built environment and the human psyche." He uses water "to evoke memories of the natural environment," and has even used "sound sculpture" a recording that "creates the impression of a flock of birds flying in, alighting in trees, and bursting into song." Another manifestation of his efforts to influence the senses with consumptive desire is his use of shared space, which he claims "is based on the human desire for a release from confinement. If more than one thing is happening in a space," he explains, "if you can look out from one area and be conscious of other activities going on, it gives you a sense of spiritual freedom."

What Powers sees in the Renaissance Center, however, is something quite different. The simultaneity of "more than one thing [happening] in a space" does not create a heightened state of awareness that leads to spiritual freedom as much as it creates a diversion. With so many things to look at from within, there is little time to notice the evidence of human displacement created by the commercial development of the space. His observation is brief and to the point:

> The size and opulence of the Center meant to attract tourist and conventioneers into double-A, self-contained luxury. The palace executed its purpose too well. It drew people (read money) up and away from surrounding businesses, and because the towers were so self-sufficient a village, the people never came back out. The area surrounding the Renaissance Center showed the signs of a hasty evacuation and rout. Gravitating toward the towers, I passed row on row of brick, triple-decked residences standing vacant, their windows and doors broken open to reveal nothing inside. (11)

The affect of the Center reaches far beyond the architectural limits of its structure. Upon leaving the Center, Powers encounters a bum looking for money to buy, not the standard cup of coffee, but suntan oil. Even in the shadows of the open celebration of consumptive desire represented by the Renaissance Center, needs and wants become interchangeable. This is the legacy that Powers associates with Jarry and Rivera, with the Grand Trunk and the Institute. Having discovered the common ground that connects these various histories and biographies into a portrait of the twentieth century as the era of simultaneity, Powers must now find a way beyond the inevitable capitulation of man into machine, of personality into cult, of order into

excess. He must find new evidence to support the notion that "no war is inevitable until it breaks out" (84) . Significantly, it is while sitting in the Renaissance Center, that Powers begins to articulate a connection, a concrete historical link between postmodernism and the early years of science in this century. His return to the history of science will later provide a crucial critical vantage point that will allow him to re-negotiate the collapse of public places into private spaces.

What Powers sees inside the Renaissance Center is a revolving restaurant. It is an odd enough idea, to eat and turn at the same time, but, for Powers, it brings something else to mind:

> My training in physics made the huge spinning plate seem an unintentional homage to the last, great empirical experiment of the nineteenth century. In 1887, the physicists Michelson and Morley set out to measure the absolute velocity of the earth through the ether field. The two scientists floated a gigantic slab on a sea of mercury, on the same scale and set-up as the slab I now rode. They shone a beam of light through a prism in the center and back to mirrors on the perimeter, reasoning that light flowing in the direction of the ether stream would travel faster than light flowing upriver. But Michelson and Morley found no difference in light speeds, regardless of orientation. An international calamity followed in 1905, when Einstein, a Bonn patent clerk with no reputation to lose, suggested preserving the velocity of light at the expense of absolute measure. The century was off to a quick jump out of the gate. (12)

There is no history of the twentieth century--whether framed by Great Personalities or ordinary family remembrances that has not been affected by Albert Einstein. In revising the relationships among time, speed, and measurement, he threw over three hundred years of scientific thought.

Though his discoveries certainly did not invalidate all of the scientific principals that preceded them, he catapulted science, and with it the rest of human activity, into a new era dominated by terms such as relativity, indeterminacy, and incompleteness. Gone was the grounding stability of complex and simple systems governed by predictable laws. Prediction, the very cornerstone of the first Scientific Revolution led by Newton, was transformed from an end into a means. In a history of scientific revolutions, Bernard Cohen describes the birth of a new era:

> The twentieth century, by contrast, has been shaken by tremendous upheavals, true breaks in the continuity of history. The social, political, and economic effects of the Russian and Chinese revolutions alone have by far transcended those of the French Revolution, engendering international revolutionary movements on a worldwide scale. The early years of this century also witnessed great revolutions in science, chiefly in physics: x-rays, quantum theory, radioactivity, relativity, the electron, the nuclear atom. In 1905, the same year as the abortive Russian revolution, Einstein published his epoch-making paper on relativity and another paper which revolutionized the physics of matter and radiation and established quantum theory (inaugurated in 1900 by Max Plank) in a direction that has dominated physical thought ever since. In the arts, the pre-1914 era produced the savage rhythms of Stravinsky's *Le sacre du printmps* and the shocking brutal paintings of Picasso and Baroque, works which began an age of constructivism, modernism, and abstract art, dissonance and atonality.[7]

Cohen describes the revolutions that mark the beginning of this century--political, scientific, and aesthetic--as a paradigmatic shift way from a Newtonian world, which he describes elsewhere as "one of the most profound revolutions in the history of human thought."[8] What Newton and his

Enlightenment colleagues promised was a world in which not only knowledge, but the "regulation of human affairs would yield to a rational system of deduction and mathematical inference coupled with experiment and critical observation."[9] With Newton sitting at the right hand of God taking notes, all things were possible. History was the progressive tale of humanity absorbing the mind of God. That is, until Einstein set off a revolution of his own.

Powers, like Cohen, recognizes the impact of this revolution and its implications for how we understand history, which is nothing if not a record of time and place. He begins with Charles Peguy's famous quip in 1913 that "the world has changed less since the death of Jesus than it had in the last thirty years" (80) . Hidden in the geometric acceleration of change suggested by Peguy's observation is "the idea that each tool, each measurement, each casual observations of the nature of things...accelerates and automates the acquisition of the next tool." However, acceleration of change must reach a point of terminal velocity--a trigger point. This, for Powers, is what has happened in our century. The rate of change has reached a point where the ability of a system to change is changed. Or as he explains it:

> Trigger points come about when the progress of a system becomes so accelerated, its tools become so adept at self-replicating and self-modifying, that it thrusts an awareness of itself onto itself and reaches the terminal velocity of self-reflection.
>
> Trigger points represent those times when the way a process develops loops back on the process and applies itself to its own source. (81)

He cites the familiar roster of thinkers who have initiated such changes within our culture: Darwin, Freud, Marx, Gödel, Plank, Bohr, Heisenberg--Einstein goes without saying. The collective impact of all these trigger points and the diversity of disciplines represented suggest a fundamental shift in the relationship between what we know and how we know it.

Powers also recognizes that these trigger points have more than intellectual significance. "The squeezing of any trigger point," he warns, "results in some explosion" (83) . That explosion was the Great War, "this century's way of catching up with itself." The exchange rate of adjusting to this new way of thinking is estimated at over ten million lives. The real world consequences of the First World War is that "war in this century has become about itself"--a "field test for new technologies" (87) . Recent events in Bosnia, Somalia, Haiti, and certainly the Persian Gulf War, suggest the extent to which the business of war is constant engagement. Understanding the relationship of probability and certainty, chance and necessity, is no mere intellectual debate for Powers. It is a social imperative if we are to survive our own ability to self-destruct. The emergence of simultaneity and self-reflexivity into scientific theorems and aesthetic principles have political consequences which can not be ignore. Thus, he warns:

> Hyperprogress transmutes, paradoxically, into stillness. It is *still* true that things have changed more in the last thirty years than in all the time since Christ. Since it is *still* true, then *nothing* has changed since Peguy. Social culture has taken tail in mouth and rolled into a benzene ring. Art takes itself as both subject and content: postmodernism about painting, serialism about musical composition, constructivist novels about fiction. At that, the century has become *about* itself, history about history a still eclectic, inversely reflexive, uniformly diverse, closed circle, the homogeneous debris in space following a nova. Nothing can take place in the century without some coincident event linking it into a conspiratorial whole. (83)

The problem Powers confronts is one of position. The era of simultaneity locks observer and observed into an endless battle of determination. It is the same problem Adorno articulated when he claimed that there could be no art after Auschwitz. For Adorno, the mutilated bodies of the concentration camps desecrated the very subject that art must strive to create. There could be no art after Auschwitz because the *potential* of Beauty--that rarefied vantage point from which the artist seeks to dress the scars of living, to comfort the sick at heart, or to imagine better worlds--lay, itself, among the wasting corpses. Without this vantage point, the artist, even if he could manage to look at reality without turning to stone, had no purpose. At best, his work could reflect the death of beauty in the world; at worse, and in most cases, art merely added to the decay.

Postmodernism, for all of its playful energy, is a weary beneficiary of this view. If Adorno reported the fall of the artist from his mountain top into the mangled bodies buried at its base, Powers is here to tell us that the artist has landed in quicksand. With no solid ground on which to stand, the best the artist can now do is to describe, minute by minute, the shifting spaces in

which he finds himself, which doesn't give him much time to try and figure a way out of his predicament. The worse, and of course most likely, response is that the artist packs his quicksand into a yellow brick road, or rather a lot of yellow brick roads, all leading somewhere, but most definitely not back to Kansas.[10] Taking a que from the Wizard--it is far more profitable to invent new worlds than to save old ones--the postmodern artist sets out for groundless horizons, unencumbered by the need to return home.[11]

Unwilling to accept the futility implied by the first position and the disgraceful abandonment of ethical responsibility implied in the second position, Powers sets out to find another alternative. It is a move he will make in all of his fiction, negotiating paradox by finding a new way of seeing. And while looking at the historical connections between Einstein and postmodernism may be fruitful, there are other ways of looking and measuring the world. Though he does not realize it at first, what he needs to unlock the deadlock of determinism in which he finds himself is a surprise.

UNSPONSORED RECOGNITION

In literature, a moment of critical insight is called an epiphany. In science, it is called the instance of aha. In both it is a pivotal moment in which old assumptions yield surprising new ideas. For Powers, this moment begins with an initial mistake. The first epigraph that begins the novel is taken from Proust:

> We guess as we read, we create; everything starts from an initial mistake. . . . A large part of what we believe to be true. . .with a persistence equaled only by our sincerity, springs from an original misconception.[12]

As I suggested earlier, the Powers section is not only a record of his research of how to get from A to B, but it also stands as journal of the creative process itself. If the Ford epigraph represents the need to provide historical context, the quote from Proust is an indication of what Powers must do in the face of the evidence that he has collected. Interpretation may always be relative to the observer; but that does not necessarily mean that all interpretations are relatively equal. Finding a way to measure interpretative value is the way in which Powers hopes to break free of the benzene ring--to find an alternative to interpretation caught in the recursive loop of self-reflexivity.

Characteristically, Powers finds that alternative in a scientific model. "To see an object from a distance is already to act on it, to change it, to be change" (46) . Power's observation is a familiar reworking of the disturbing concept of indeterminacy, demonstrated in science by a conundrum known in quantum physics as Schrödinger's cat.[13] Heisenberg's Uncertainty Principle demonstrated that all observation is a trade off--one can never know simultaneously both the velocity and the position of a subatomic particle. However, indeterminacy takes this proposition one step further, suggesting not only that observation, which is a form of measurement, is inexact, but that the act of observation influences the object under study. But does the act of observation, in fact, determine the state in which the object,

in this case a quantum cat, exists? In order to illustrate what he found a most troubling appropriation of his wave theories, Schrödinger asks us to imagine a cat in a box:

> The cat faces a gun, which is connected to a Geiger counter, which in turn is connected to a piece of uranium. the uranium atom is unstable and will undergo radioactive decay. If a uranium nucleus disintegrates, it will be picked up by the Geiger counter, which will then trigger the gun, whose bullet will kill the cat.
>
> To decide whether the cat is dead or alive, we must open the box and observe the cat. However, what is the state of the cat before we open the box? According to quantum theory, we can only state that the cat is described by a wave function that describes the sum of a dead cat and a live cat.[14]

Quantum theory is hopelessly counter-intuitive. After reciting the above version of the quantum cat, Michio Kaku includes a warning taken from Richard Feynman:

> I think it is safe to say that no one understands quantum mechanics. Do not keep saying to yourself, if you can possibly avoid it, 'But how can it be like that?' because you will go 'down the drain' into a blind alley from which nobody has yet escaped. Nobody knows how it can be like that.[15]

In taking Feynman's advice, I will not attempt to determine if the cat lives in multiple realities, or if the cat's existence at the quantum level is insignificant, or if God merely insured that human intelligence would meet with a roadblock on its way to divinity. (These three positions roughly

correspond to various camps within quantum studies.) The significance of the parable of the quantum cat is the fact that the act of observation does have an influence on the object of study. How we measure determines what we see, or to see an object is already to act on it. For Powers, the significance of the paradox of Schödinger's cat is suggested, not in the explanation, but in the model itself. Potential exists in a vacuum. Only through human action does that potential manifest itself in reality, an observation which allows Powers to wrest action away from its random significance inside of the benzene ring, by investing it with social, not random, consequence.

For Proust, action begins as an initial reaction--that "initial misconception." For Powers, the initial misconception comes on that fateful day in Detroit.

> Stung by three casual glances, I felt that the photographer had stumbled across a great discovery, caught, by talent and chance, an image of great importance, and that no one would have rescued that moment from obscurity if he had not arrested it on film. My first response, triggered by my passing resemblance to one of the figures, was to find out the photographer's name. And later, if possible, to find out and hide away the names and identities of those young men. (37)

It is his passing resemblance to one of the figures that first triggers Powers's interest in the photograph. Significantly, he has no such moment of identification with the "mural-men" in Rivera's fresco who look like insects in their "asbestos suits and goggled gas masks" and who are "crawling in, around, and over their creation" (14) . The juxtaposition of the Rivera mural

and the Sander print is important, not only because it suggests Powers's own preference for aesthetic realism, but because he will find in photography a model for active participation on the part of the viewer.

What Powers begins to realize is that his first response to the photograph--his moment of identification--was a mistake. Stunned by the photograph, he wants to name the farmers. He assumes the significance of the photograph can be traced back to the source, to the biographies of the young men and of the photographer. In framing his search accordingly, Powers misses the obvious, bigger picture. It is not the three men in the photograph that have ignited his curiosity, but the photograph itself.

Slightly before Henry Ford gave the world the assembly line and mass production of commercial goods, photography had already demonstrated the aesthetic viability of the mass distribution of art. In Powers's reading of Walter Benjamin's "The Work of Art in an Age of Mechanical Reproduction," he divides the response to photography into two camps: the anti- and pro-mechanicals. The positions taken by each group are familiar. The former, investing in the originality of a work of art, in uniqueness, in what Benjamin calls the "aura," are deeply disturbed by mass reproduction, which "represents and initiates those values that would destroy beauty, singularly, and all that is human and humane" (254) . The pro-mechanicals, on the other hand, see mass production as a form of democratization of art which results in "a welcome liberation from the tyranny of privileged aesthetics" (254) . Meanwhile, he continues, most of us "take out snapshots, at times out of a love of rare beauty, at times out of a documentary impulse, but mostly as a healing charm against death" (256) .

Thus, Powers locates the value of art, not in its authenticity, nor in the means of its production, but in its ordinary capacity to elicit engagement on the part of the viewer. "What matters," he claims, "is not the slice of history on the emulsion, but our development of it" (306) . For Powers:

> [T]he act of seeing and loving a photographic image calls us to action, but action circumscribed by the image's historical context. Interpretation asks us to involve ourselves in complicity, to open a path between feeling and meaning, between ephemeral subject matter and the obstinate decision to preserve it, between the author of the photograph and ourselves. (257)

It is important to note here that Powers does not submit the act of interpretation to the entirely random response of the viewer. Interpretation, the act of seeing, is not merely a matter of choice or aesthetics--it must be circumscribed within a historical context. Photography gives us historical reality--the three farmers on their way to the dance in 1914 were no trick of the camera. The photograph serves as documentary evidence of their existence. Powers's inability to discover their true identities does not negate their historical reality. But the photograph also demands interpretation. In adding the date to the composition, Sander clearly intends for the viewer to interpret the dance to which the young men are heading as the deathly dance of the First World War. Powers, too, will write these three into a history that was not their own. His fictive narrative of the three farmers, like Sander's Man of the Twentieth Century, circumscribes the way in which we will look at the photograph.

We are back to Schrödinger's Cat. The farmers are now both fact and fiction, alive and dead. The recursive dilemma of Schrödinger's cat is important, not for the limits it places on knowledge, "but because it shows the impossibility of knowing where knowledge leaves off and involvement begins" (206) . By insisting on the necessity for historical context, however, Powers finds a way to reassess the paradox. Just because there is no vantage point outside of a system--there is no way for Powers to interpret the identity of the farmers without recourse to his own motives in doing so--it does not follow that there is no way to gain a critical vantage point from within the system. As Powers explains:

> Because there can be no interpretation without participation, the biographer has to be accountable to some third party that is neither commentator nor subject, independent of the system under observation. If no such independent accountability existed, each judgment would stall in an infinity regress of self-judging. Although we cannot hope to pin down a view of our subject undisturbed by our observation, we can test if we have reached an optimal fit between the two. (207)

There are moments, Powers calls them "moments of unsponsored recognition," where we sense a "logical fit of two interdependent activities--looking and knowing" (208) . By altering our perspective, a random group of trees becomes an orchard. The orchard has an "independent validity," that is "not of the viewer's making" (208) . That independent vantage point in this novel is historical context.

What Powers discerns in his own moment of unsponsored recognition is that: "Every moment of unsponsored recognition calls me to return to the uninspired world, to continue the daily routine of invention and observation, to dirty my hands in whatever work my hands can do" (209) . Art abstracted into icon or artifact ignores the ability of a work of art to produce not just sensation--Powers is deeply agitated by the Rivera mural--but participation. The value of his research, his fiction, is not in what it might recover from the past, but in what he can create and imagine for the future--but not any future. For the future, like the past, must always be circumscribed and accountable to the present. It is from this vantage point that Powers sees that the photograph of the farmers "was less a document for archiving than it was a call to action" (209) .

SHIP OF FOOLS

If the Sander print leads Powers to action, it is a face lurking in the Rivera mural which helps him define what action he might take. Powers finds among the ranks of "crabbed industrialist and innovators" (15) an unlikely source of inspiration. Henry Ford, he tells us, was the "improbable meeting of pragmatist and idealist, innovator and reactionary, peacemonger and war profiteer" (117) . Of particular interest to Powers are two events in Ford's biography. The first is the private minting of some copper pennies--commemorative coins with Ford's likeness replacing Lincoln's, and the inscription *Help the Other Fellow*. The second was his attempt "to help the other fellow with a vengeance" (119) .

In 1915, concerned that the war was lasting too long, Ford took it upon himself to organize a peace mission. His idea was to get important people and celebrities to sail over to Europe to serve as a mediating group between the warring parties. The Peace Ship was, however, a resounding failure. There was trouble getting support and participation. Once out to sea, arguments broke out on board. When the ship finally did landed in Oslo, Ford made a brief appearance, talked not about peace, but about a new tractor, before abandoning the goodwill mission and heading for home.

What Powers finds in the Ford biographies, admittedly missed in the first read, is a new lead, an idea of what to do next. Ford minted his own pennies--"literally making his own pile" (210) . He had not only the audacity to think that he could change things, that he could make a difference, but the ability to transform "the mundane" into something more, something other than what it was--money. While clearly recognizing the disturbing aspects of Ford's own desire to transform culture, Powers sees that you don't have to be a megalomaniacal industrialist to believe that individual action can make a difference. Motives matter. Compassion, not arrogance, is the key. If the unsponsored moment of recognition is a call to action, that action is the creative work of imagining a better world. The question for Powers, then, becomes how best to mint a new kind of exchange, to transform the mundane act of writing into a moral plea for action. How does one go about creating an economy of compassion?

Having learned a great deal from his research, but very little about his farmers, Powers's recognizes that "To look anyway beyond my own daily routine was to go too far afield" (212) . The photograph that had sent him

first into the pages of reference books, finally takes him into the sitting room of Mrs. Schreck, a night cleaning woman, who gives him a valuable "lesson in how to see" (263) .

In one of the most moving moments of the novel, Powers, on leaving Mrs. Schreck's after a turn on an old player piano, recognizes that she is, as we all are, "genetically slated for disappearance" (332) . There would be no evidence of his afternoon with her, no permanent document that she ever existed. But if not permanent, Powers nevertheless finds proof enough:

> Mrs. Schreck would disappear. My visit to her would disappear as surely as the notes we'd pumped out of the old player disappeared into the surrounding silence. Only on one count did I have proof of ever having met the woman: only through my having shared Mrs. Schreck's story could the photo of the three farmers *auf dem Weg zum Tanz* be so thoroughly and permanently changed. I would never again see the old image in the same way. That was my proof that the woman had existed. (333)

She too has a copy of Sander's print. One of the young men reminded her of her finance who died long ago. It is an idea of stunning simplicity. Every picture doesn't tell a story. It tells as many stories as there are viewers. Authority shifts. It is not the photographer, but the viewer who must construct a narrative that gives significance to the print.

> For photographs, like the genetic material in each living cell, represent coded material from the past, an encrypted solution to the problem of survival.
>
> And just as genes are retested in the crucible of individual experience, so must the photographic code be reinterpreted with each viewing. The end of the retesting and reinterpreting is to add to the code, improve its survival rate. Mrs. Schreck had improved the Detroit image for me. (334)

Three Farmers is what Powers offers the reader as proof that art is capable of demanding social engagement. An initial misconception, his passing resemblance to one of the farmers, leads him through "that unmitigated act of violence called the twentieth century" (212) and into an exploration of the limits of art and of knowing. The two fictive narratives offer a version of the past and of the present. If the novel wove only these two tales together, it would still be an impressive display of talent and an interesting critique. However, it is the Powers section, as I suggested earlier, that becomes our own model for seeing. By tracking his own involvement with a work of art, he demonstrates not only the work of engagement, but also suggests that there can be an art after Auschwitz, an art that accounts for indeterminacy and uncertainty without sacrificing history and common sense. Just as art does not exist in a historical vacuum, it is important to recognize that Powers is drawn out of the realm of abstract research into Mrs. Schreck's living room. Knowledge disconnected from human experience is as meaningless as art alienated from history.

In a rare display of the transformation of data into creative design, Powers explains how the first moment of impact with the three farmers initiated an idea which he worked over and over, revising constantly in the

light of new research, an idea he has worked into the fictive narratives of the three farmers and of Peter Mays and, finally, into his own story. By mapping his own involvement with the photograph, Powers proposes an alternative to art as placebo:

> With two slightly different views of the photo--the essayistic and the imagined--side by side, I needed only the stereopticon itself to bring the image into fleshy three-dimensionality. Walking home through the drifts in the dark, I began to imagine what shape that machine might take. I saw the thin film of the image spreading out in two directions, back through the past, through catastrophe, to that idyllic day that had brought the taker and the subjects together, and forward, far forward in time until the product of that day crossed the path of one who, like me, took on the obligation of seeing. (334)

He includes the account of the making of the novel as a necessary part of the process of transforming private knowledge into public action. Far from hoping to impress the reader with his creative brilliance, Powers is earnestly asking the reader to pursue the same daunting task. "I am every day more convinced," he tells us, "that it is the work of the audience, not the author . . . to read into the narrative and supply the missing companion piece, the stereo view" (335) . Art which has abandoned its function to induce the participation of the audience can do little to "extend the code of survival hidden in the past" (336) . The common project of humanity, if the concept is to survive, is to imagine a world in which the pain of human suffering is alleviated by each act of individual will joined in the common pursuit of human happiness.

Charles Newman in an essay on the state of contemporary American fiction for the New York Times asks an important question: "Have the

velocities of recent change been so great that we do not know how to trace their lines of force, that no sensibility, least of all narrative, has been able to articulate them?"[16] The answer, I believe, is no. Narrative, in fact, has an ability, unique to its form, to decompress time and space in such a manner that our experience of reality approximates what we know to be true. In choosing for his first novel the daunting task of tracing the lines of force which have so hopelessly scarred the aspirations of the twentieth century and by bringing into focus the connecting realities of history, science and art, Richard Powers affirms that narrative, indeed, can do what it has always done best. It can inspire wonder for a world much in need of it, and it may even show some of us a way to get back home.

It is the work of his second novel, however, to map out the consequences of narrative which overestimates the power of its own invention. In a variation on Feynman's warning about quantum cats, Powers suggests that fiction which abandons the world merely because it can, risks disappearing into a narrative blind alley, sentenced by words to prisons of its own design.

Notes

[1] James Hurt, "Reading: Optical Allusions," a rev. of Three Farmers on Their Way to a Dance in Chicago Reader Feb 7, 1986:12.

[2] This epigraph is referenced as Anne Jacobs, The First Henry Ford: A Study in Personality and Business Leadership.

[3] David Harvey provides an invaluable analysis of the relationship of rchitecture and capitalism to the interests of Modern and Postmodern aethetics. I have used his insights throughout this discussion. See, David Havey, The Conditions of Postmodernity: An Enquiry into the Origins of Cultural Chage (Cambridge: Basil Blackwell, Inc., 1989).

[4] Friedrick Engles, The History of the Working Class in England, tran. W.O. Henderson and W. H. Chaloner (Stanford: Stanford UP, 1968).

[5] For more information on the history and design of the Renaissance Center, see W. Hawkins Ferry, The Buildings of Detroit: A History (Detroit: 1980) 393-395.

[6] John Portman, "Architecture for People and not for Things," Architectual Record, January 1977: 133, excerpted from John Portman and John Barnett, Architect as Developer (New York: McGraw-Hill, 1974). All subsequent quotations attributed to Portman are taken from this article.

[7] I. Bernard Cohen, Revolutions in Science (Cambridge: Harvard UP, 1985) 370.

[8] Cohen 175.

[9] Cohen 174.

[10] There is only a brief allusion to the Wizard of Oz in this novel. After discovering the futility of his efforts to isolate the exact identity of the three farmers, Powers acknowledges: "To look anywhere beyond my own daily routine was to go too far afield" (212) .

[11] For a comprehensive critique of postmodernism see Terry Eagleton, The Ideology of the Aesthetic (Cambridge: Basil Blackwell, Inc., 1990) and David Harvey, The Conditions of Postmodernity.

[12] Cited in epigraph as Marcel Proust, Remembrance of Things Past.

[13] Like Gödel's Incompleteness Theroum, Heisenberg's Uncertainty Principle, and Einstein's Theory of Relativity, the principle demonstated by Schrödinger's Cat also helped to dislodge the long-held assumption that absolute measurement and accuracy was possible. The indeterminacy of quantum particals allows for the theoretical possiblity that the subject under observation can be qualitatively altered by the act of observation. For more information on quantum physics written for a general audience see Edward Speyer, The Six Roads from Newton: Great Discoveries in Physics (New York: Wiley, 1994); Hans Christian von Baeyer, The Fermi Solution: Essays on Science (New York: Random House, 1993); Heinz Pagels, The Cosmic Code: Quantum Physics as the Language of Nature (New York: Simon, 1982); Micho Kaku, Hyperspace: A Scientific Odyssey Through Parallel Universes, Time Warps, and the 10th Dimension (New York: Anchor, 1994).

[14] Michio Kaku 261.

[15] Kaku 262.

[16] Quoted in Harvey 350.

CHAPTER III

PRISONER'S DILEMMA:
A PORTRAIT DRAWN IN BUTTERFLY WINGS

There are some things so serious you can only joke about them.
Niels Bohr

If Three Farmers is primarily about Powers's attempt to find a way to include the world in his art, Prisoner's Dilemma is his attempt to find a way to put art back out into the world again. The two novels, of course, have a good deal in common. Both range through the history of the twentieth century in multiple narratives, the first novel juxtaposing the present to the events surrounding the World War I, the second juxtaposing the present to the events surrounding World War II. Both also deal with the difficulty of finding a moral ground for fiction in a postmodern culture hostile to grand narratives and authority. Both explore the nature of reality as it has been derived through science. However, the sweeping scope of the first novel contrasts sharply with the domestic setting of Prisoner's Dilemma. Powers has substituted his panoramic, wide-angled viewer for a portrait lens in order to focus more tightly on the dilemma at hand: How can one man--one book, *this* writer--make a difference in a complex world?

The common ground that situates all of the characters in the novel--fictional, real and meta fictional--is a world in which "nobody really expects that even collectively, which is impossible, we can fix things" (169) . It is a

world already lost to the nightmare of consumerism. The City of Tomorrow exhibit at the 1939 World's Fair is a commercial venture, like the Fair itself, which collapses the distinction between reality and representation as the forces of commerce attempt to transform reality into a representation of itself. However, even young Bud Middleton--"himself a creation of that same fair" who "has just the degree of insight the fair gives him and no more"--recognizes "that fitting all America into the tube would take a tube the size of all America" (41) . The problem is that reality will not stand still long enough for a decent snapshot. Thus, more and more images need to be produced to cover more and more of the landscape. For Powers, the World's Fair signals a fundamental shift in the balance of perceptual power. No longer able to command our exclusive attention, reality (the-world-as-is) slips into a pool of possibilities, just one more scenario in the advertising game of the world-as-it-can-be. In the wake of this shift, the work that fiction might do has been seriously compromised.

Prisoner's Dilemma, like Three Farmers, is an attempt to work through both the potential and the limitations of modern and postmodern aesthetics, for this is a novel about the purpose and practice of fiction. Like the characters in this novel of dilemmas, Powers finds himself caught in a dilemma of his own: If the world is so cluttered with representations as reality, then what chance does fiction, as fiction, have to compete. As the title would suggest, it is a dilemma not easily resolved.

THE PRISONER'S DILEMMA[1]

Eddie Hobson, Sr., the enigmatic father and itinerant history teacher who wanders between the family porch in DeKalb, Illinois and the fantastic world he invents called Hobstown, introduces a concept taken from game theory called The Prisoner's Dilemma early on in the novel. It is a logic puzzle, which according to Eddie's version, goes something like this:

> Two men are summoned into Joe McCarthy's office . . . sometime in the early 1950's. The gentlemen are both prominent public servants. The senator says, 'Fellas, we know that you are both Reds. I've got plenty of evidence for an indictment, but not enough to guarantee the conviction you deserve. Let's make a deal. If either of you comes forward with the dope on the other, the man who talks will go free and the other will fry. If neither of you spills the goods on the other, you'll still suffer public humiliation at the very least.
>
> "What happens if they both squeal?" Eddie Jr. interrupted, drawn into the game despite the situation.
>
> "Good question, number-two son. That's important. If they both rat on each other, their double-crosses partly invalidate the other's testimony. But they still lose more than they would compared to shared silence." (69-70)

Eddie goes on to draw a chart, explaining that if both squeal they both serve time, only neither one will go free, nor will either one fry. There are many versions of the Prisoner's Dilemma, but they are all intended to gauge one prime factor: conflict of interest.

Although the premise of the Prisoner's Dilemma has been around for a very long time, the formal designation and the attendant theoretical research to find a solution parallels the escalation of the Cold War, and is directly tied to the development of political policy that followed World War II.[2] John von Neumann, the brilliant mathematician best known today for his

work in developing digital computers, published a 1944 treatise that was to become an overnight sensation and the cornerstone of a new field of study.[3] The Theory of Games and Economic Behavior sought to expand the application of mathematics into the realm of conflicting human interests. Game theory is based on the assumption that two parties are in conflict and that the resolution of that conflict will depend on the joint action of both parties. Unlike chess, a game in which strategy is based on the *open* moves of an opponent in a win/lose scenario (a situation rarely encountered in real world conflicts), von Neumann's games calculate the probability of determining the actions of an opponent schooled in bluffing and deceit. He developed a mathematical proof called the "minimax theorem" in order to demonstrate that there is *always* a rational course of action in any game, be it poker or war, provided the interests of the opponents are completely opposed.[4] Using this as a foundation, game theory was then applied to economic systems in an attempt to provide an axiomatic base for economics, so that "the typical problems of economic behavior become strictly identical with the mathematical notions of suitable games of strategy."[5] Von Neumann's interest in games, however, was not limited to economics. In 1944, he was also working on the Manhattan project.

Six years after the publication of The Theory of Games and Economic Behavior, two other scientists, Merrill Flood and Melvin Dresher, formulated the conditions for the Prisoner's Dilemma. It is impossible and unnecessary to try and separate the theoretical work done in game theory from the emerging Cold War politics of the late forties and early fifties. For one thing, the advent of atomic weapons and mass and mutual destruction insured an

interest in conflict resolution. However, it was not in the abstract debates among university scientists that game theory and the Prisoner's Dilemma first received significant attention, but in the government-funded, corporate-sponsored offices of the RAND Corporation.

It is difficult to ascertain what the original function of Project RAND (for Research And Development) was meant to be, primarily because of the sometimes conflicting interests of its founders. The war over, there was great concern that the scientists so important to the war effort would retreat back into their universities, leaving the military complex bereft of an essential resource. Franklin Collbohm of Douglas Aircraft secured a legally questionable commitment from Army Air Force General Henry ("Hap") Arnold of $10 million in leftover defense funds for a research grant intended to attract top scientists. After a shaky three year start in which the government's attachment to Douglas came under attack by other aerospace companies, the RAND Corporation was chartered in March of 1948 as a non-profit organization set up to "further and promote scientific, educational, and charitable purposes, all for the public welfare and security of the United States of America."[6] With a line of credit extended by the Ford Foundation and a lucrative and initially exclusive contract with the Air Force, RAND attracted an impressive array of scientists, among them von Neumann, Flood, Dresher, Collbohm, Morgenstern--they even brought in Margaret Mead as a consultant in one instance. These recruits were given the freedom to study just about anything that was of particular interest to them, even if these studies had no direct bearing on military operations. RAND

members, in fact, could even refuse studies proposed by the Defense industry should the researchers have no interest in pursuing the matter.

Game theory in general, and the Prisoner's Dilemma in particular, seemed to represent an irresistible attraction to the elite gathering of researchers and military strategists at RAND. By 1950, the Soviets had a bomb, and public debate over "preventative warfare" was mounting. Even Bertand Russell, a well-known pacifist and popular philosopher, argued for a first-strike policy.[7] Game theorists developed new strategies in which to play out the conflict inherent in pitting the self-interest of one group against the opposed self-interest of another group, trying to calculate the mathematical probabilities of an outcome in any given situation. For all of its impressive computations, game theory has obvious limitations, which were understood by the theorists, if not by the politicians and generals who employed them and who were eager to rely on odds that might be in their favor. In an enlightening essay published in 1962, Anatol Rapoport noted that:

> game theory has been embraced in certain quarters where Francis Bacon's dictum "Knowledge is power" is interpreted in its primitive, brutal sense. The decision makers in our society are overwhelmingly preoccupied with power conflict, be it in business, in politics or in the military. Game theory is a "science of conflict." What could this new science be but a reservoir of power for those who get there fastest with the mostest?[8]

The core problem is that in life it is impossible to correctly predict the preference for mutual cooperation over individual interests. With enthusiasm and funding at a peak, many of those attracted to game theory chose to

ignore the limits of mathematics imposed by Heisenberg and Gödel. In spite of von Neumann's warning that pure mathematics is a dangerous folly precisely because it aestheticizes the real world utility which should govern all scientific pursuits, many game theorists seemed to believe that mathematical models could accurately simulate real life.[9] However, there is simply no accounting for irrational behavior, since it is, by definition, behavior which does not adhere to logic; and there is no system of analysis that can possibly account for every contingency. All the models in the world would never adequately exhaust the ability of human actors to devise new strategies.

What the Prisoner's Dilemma and its subsequent variations do, however, is raise an important issue, one essential to our survival on this planet. As William Poundstone explains:

> This is what we've been trying to do all along with laws, ethics, and all other cooperation-promoting social machinery. Von Neumann was probably right, in that the long-term survival of the human race depends on our devising better ways to promote cooperation than any now in existence. The clock is still ticking.[10]

Devising a mechanism that will promote such cooperation is precisely the task at hand in Powers's second novel. If mathematics can't do the trick, maybe words can. The fact that Powers does not in the end resolve the dilemma, but chooses instead to rephrase the paradox in a leap of faith not unlike von Neumann's, in no way detracts from the poignant tale of his trying.

In looking for what it is that narrative might do, Powers (always the good scientist) takes a look first at what it is narrative cannot do.

HOBSON'S CHOICE

Where you are, Eddie Hobson tells his children, depends on how you got there. Eddie, it turns out, has been a lot of places, moving and uprooting his family further and further into the heartland of America. It was the death of his brother, a stateside accident at an air force base in Brownsville, Texas in 1944, that brought Eddie Hobson to the white sands of Alamagordo as a young PFC working furiously to make the engines of war safe. Standing outside of his barracks one mid-July night in 1945, he watched as an overly bright and premature sun appeared on the horizon. The literal and metaphorical fallout of the event imprisoned Eddie Hobson in a world where, as his son Artie, in a variation on Einstein, puts it, "Everything has changed except my father's power to make any difference" (322) . Confronted by the disparity between the atomic blast and the other great event of his life, a trip at thirteen to the 1939 World's Fair, Eddie cannot reconcile the promise of the City of Tomorrow and the reality of Alamogordo. As he sifts through the history, looking for some evidence that individual action counts for something, "Ought and Can tear him up between them. The danger of the search drives him, pointless and alone, into a place of no recovery" (248) .

That place, for Eddie, is Hobstown. Hobstown is Eddie's narrative attempt to rewrite the history of the war. It begins in 1939, but not with the invasion of Poland on the first of September. It is spring, and a time for youthful enthusiasm. A time for awe and wonder at the ability of the

imagination, with the help of some very fine engineering, to literally transform the American landscape "from an ash dump into a model of the future" (43) . This is a boy's story and old man's fantasy featuring the World's Fair in Flushing Meadows and the father of fantasy himself, Walt Disney.

In the first of the Hobstown sections, Eddie is thirteen. Were he more like his pen-pal from the fair, Bud, a member of the "mythical Middleton family" who "serve as a model Americans in this model America" (42) , he could ignore the disparity between the fairgrounds and the less perfect world outside. However, Eddie at thirteen, especially an Eddie reconstructed from the memories of a dying man, knows "without knowing that something terribly wrong infects the world in 1939" (45) . And what Eddie knows will trap him in a prison for the rest of his life:

> But the real crisis of 1939 is not just his helplessness in the face of the coming violence, the final, unthinkable crimes that will end up, as always, harmless in history books. Little Eddie's great terror is that his life is more benign and beneficent than ever. An unimaginable gap opens between the place people make to live in and the place springing up all around them and despite them. Enjoying life like everyone else might actually make things worse. The possible no longer keeps pace with the necessary. Little no longer divided cleanly into Big. Eddie Hobson no longer has anything to do with events. (46)

Possibility unfettered from responsibility or necessity, a technological version of *l'art pour l'art*, has, for Eddie, a profound effect on the ability of individual action to make a difference. It is a gargantuan task, but Hobstown, a private narrative he spins into a tape recorder that not even his family is privy to, is Eddie's attempt to rescue humanity from itself in "a world already lost."[11]

To do so, he enlists the unlikely aid of Walt Disney. The reason for the choice is simple. Disney created an ideal everyman for the age, "a pretty nice fellow who never does anybody any harm, who gets into scraps through no fault of his own, but always manages to come up grinning" (98) . That Mickey Mouse is a cartoon character makes him no stranger a hero than his mythic counterparts. Unlike Superman or even Hercules, however, Mickey "is simply the finest provider of escape form the confusing, opaque, overwhelming, paralyzing, deadly serious, irreversible, and appalling times" (98) . His antics are silly and have no real value other than entertainment. He is not out to stop crime, preserve order, or placate the gods. The world that is lost is only the real one. In its place, Disney, armed with "the most famous voice in all the world," erects a celluloid mirage--a collage of seemingly harmless images which distract the viewer's attention, in much the same way that the Fair shifts attention away from the poverty just beyond its pristine promise, and from the "'color-coded zones [where] the place degenerates into a nudie show where near naked girls tussle with octopi" (43) .

Read against the backdrop of the war, however, Snow White and Fantasia become not so subtle or silly pleas for American intervention in the war. Evil witches and poisoned apples have an appetite for global domination which only the fair prince, read America, and his little allies can stop. Mickey's careless abuse of power in setting the brooms to work (England's inability to deter the rise of fascism) results in a near fatal drowning, averted only by the timely return of the master. America enters the war. While Disney's real participation in the war effort is a cozy tale of government contracts and bank loans in exchange for some of the best

propaganda films to come out of the war, Eddie's Walt is something else altogether.

In the Hobstown version of history, Disney's grandfather was the product of a liaison between a midshipman and a geisha girl. This is a tricky issue in the spring of 1942. Roosevelt has approved the plan to remove over 100,000 Americans of Japanese Ancestry (AJAs) into concentration camps in Colorado, Montana, and Utah. Disney blackmails the government into giving him 10,000 AJAs, a hefty sum of money, and the green light on a new project he has conceived to end the war. The project, "nothing more than airy nothingness with an urgent motive" (183) , finds a group of ex-AJAs, from mostly technical backgrounds but with little film experience, and Disney in a Southwest desert erecting a model community of their own. In this fictive Disney World, they build World World here instead of the bomb.

And here, too, Eddie and Disney meet. It is Eddie's big chance to set things right--if only in fiction. Snatched from reality "just in time, before he is touched by outside developments," (263) Eddie is enlisted by Disney as "the moral and motive force" for You Are the War, a film to end all films. Eddie will be "the national spokesman against Despair" (265) . Disney's inspiration for You Are the War, and Eddie's participation, is based on the simple, if profound, observation that "The world is not millions; it is one and one and one" (265) . The actions of a single individual can resonate through the lives of thousands, of millions.

It's a beautiful idea, and it might have worked. But even World World couldn't keep the real world at bay. It begins with a single defection. Sato, one of Disney's AJAs, breaks the spell: "We belong out there, Walt. Nothing

can be fixed, except from inside." In spite of the mounting casualties and unimaginable cruelties, Sato insists that "It's wonderful, out there, Walt. Something remarkable is about to happen. We've got to meet it" (272) . And so he goes, willing to take the risk of dying as the only way of living. it is a remarkable event, not only as an act of courage on Sato's part, but in the context of Eddie's Hobstown as well. World World is Eddie's attempt to salvage the mess that had already been made of Hobstown, which itself was only a smaller version of learning to survive the rupture of history--"the final triumph of self-defeating realism, a last mass surrender to dreadful practicality, the dying spark of his age, the Age of Utility, the beginning of what will be a long and spasmodic end" (308) . Sato's defection from World World marks his allegiance to a dying and impractical age. He makes a choice. For Eddie the consequences of this fact are enormous, though not yet quite apparent.

It takes Mickey, at the conclusion of the final reel of You Are the World, to show Eddie the consequences of choice. The vision is a nightmare. They watch as the explosion of global populations, the emergence of local outbreaks in an on-going global war, environmental devastation amidst a "landscape of hysteria and accusation" (310) batter the best of myths ever created by human imaginings--the belief that life intrinsically matters. For Eddie, watching the horror, "a rift tears open between little and big." It is the same tear in the fabric of reality ripped open by the death of his brother. No more than the real one, this fictional Eddie, cannot avoid the inevitable consequences of living through this century, this war. But how had this happened? How could World World, how could

Hobstown and the World's Fair lead to the same nightmare as the blitzkrieg of Poland, death camps, and the explosion of the atomic bomb?

In answer, Mickey begins a now familiar tale:

> It's really simple: two men are put in separate rooms. They can play it safe or they can put their faith in the hands of another. Lack of trust begets lack of trust. The fear of being undercut trickles into the garden, as irreversible as falling. The choice of those first two people filters into four, then eight, and then several billion. (311)

Once again, it is the old story of self-interest in conflict with mutual collaboration. It is a biblical tale of broken faith, fear, and the fall--only this time it is not God in whom we have lost our trust, but each other. It becomes ever Us against the Other Fellow. The lesson of the future, of the perpetual enactment of the Prisoner's Dilemma, is that human nature can never change. The pursuit of self-interest is as inevitable as breathing. With the end of the war, and the illusion that he might save the world shattered, Disney joins the several billion others unwilling to trust the Other Fellow. In his final exit, he tells Eddie that "the time for dreams has passed." It's time now for "Park Warfare" (330) .

Eddie Hobson created Hobstown in order to recreate the world, but in so doing he discovers that the world cannot be saved by narrative alone, that even in narrative worlds, we are still split open by the old dilemma. Left with the futility of his own words to make over the world into someplace better, Eddie Hobson finds some comfort in the pathos of Rudyard Kipling's "If"--if he can only keep his head, if he can only last the distance--slipping into the

private salvation of "if only." He started with the best of intentions, looking for a treaty, a model world that might become a "life-sized display, out in the open air" (83) . But something happened in building that life-sized display. It replicated too closely the world it tried to save, dissolving into the chaos it sought to contain. Eddie finds, too, that it has left him "cut adrift in the world for a while and failed to show him the way back home" (16) .

The first epigraph to the novel is taken from T.E. Lawrence, a man who also had taken it upon himself to lend destiny a hand. It reads: "I am still puzzled as to how far the individual counts: a lot, I fancy, if he pushes the right way." This is the same Kiplingnesque Individual to which Eddie clings, the one who can survive and the one who can change things. Just as Mickey Mouse is an everyman for a new age, so, too, is Eddie Hobson. Only, they represent different halves of the same century. Eddie is, at heart, a modern man, ordinary it would seem, but with an extraordinary desire. He wants to make the individual count for something so that the individual might then be able to do something, to change the world into a better place. Stephen Spender once characterized modernism as an "Invention through art of a *pattern of hope*, influencing society" and as "the idea of an art which will fuse past with present into the symbolism of a *shared life*."[12] This statement aptly describes Eddie's work in the construction of the Hobstown narrative as well.

In a novel about narrative, it is not surprising that Powers offers a critique of the limits of modernism. Art simply cannot compete in a one on one with world. Walt opts for collaboration. He will build his theme parks, and who knows, maybe he can find a way to subvert the system from within. Eddie, on the other hand, disappears under the weight of his guilt at having

failed to do what cannot be done. Modernism, with its myth-making patterns of hope, is undercut by its need to believe in the reality of the myths it creates. The linchpin which topples the whole project, is that modernism, in order to know what kind of myths to create in the first place, must keep constant checks on the world it is trying to save by keeping its distance from it. It would be a balancing act of great delicacy in any case, even if it could be done, but the reality myth wants to remake is like that quantum cat--multiple and indeterminate, a myth in the making.

But if the Hobstown narrative contains an implicit critique of modernism, it also holds postmodernism to a similar accounting. In what might, at first glance, appear to be yet another recursive loop in this mobius narrative, Eddie Hobson makes a final entry into his dictaphone, the splendor and terror of World World dissolving as he speaks:

> Let's start again, from scratch. Let us make a small world, a miniature of a miniature, say an even half-dozen, since we screw up everything larger. Let's model the daily workings of an unremarkable, mid-sized family, and see if we can't get it right. A family of six, who had one halfway happy summer vacation on the Pacific a decade ago. (333)

It is a beginning for the story that we have been reading. We already know the six: Artie, Rachel, Lilly, Eddie, Jr., and their parents, Ailene and Eddie. There is a difference, it would seem, between fantasy and fiction. The billboard, desert community of World World was a fantasy of escape--an attempt to remake the world from the outside. But as Sato points out, there is no outside of living, only inside or death. Having abandoned the grand

narrative, Eddie begins again, on a smaller scale. It may be just the map he needs to connect little and big, in order to circumvent the inevitable future implied in the Prisoner's Dilemma. Unfortunately, this understanding comes to Eddie too late. Having always been an enigma, he leaves his children one final clue: "It's one of those unrepeatable days in mid-May, and all those who are still at home sit down to dinner" (333) --an unremarkable beginning for a story that must be completed after his final disappearance.

Open-ended and incomplete, this new story nevertheless begins a tale intended to work out the complex issues of living and dying, of love, disappointment, confusion, and joy with the express purpose of gaining insight, and more importantly of passing that insight along. In giving up on Hobstown, Eddie gives up, not on the ability of narrative to affect change in the world, but in the ability of narrative *alone* to survive with any meaning. World World, remember, only begins to breakdown when Sato first rips through the simulation to expose the reality underneath. Reality may be mediated by our representations of it, for indeed, we have no other means to access it. Nevertheless, it does not follow that our representations can replace the necessary perspective imposed by the distance between the world and our articulations of it. In an effort to acknowledge the indeterminacy and uncertainty inherent in the act of observation, the postmodernist forgets to maintain the very distinction which makes even that observation possible. In mistaking the potential of multiple realities for the existence of multiple realities, postmodernism loses its ability to gain perspective. Eddie, in trying to focus on alternatives, as he does in Hobstown and World World, ignores the world he is trying to fix. In effect, he

brackets out the wrong reality, trying to save his fictional reality, rather than trying to use fiction to save the world in which he lives. In inventing World World to save Hobstown, Eddie abandons his family and his life in the process. This is the danger inherent in postmodernism. Potential, like infinity, is apt to drive one either into maddness or absurdity. One can either attempt to catalogue all realities, as Eddie does, or one accepts the futility and adds to the confusion--Walt's choice. Having tried one, and unwilling to participate in the other, Eddie, finally, opts for the only viable alternative left. In the process, he opens the door for something altogether new.

CRACKPOT REALISM

It is Artie, the eldest son, who sees the unsettling consequences of his father's cartographic desire to re-map history, "to undo what was done to him out in the desert" (243) . As he sifts through the family archives trying to piece together his father's history and his own, Artie finds that they are both "boxing against an unbeatable ghost" (241) . For Eddie, that ghost is the maxim that where you are depends on how you got there. Everything that happens matters. In trying to expose the staggering abundance of historical connections, he loses himself in the search.

For Artie, the ghost is simply the enigma that his father has always been. He comes across a photograph and sees for the first time what he should have seen all along:

> Now I must find in his surviving records--a way to forgive myself for not seeing how sick my father really was. I must find, in his life, the proof that history is not the big, which will never reform, not the little, which will never know where it is. I must be coaxed to act on my own. Tell me how free I am, Dad. Tell me how free I am. (251)

Trapped by his father's own life of abstraction, Artie realizes that he must find a way to circumvent his father's dilemma, some way to break free of the isolation that separates global events and local history, the isolation of living in the world alone. Ironically, on the very night of his father's final disappearance, Artie discovers in an instant "the only and awful way back to We" (313) .

Having earlier rejected the Disney Tit-for-Tat, fight fire with fire solution and frustrated by the equally devastating consequences of his father's attempt at non-cooperation--both losing scenarios--Artie hits upon an idea that is almost too simple to work. He calls it Crackpot Realism: "If guarding one's self-interest condemned both player and antagonist to the perpetual worse case, then self-interest was not the self's best interest" (313). Or, put another way, "the only way out was to release the us-and-us that was trapped inside the you-verses-he." The way to break out of the matrix circumscribed by the Prisoner's Dilemma is not to disappear into meta-history, nor to sell out. A Hobson's choice, after all, is no choice at all. What Artie finds in the attic, leafing through the family archives, is a way to rephrase the question, a way to pull back his perspective far enough so that he can see what was in front of him all the time. Since it was a mathematician who first gave Eddie the idea for his own prisoner's dilemma, it is only fitting that it is another mathematician who gives Artie the key to

decode the random patterns of consequence that have so effectively imprisoned his father.

Alan Turing, like Artie, was confronted by an enigma, only this one was a machine, the German Enigma Machine.[13] The Enigma had actually been around since 1923 and was used commercially by financial institutions to transmit data. But with war on the horizon, the Germans used an electronic device to create an additional level of encryption that would make decoding impossible. Hired by the British government in 1939, Turning devised a machine that could be programmed to recognize and isolate certain patterns, such as the frequency and probability of certain letters. It worked. The British Navy began intercepting German U-boats. The Germans, confident that the Enigma was safe from decoding, blamed the spy-network.[14]

When Artie finds his father's Hobstown tapes, he discovers that even Eddie couldn't give up the hope that there was something he could do. And like Artie's Crackpot Realism, the idea was there all along. It was in Hobstown, in a brief account of Turing's success in breaking the Enigma. In cracking the code, Turing gave the "informational edge" to the allies, which itself created a different dilemma: use the information and sink the boats, or keep silent and preserve the element of surprise. Either way, lives are lost. What Eddie sees in Turing's handiwork is that "Every loss we foresee but do not prevent is partly on our hands" (212) . Or as Artie rephrases it: "What we can't bring about in no way releases us from what we must" (343) . It is in the self's best interest to ignore the probability of failure. However, to do so, there must at least be the possibility of success.

CHAOS

Just before Eddie leaves World World, he wonders out loud about who will open the time capsule if humanity succeeds in destroying itself: "His only answer is the beating of insect wings" (312) . The allusion here is to chaos theory. Artie recalls, during a late afternoon game of football with his younger brother, a phenomenon taken from chaos theory known as the Butterfly Effect: "That model of random motion describing how a butterfly flapping its wings in Peking propagates an unpredictable chain reaction of air currents, ultimately altering tomorrow's weather in Duluth" (94). For Powers, chaos theory provides a model for connecting not only the different narratives such as Hobstown and the account of the Hobson family. It is also the elusive means of reconciling the elusive paradox of the Prisoner's Dilemma.

Chaos theory was an accident just waiting to happen.[15] The story goes that Edward Lorenz, a meteorologist and mathematician, was investigating weather patterns at the Los Alamos labs. There was some trouble with the computers and Lorenze decided to enter the data again, only rather than starting from the beginning, he entered only the data that was scrambled after the computer shutdown. It was tedious work. When the new print-out arrived, Lorenz realized he must have made a huge mistake in entering the data. This print-out looked nothing like a previous one developed from the same data. After a series of tests, he was astonished to realize that even a minuscule mistake, a change in the initial set-up of the data, produced large-scale anomalies. These weather patterns fail to

conformed to the Newtonian notion that "given an approximate knowledge of a system's initial conditions and an understanding of natural law, one can calculate the approximate behavior of the system."[16] Minor anomalies or alterations in the system should not, therefore, effect major changes. What Lorenz discovered, however, was that even a small alteration in the initial conditions produced catastrophic results.

In order to account for the complexity of a system capable of infinite non-repeatable patterns within the deterministic nonperiodic flow of weather patterns, Lorenz designed a three dimensional model of double spirals that on paper strangely resembled the wings of a butterfly. This early demonstration of chaos visualized a hidden order that lay within the disorder of random patterns. James Gliek, author of the influential "biography" of chaos theory, explains the significance of the event:

> In science as in life it is well known that a chain of events can have a point of crisis that could magnify small changes. But chaos meant that such points were everywhere. They were pervasive. In systems like weather, sensitive dependence on initial conditions was an inescapable consequence of the way small scales intertwined with large.[17]

However, it was the work of Ilya Prigogine that developed the more significant applications of chaos theory. Using a mathematical model, Prigogine was able to explain how, under special circumstances, order could emerge spontaneously from chaos. The problem, as he sees it, is that quantum theory was designed to account for anomalies at the sub-atomic

level using an abstract idea of space so that the activity of particles is measured in a vacuum. As he explains it:

> There is always a temptation to try to describe the physical world as if we were not a part of it. We could then conceive of velocities of propagation of arbitrary, even infinite, speed and the determination of initial conditions with infinite precision. But seeing the world from the outside is not the object of physics, Rather, it is to describe the physical world as it appears to us, who belong to it, through our measurements. In the line of thought inaugurated by the theory of relativity and followed by quantum mechanics, it is a basic objective of theoretical physics to make explicit the general limitations introduced by the measurement processes.[18]

For Prigogine, heavily influenced by and interested in French intellectual thought, physics suffers from a fetish for simplicity and reductionism, in spite of the overwhelming evidence that reality is a complex interaction of systems moving through time. Chaos theory, or in Prigogine's jargon, dissipative structures, suggests that seemingly random patterns within a system are actually highly refined structures hidden among the noise of excess data.

Dissipative structures is an odd concept in a science looking for long term models for explaining how the world works. For one thing, they emerge in transient, highly unstable systems that are open-ended, or engaged in a constant exchange of energy, matter, and/or information. Because the system is so erratic, it is also highly sensitive to initial conditions, as we saw with Lorenz's weather mapping. The system must also be subject to non-linear fluctuations, which means that there can be no predicting the future based on an understanding of the present state. And the system must be large. Smaller systems, containing less excess, tend to behavior in

accordance with Newtonian mechanics. Finally, the system utilizes positive and negative feedback in order to adjust the influence of smaller scale activities to the global conditions of the system. What Prigogine suggested was that under these circumstances there will most likely arise a moment when the existing organization can no longer support the frequency or intensity of its own fluctuations. At this moment, the bifurcation point, the system either falls apart or leaps to a new level of order. It will re-organize itself in order to support its own activities.[19]

Standing alone on the empty stage of World World, Eddie Hobson chooses to begin again. Though he will not have the chance to see it through, what he has come to understand is that fiction is a way to leave the world, transform smaller packets of energy, of information, into patterns of meaning which are manifest only in the juxtaposition of the two worlds, fiction and real. A closer look at the narrative structure of the novel will help to clarify this point. There are several narrative voices in the novel which might be schematized as follows: 1) the real-time narrative, composed of the numbered chapters, tracks the imminent death of Eddie Hobson; this narrative begins at Thanksgiving and ends around Christmas and is presented in third person; 2) Eddie Hobson's narrative, *Hobstown*, designated by dates, beginning with 1939 and ending with 1945; 3) the initialized chapters titled: *Riddles*, *The Dominant Tense*, *Tit For Tat*, *If You Can Fill the Unforgiving Minute*, *Breaking the Matrix* and the final chapter *1979* are a son's remembrance of his father. Which son, Artie or Powers himself is not entirely certain, though Powers's entrance into the novel in the chapter entitled *Calamine* suggests that it has been his account. It is

significant, however, that on first reading Prisoner's Dilemma the reader must assume that the voice is Artie's as the events recounted in this section parallel events described in the real-time narrative. It is only after Powers tells us that his father has died that the possibility opens up that this narrative account is actually his. The important element here is surprise. Though he does not introduce himself until the penultimate chapter, it turns out that Powers has been a part of the novel all along. The nestling narratives reflect a pattern only in retrospect as the differences and similarities among the narratives loop back and intertwine all of the narratives into one. From the isolated perspective of any one of these narratives something is lost. The novel gains momentum only in the shifting perspective made possible by juxtaposing the various voices.

Clearly, Powers is offering the principles of chaos theory as a solution to the Prisoner's Dilemma. The open-ended and looping resolutions of the multiple narrative structure of the novel reflect the repetitions and variations of chaos theory.[20] Within the confines of the novel, Eddie, the dying man, chooses to abandon his meta fictional account of Disney and the war in order to focus instead on the life that he has lived as we know it through the real-time narrative. But that is only the half of it. Fiction must find its way back into the world, in order to resonate outward and gain momentum. Isolated in a vacuum, it can do nothing.

Narrative, however, has long toyed with the ways in which small occurrences evolve into larger consequence. However, chaos also represents a connectedness, a relationship between patterns that is not wholly arbitrary, nor wholly determined. It walks a razor's edge among the

mythic reality of modernism and the multiple realities of postmodernism. Nor is it necessarily inappropriate to talk about chaos in application to these aesthetic terms, though I in no way intend to suggest that Powers is aesthetizing science here, or in any of his novels. Rather, in finding a model that suggests something about the nature of reality, Powers finds a justification for believing in the consequences of his fiction, in the way that information processed within a system has potential to initiate large-scale changes of the system.

At the end of the novel, as each of the Hobson children in turn takes up the tape-recorder to tell their own tale, they begin to forge a conversation, which is itself an open invitation to weave millions of single voices into an intricate pattern that can subtly and suddenly effect the conditions that determine our lives. In telling their private tales, the Hobson children, however, confront more than their own histories. They actually gain insight and perspective in relationship to one another. In fact, they can only gain such insight because of the distance in perspective between each of them, a condition which requires each to step outside of whatever potential reality they may inhabit and confront each other in the shared reality of the world we all inhabit.

In the penultimate chapter of the novel, Powers makes a personal appearance. The chapter begins where Eddie Hobson left off: "It's one of those unrepeatable days in mid-May, and all those who are still home sit down to dinner" (345) . Only this time, it is not Eddie Hobson, a fictional character who has died, but Powers's own father.

> I, the middle son, going out into the flats on a long post, a deep pass, a bomb, stop short in mid-pattern. I have had an idea for how I might begin to make some sense of the loss. The plans for a place to hide out in long enough to learn how to come back. Call it Powers World. (345) .

For Powers, this novel is not only a refuge from grief, but a way to whisper into the wind. He recognizes both the need to take leave of the world in order to gain a perspective on it, and the concurrent need to do so only in order to return something to the world temporarily left behind. The inclusion of the first person here, as with the Powers section in Three Farmers, is not an attempt to collapse the difference between real and fictive worlds, but is, rather, a way of insisting on the real world value and consequence of fiction.

The nestling of narratives throughout, the surprising recognition that Powers's voice has been with us all along--though we must have assumed it to be Artie's--reflects both the undulating patterns of the Butterfly and the strength of conjoined voices. Narrative, finally, is a moral act. Its seemingly inconsequential relevance in face of the catastrophic events of human history does not alleviate the responsibility each of us has to try and articulate a better place. But to do so, we must each listen and learn from other voices, acquiring the best information we can for our best chance at survival.

THE LIMITS OF CHAOS

If Crackpot Realism demands that we must listen, learn, and act together, however, it cannot ignore the realities of the world in which we live. Like weather, social systems are highly sensitive to fluctuations. Unlike

weather, however, social systems are not determined by random occurrences. In a social system, an alteration in the *initial* conditions--i.e., a fundamental change in the organization of human relations--does not produce entirely random results as it might in weather. Consumerism is not a random result of capitalism, but a predictable one. Chaos, as a model of how to connect local action to global consequence, fails to adequately account for the resistance to change built into the structure of capitalism.

In social systems, power rarely tends toward entropy as energy does in the physical world. If anything, it has demonstrated an uncanny ability to evolve, to accumulate strength at lower levels that insure, as much as possible, its continuation at higher levels. Large systems, like large companies, have a very direct affect on our everyday lives, while our local actions have only a minor affect, if any at all, on the larger system. Interest rates daily effect our checkbooks, whereas my decision to buy or not to buy goods has no discernible affect on the rate of interest, unless a great many other individuals make the same decision that I do. If by chance a million people randomly decided not to buy goods on a particular day, there might be a minor disturbance within the economic system. But the likelihood that such random occurrences would be repeated day after day for a period long enough to affect a major change is statistically improbable. And even if such a phenomenon occurred, let's say through an organized strike, the power-elite does have resources with which to counter. (The rise and decline of organized labor in this country is a good example of this.) Local action that ignores the systemic power of capitalism to accommodate minor disturbances can, in the end, affect only minor changes.

We have seen that narrative alone cannot save the world, a point made clear in Eddie's rejection of World World. Even so, Powers's attempt in this novel to find a way beyond the Prisoners Dilemma is, itself, important. In a 1952 letter to anthropologist Gregory Bateson, Norbert Wiener warns of the dangers in mistaking the scenarios of game theory for accurate representations of real life:

> What applications of the theory of games do, is to reinforce the players' acceptance of the rules and competitive premises, and therefore make it more and more difficult for the players to conceive that there might be other ways of meeting and dealing with each other....its use propagates changes, and I suspect that the long term changes so propagated are in a paranoidal direction and odious. I am thinking not only of the propagation of the premises of distrust which are built into the von Neumann model *ex hypothesis*, but also of the more abstract premise that human nature is unchangeable.[21]

Powers, however, is offering more in this novel than a simple substitution of chaos for dilemma. In the second epigraph to the novel, he pulls a quote from the Capra classic, It's A Wonderful Life. George Bailey, having seen the significance of his own existence, joyfully exclaims: "I'll bet it's a warrant for my arrest. Isn't it wonderful? I'm going to jail." Crackpot Realism is a fitting name for an idea that so closely resembles Jimmy Stewart's George Bailey. Like Wiener, Powers sees the danger in aligning self-interest too closely with competition, especially the form of competition bred by capitalism. What Clarance shows George is that self-interest must be defined in relation to a larger system, society's interest. For Powers, narrative is a way of gaining that perspective.

However, the alternative Powers offers, the application of chaos to narrative, though insightful, fails *within the context of the novel* to provide an adequate response to the cloying proliferation of images in our culture. It is the risk of writing about the world in which we live that any solutions offered will be overwhelmed by the problems critiqued. In this novel, Powers's loses the very ground he works so hard to establish in Three Farmers. Like Eddie, he has cut himself adrift from the only history that can save him--a history subject to variances in perception, indeterminate, and accountable to the collection of new data, but one grounded, nevertheless, in the measurable reality of rocks and life, and the history of probable, not certain, consequence. In trying to demonstrate the dangers of rejecting history as a system in favor of history as postmodern invention--the patching together of random events into a narrative that will unravel at day's end--Powers so closely aligns himself with that which he is criticizing, that he recapitulates the problem, and adds to the error. Nor is he unaware of this danger, which accounts for his appearance in the novel. Nevertheless, the authority of Powers's voice, surrounded by so many others and followed by a final ghostly appearance of Eddie, loses its ability to throw this novel back into the world he left behind in order to write it.

That said, I would like to close on a more personal note, one which, in fact, validates the success of this novel tc foster engagement. Like many of us, I, too, have experienced the death of a father--one who taught me Kipling, one who disappeared before I was ready. If this novel were nothing else, it would still stand as a devastating and poignant requiem for the inevitable deaths against which we must all measure of the quality of our

lives. In translating his private grief into public art, Powers demonstrates clearly the mediating value of fiction.

Notes

[1] In 1992, William Poundstone published a non-fiction book entitled Prisoner's Dilemma: John von Neumann, Game Theory, and the Puzzle of the Bomb (New York: Doubleday, 1992). The book is a detailed, though somewhat scattered history of the prisoner's dilemma. There is no evidence that Poundstone was familiar with Powers's novel, even though there is much overlap between the two works. As a matter of fact, Poundstone's book is an excellent companion to Powers's novel. I have used it extensively in my own treatment of Prisoner's Dilemma.

[2] The first military application of game theory actually took place during the war when Merril Flood, a former student of von Neumann at Princeton, was asked to devise a bombing strategy in the Pacific. See, Poundstone 68.

[3] The Theory of Games was co-authored by a Princeton colleague, Oskar Morgenstern.

[4] Von Neumann had earlier in his career attempted an axiomatic encyclopedia such as Principia Mathematica, the astounding effort by Bertrand Russell and Alfred North Whitehead to collate all of mathematics into a few axioms of logic. Von Neumann abandoned the search when he realized that Gödel was right. The whole of mathematics cannot be axiomized because of the arbitrary relationship between the observer and the measuring instrument in trying to fix on the object under observation. Nevertheless, he was still attracted to the idea of providing a logical, mathematical bases for a science of economics.

[5] Poundstone 42.

[6] Poundstone 87.

[7] Russell position on the bomb runs counter to his public record as a pacifist. One reason for this seeming contradiction is his intense fear and hatred of communism. A selection from a letter written in 1948 is representative: "If Russia overruns W. Europe, the destruction will be such as no subsequent re-conquest can undo. Practically the whole educated population will be sent to Labour camps in N.E. Siberia or on the shores of the White Sea, where most will die of hardships and the survivors will be turned into animals. . . . I have no doubt that America would win in the end, but unless W. Europe can be preserved from invasion, it would be lost to civilisation for centuries. Even at such a price, I think the war would be worth while. Communism must be wiped out." Quoted in Poundstone 79.

[8] Quoted in Poundstone 169.

[9] Poundstone 28-29.

[10] Poundstone 278

[11] The phrase "a world already lost" is repeated through out the novel.

[12] Stephen Spender, "The Modern as Vision of the Whole" in The Idea of the Modern in Literature and the Arts, edited by Irving Howe (New York: Horizon Press, 1967) 50-58.

[13] Turing himself was quite an enigmatic figure. One of his biographers, Andrew Hodges, described him as "an ordinary English homosexual atheist mathematician." Nevertheless, he was convicted of "gross indecency" after a strange incident in which he reported a burglary to

the police, then recanted in order to protect his lover. As a result, he was given a choice: jail or chemical castration. He choose the latter. Two years later, he committed suicide by eating a poisoned apple. He left no note, and even his closest friends were surprised. For more details on Turing's work see H.P. Newquist, The Brain Makers: Genius, Ego, and Greed in the Quest for Machines that Think (Indianapolis: SAMS, 1994).

[14] Newquist 40.

[15] Katherine Hayles points out that there are actually two distinct branches of study in chaos which she identifies as the "order-out-of-disorder" branch and the "strange-attractor" branch. While the former lends itself more enthusiastically to philosophy with its analysis of the process of being into becoming, the latter is more interested in the ability of certain systems to generate new information. The two fields do share a common interest nonlinearity, complex forms, recursive symmetries between scale levels, sensitivity to intital conditions, and feedback mechanisms. See N. Katherine Hayles, "Introduction: The Evolution of Chaos" in Chaos Bound: Orderly Disorder in Contemporary Literature and Science (ithica: Cornell UP, 1990) 1-28.

[16] James Gleick, Chaos: Making a New Science (New York: Viking, 1987) 15.

[17] Gleick 23.

[18] Ilya Prigogine, From Being to Becoming: Time and Complexity in the Physical Sciences (New York: Freeman, 1980) 44.

[19] I have borrowed generously from David Porush's condensation of Prigogine's very complex arguments in his essay "Literarure as Dissipative Structure" in Literature and Techonology edited by Mark L. Greenberg and Lance Schachterle (University of Lehigh, 1992).

[20] The attraction of chaos theory for the fiction writer is obvious. Writers have been making hurricanes out of butterfly wings for centuries. It could easily be argued that what fiction does, by definition, is link little to big, relate the particular to the general. Certainly the idea that a minor change in initial conditions can have disproportionately large consequences is an aesthetic mirrored in narratives from the Greeks to the postmodernist. See David Porush, "Literature as Dissipative Structures."

[21] Quoted in Poundstone 168.

CHAPTER IV

TRANSLATING SCALES:
ORIGINS AND EVOLUTION IN THE GOLD BUG VARIATIONS

We feel our toes from outside and from inside.
We hear our heartbeats at night. We smell our sweat, we taste our blood.
We are not all physicists or economists or mathematicians, but we are all biologists.
Michael J. Katz

What could be simpler? These first four words in the opening poem of The Gold Bug Variations provide a remarkable frame for reading the 657 pages that follow.[1] As this novel meanders through such complex issues as molecular biology, musicology and the erratic, indecipherable condition of desire, the echo of the opening phrase is repeated throughout. Like the paradox of self-interest contingent on collective responsibility that lies at the heart of Prisoner's Dilemma, this opening four-worded code is itself a paradox of the immense complexity of living organisms whose origins lie in the almost unbearable simplicity of a four-letter alphabet. To think of it is difficult, even after all of the learning tools have explained the physical and chemical properties of A, T, C, and G, the structural grammar of the double-helix, the ways of mapping all of life's origin at its base. Baffling and beautiful at the molecular level, the translation of these codes into the evolution of

organisms in a universe heading for heat death is a paradox seemingly impossible to resolve.

Yet, that is the task Powers sets up for the reader in The Gold Bug Variations, which offers, if not resolution, at least comprehension of the sliding scale between origin and extinction. Using the double-helix as a model, Powers enfolds the parallel love stories of Stuart Ressler/Jeanette Koss and Jan O'Deigh/Franklin Todd into dual narratives which explore not only the daily patterns of human existence, but the larger and smaller physical and chemical patterns at work in life as well. Jan's autobiographical history of science and Franklin's biography of breaking the heart's code are nothing so much as an attempt to formulate a response to Einstein's quip: "How on earth are you ever going to explain in terms of chemistry and physics so important a biological phenomenon as first love?" (124) . For Powers, the operative phrase in this equation is the first one: *how on earth*. The explanation that he is after cannot be found in religious ecstasy, philosophical ideals, or even the aesthetic sublime, but must be grounded in the more substantial realities of this world, this earth.

For such explanations, he turns first to the sub-microscopic patterns of nucleotides and the macroscopic patterns of evolution, then to the patterns of words, sound and color--to Bach's Goldberg Variations, Paul Robeson's "Jacob's Ladder," Edgar Allen Poe's "The Gold Bug," and the obscure landscape paintings of Henri met de Bles. The novel is, in fact, saturated with a wide-range of cultural allusions which express in various ways the "poignancy of a pattern lifted beyond identity, beyond the thing it was mimicking, past metaphor, into the first mystery: the bliss beyond the

fiddle" (574) . Yet, for Powers, "the fiddle remains my only conveyance" (469) . There is no leaving this earth, no heaven, no transcendental sublime. The "bliss beyond the fiddle" is no other place but here, built already into the fabric of the extraordinary world around us. "In life," as Jan calls to mind a quote from Dostoyevsky, "sheer hosanna is not enough, for things must be tested in the crucible of doubt" (574) .

Science is that crucible, and is, finally, all that we have. It is the only way of demystifying intangibles such as love and music, the only way of translating them into something real, something necessary. Ressler, trapped by his own need to connect words to things and frustrated by his inability to do so, suggests the urgent significance of understanding both the limits and possibilities of science:

> I was a good empiricist, and just as causality was forbidden to me, so was prescription. All an empiricist is allowed to do about terrible possibility is describe it. All things being possible, description is everything. (193)

Gold Bug is Powers's own local hymn to the veracity of description. The charts, diagrams, and catalogues attest to his fidelity to this principle. Description and meaning, though not the same thing, do, however, exist only in tandem, as point and counterpoint on the double-helix of human intellect. It is significant, however, that this advanced, amateur's manual for cracking the genetic code is not an attempt to uncover *the* meaning of life--meaning, as we shall see, is neither essential to life's survival, nor singular. It is, rather, a variation on the more desperate theme that underlies all of Powers's fiction--the need to assert the priority of the individual and to explain the

necessity of compassion and love in our chance encounter with cosmic indifference.

In many respects, we are on familiar ground in this novel. As in the previous works, Powers uses multiple narrative--here the tightly woven tales authored by Jan and Franklin structured to replicate the recursive design of Bach's Goldberg Variations. Having tackled the World Wars in the first and second novels, Powers jumps forward a decade to 1957, the setting of Ressler's youthful attempt to unearth the genetic code by way of a transforming key. As we shall see with Operation Wandering Soul, Powers is slowly working his way through the twentieth century, bringing the past closer and closer to the present--the contemporary action in this novel, as with the previous two, is the 1980's, specifically 1982-85. The landscape, too, is familiar: Europe, the East Coast, the heartland of Illinois--home to safe havens such as libraries and laboratories where restless intellectuals move quietly about. And while Gold Bug lacks an overt *obermench*, a Henry Ford or Walt Disney, the world of enterprising capitalism (NIH funding, the Human Genome Project, university fellowships, genes-for-patent, pharmaceutical R&D) rages in a chaotic and terrifying collage of fierce competition, power struggles, war, famine, greed, disease, and poverty.

Though all of Powers's fiction is deeply involved with the history and theory of science, it is in this respect that Gold Bug differs from the previous works. In Three Farmer's, Powers takes us on a guided tour of twentieth century physics as a vehicle to crosslink the past and the present in order to gain perspective. In Prisoner's Dilemma, he similarly uses chaos and game theory, primarily mathematical sciences, in order to negotiate the disturbing

isolation of local voices from the noise of global events. In Gold Bug, however, science itself takes center stage. And unlike the more abstract interests of theoretical physics and mathematics, here Powers focuses on the concrete workings of the life sciences. For the first time we see science at work in the place where all science must begin--in the field, in the laboratory among petri dishes, beakers, Bunsen burners, microscopes, computers, and the often tedious labor of trial and error. Gold Bug, however, is not only a novel about science, but an intimate account of one scientist, one who held on tenaciously to the "Faith that demonstration could replace faith" (123) .

The story of Stuart Ressler is a twice told tale: Franklin's biography of Stuart's year with the research team, Cyfer, at the University of Illinois, and Jan's own attempt to recover the man through an understanding of his work. It is significant that neither Jan nor Franklin are themselves scientists. Franklin is an ABD in Art History unable to find sufficient motive for completing his study of an obscure, Flemish Renaissance painter. Jan is a reference librarian for a branch library in Brooklyn, a hopeless generalist. For both, research is a matter of routine and knowledge a form of escape in a culture which values meaning as only a means to an end.[2] As Ressler notes, looking over the dusty, unused volumes in the 800 stacks of the library, the "humanities have clearly slid into the terminally curatorial, forsaking claim to knowledge" (47) .[3] Jan and Franklin are separately adrift--Jan amid facts on file, lookup reference manuals devised to associate names and things, and Franklin in romantic melancholy, paralyzed by the conflicting desire to both experience the sublime and to name it. In Stuart Ressler, however, they find

an enigma--something, *someone*, truly in need of explanation. Having made the pages of Life magazine at twenty-five as "one of the new breed who will help uncover the formula for life" (39) , he turns up almost thirty years later in New York as a night-shift, computer operator processing financial transactions to a battered old tune by Bach. Ressler proves to be not only a source of inspiration for finding a way beyond the stalemate of unintended indifference, but a capable teacher--another way of saying the same thing. Through him, they learn that knowledge is something more than the ability to Name That Tune. In learning to hear the connections that Ressler heard between Bach's Goldbergs and the music of molecules, Jan and Franklin discover that the true purpose of science is "the purpose of being alive: not efficiency or mastery, but the revival of appropriate surprise" (129) .

On first hearing of Darwin's theory of evolution, his future champion, Thomas Huxley, remarked: "How extremely stupid not to have thought of that!"[4] The fit between the evidence and the theory was so perfect, that for Huxley the idea, once articulated, seemed too obvious never to have been said before. The same might apply to Powers's own remarkable observation about the similarities between the Goldberg Variations and the structural operations of genetics.[5] In Ressler's phrase, the two are "exactly similar." The match up of music to science, however, is more than a simple matter of point for point identification. It is a rendering of micro-level signifiers into macroscopic significance, in other words, a metaphor. In both science and in art, the whole is always more than the sum of its parts. The world they seek to describe can only be mapped by scale, an inch for a mile, a note for a gene, a heart for humanity. In Gold Bug, Powers looks to science for a

transforming key that will cipher information into knowledge and knowledge into insight--the foundation he needs to build a brave new world. But in order to build, one must first have blocks.

ORIGIN AND EXTINCTION

Newton accomplished a great many feats, not the least of which was the formal articulation of the actual practice of science, the scientific method: ask a question, collect data, formulate a theory to fit the facts, and test the theory against repeated experimentation. What could be simpler? Though it would take volumes to explain all of the science bookended in this novel--from the far flung entropic extinction that awaits the universe to the electrical impulse which coalesced life from a primordial chemical soup--the primary focus of science in Gold Bug is centered around Ressler's search for a cipher to break the genetic code in 1957 laid against the backdrop of Jan O'Deigh's research into the species-wide tale of origin and extinction, the story of evolution.

Sometime after the origination of matter and energy, the formation of planets, stars, and the sun, a remarkable event took place on Earth. Life emerged. For billions of years, single-celled bacteria drifted in the oceans building a biosphere capable of utilizing the prevailing energy source provided by the sun. Then came the appearance of multi-cellular life in the Cambrian explosion some 570 million years ago, an organism which evolved over time into the variegated species which have populated the planet ever since. And while the odds against the accident of life repeating itself is a matter of debate among scientists today, the diversity and complexity of the

life which evolved is a matter of record. An afternoon stroll in the park is evidence enough that life itself is manifest in many different ways. That much is obvious.[6] Interpretation is the tricky part.

Charles Darwin is credited with the discovery of one of the most important and influential of all theories: species evolve through adaptation to their environment by mutations. Darwin's true genius, however, lay not in the "discovery" of evolution, but in his ability to synthesize the work of biology, geology, population studies and other diverse scientific enterprises, work spearheaded by Carl Linnaeus, Charles Lyell, and Thomas Malthus, among others. The theory of evolution that Darwin presented in the 1859 publication of Origin of the Species has itself undergone modifications in order to account for the collection of new data. The framework of his theory, however, remains impressively intact. As Cyril Ponnamerumna, a leading chemist today in the search to reconstruct the ingredients of the primordial soup, points out, Darwin even posited an early version of chemical evolution. Without training or a deep-level understanding of chemistry, Darwin was able to extrapolate an idea of origin, a logical metaphor for what must have happened in keeping with his own theory for what happened next.

In a pivotal chapter in the novel, "Natural Kingdom (II)," Jan reduces the main tenets of evolution--"the most explosive deflation of all time--the capstone of history's steady objectification of nature" (327) --to a four point outline:

> 1. Excess of issue. Surplus offspring. Seedlings rooting in the nook of an I-beam on the fiftieth floor of a two-year-old plate-glass sky-scraper; maggots overrunning a scrap of meat. . . .
> 2. Scarcity. Common currency from day one: no amount of goods are ever enough to go around. Not all surplus makes it; none makes good in every case. Death hones away, a missed heartbeat from home. ....Too much divided into too little, and something's got to change....
> 3. Variation. Differential dying creates divergence. . . .variation is two-tiered. First: the ten thousand wrigglers in a pound of anchovy spawn are all different. Trivially individual. Even dyed-in-the-wool creationists admit that poodles differ from Great Danes, let alone wolves. Man too (whatever the nausea of knowing) is not an entity, but five billion disparate creatures with different eyes, hands, and minds. . . . difference's second tier: the difference between Franklin and that anchovy spawn. A difference of some difference--where all the tempest still comes from.
> 4. Inheritance. Divergence depends on a means of conserving difference. Certain individuals in a varying population solve scarcity better than others. If their advantage is handed down disproportionately, that population changes. (327-28)

Excess, scarcity, variation, inheritance. These are the blind forces behind evolution, the materials used to thread simple structures into complex response mechanisms. In acknowledging contemporary debates, namely Stephen Jay Gould's idea of punctuated equilibrium, Jan concludes that "despite the haggle in step size, all jumps are essentially local" and that "small text changes ripple into huge phenotypic differences" (470) . Evolution, then, is a chaotic system, patterned but not predictable, in which complexity emerges not as a result of progressive design, but through random occurrences. "Each step is sculpted, restricted, feasible, frequently brilliant, on rare occasions even optimal. But the sum of these steps is unrepeatable. It will not happen again, not in this way, perhaps not at all" (470) . For confirmation, Jan turns to a different tale of origin and extinction.

Darwin's theory impacted both the scientific world and the general culture with the full weight of revolution, but his reading of evolution on the micro-level was seriously flawed. He believed that hereditary traits were passed indirectly from the mixing of blood from one generation to the blood of the next. What he didn't know at the time was that an Augustinian monk, working on the inherited property of peas in a monastery in Bohemia, had already determined that inheritance was passed on by the statistical probability of combining "factors." Georg Mendel discovered that characteristics, such as size and color, were not produced by the mixing of any essential fluid, but by the pairing of what would later become known as genes. Upon fertilization, the new embryo takes one factor from each of its parents in order to form its own unique characteristic. Rather than measuring the results of inheritance from generation to generation--a process of notable difficulty, especially in human subjects--Mendel took to counting the possible combinations which might appear in any one generation of peas. In the 1865 issue of Transactions of the Brunn Natural History Society he published his findings. However, his research remained obscure until 1900, when three separate research groups published papers affirming Mendel's theory. The recovery came, unfortunately, too late to stop the blossoming work of eugenicists, a term coined in 1883 by Darwin's cousin, Francis Galton, who believed that their new science would prove, beyond any doubt, the superiority of their race.[7]

The rediscovery of Mendel's work, however, touched off a productive controversy among biologist, and prompted one American geneticist, Thomas Hunt Morgan, to use the fruit fly in order to disprove Mendel's

findings. After only one year, Morgan realized that Mendel had been correct. What he discovered was that inheritance was linked to chromosomes found in the cell nucleus. Using microscopes developed to observe the strands, Morgan's group began the first work on "mapping" genes. In the meantime, biochemists affirmed Darwin's intuition that the chemical composition of living matter was an essential component to the evolution of the species. Only ten years after publication of Origins, Freiderich Meischer's discovered nucleic acid as the base substance of the cell's nucleus. Albrect Kossel later isolated the four compounds--adenine, guanine, cytosine, and thymine--the base alphabet of genes. Then in 1944, Oswald Avery, along with Munro Macleod and Maclyn McCarty, identified free-floating elements in a transforming substance which could change the heredity of bacteria. The particles were genes and the substance DNA.

The stage is all but set for Jan's understanding of Ressler's unerring belief in the ability of science to cultivate surprise. In a race against time and such scientists as Linus Pauling, whose own work in x-ray crystallography was seminal, Francis Crick and James Watson, in 1953, hit upon a model to fit the facts. Out of card-board, hard work and an inspired collaboration between chemistry and physics, they constructed the double helix, a model demonstration for the molecular rules of grammar.[8] It was this event which side-tracked Stuart Ressler from his original plan to study physiology, and sent him rushing to the great frontier of molecular biology and into the heartland of Illinois where we first see him on a Greyhound bus headed for his new home.

Armed with the alphabet, A, T, C and G, and the grammatical structure of DNA, Ressler and his colleagues set out to decipher "how a long string of four types of things stood for thousands of shorter, twenty-thing strings" (125) . While Ressler engages in an active pursuit of the coding problem, Jan, twenty-five years later and out of the lab and into the library, reads about the past that Ressler is in the process of making. After three months of self-study, she offers a summery of what she has learned:

> Information in the nucleic acid string is carried by the order of base pairs, the sequences of genes. The sum of gene messages--the tangled program of genotype--expands from a single egg to run-away cell civilization . . . .until at last it impairs itself with old age and dissolves. . . .
>
> Each DNA Spiral is two chains. The rules of complementary base pairing and the undulating regularity of the molecule give each half-helix the ability to act as imprint for the whole. This trick of molecules to sort, arrange, and assemble odd parts of the random world into copies of themselves arose spontaneously, from the early chemical mix and the energy of an electrical storm. . . .
>
> That length of string . . .encodes particular inheritable traits. . . . Cell growth, organism development conform to the principles of undergrad chemistry. The grammar does not change from generation to generation--only individual sentences do. (195-96)

The process of self-replicating genes--the formation of DNA into a sequence which is copied by RNA and attached to enzymes which then build the sequences into proteins chains which "in turn catalyzed all biological process" (125) --is, however, only half the story. Though the chemical and biological explanations are impressive enough, the most remarkable discovery is, initially, the one taken for granted: "Dr. Ressler's question was

not primarily cryptological or chemical or even genetic, although it was all these. Heredity's big hookup lay in information, pure form" (126) .

When Claude Shannon, working at the Bell Laboratories in the 1940's, set out to solve the problem of "white noise" or interference in telephone lines and television transmissions, he ran up against a practical problem which required a theoretical solution. In 1948 he published two papers in the Bell System Technical Journal and almost overnight information theory emerged as a new and primary component in the growing fields of AI and computing science. In order to distinguish the noise made by the desired transmission as opposed to the random signals surrounding the message, Shannon found he had first to define information. While assiduously avoiding the epistemological issues involved in defining the relationship of information to meaning, he sought rather to provide a general theory about the transmission of information. What he postulated--that the more uncertainty there is about the contents of a message, the more information the message must contain--bore a striking similarity to the definition of entropy.

Similarly, Norbert Wiener, an MIT engineer and former professor and colleague of Shannon, independently verified this unlikely connection between information and entropy--with one difference. Shannon defined information *as* entropy, while Wiener claimed the one to be the negative inverse of the other.

Whether information is entropy or its negative is still a matter of debate.[9] The significant finding is that the two correspond in some fundamental way. On a practical level, Shannon's theory demonstrated that

all information is mediated and that any message is subject to interference. More importantly, however, these theories of information, or coded language, were pushed into the center of the scientific arena. John von Neumann, whose own contributions to this field cannot be overestimated, predicted a shift away from the traditional hot topics in science of motion, force, energy, and power to a new emphasis communication, organization, programming, and control.[10] It is not necessarily that our understanding of the world on both the macro and the micro level has moved away from the search for quantum particles or evolutionary patterns, but that what exists and how it functions is now understood in terms of the transfer of information. Nor is it a mere coincident that both Shannon and Wiener developed the theory of information as an extension of their work to develop thinking machines--what Wiener called cybernetics, or the science of the control of information in his 1950 publication entitled, Cybernetics. (The term "artificial intelligence" was not adopted until the 1956 Dartmouth Conference organized by two of Shannon's interns, Marivn Minsky and John McCarthy--the rival Founding Fathers of AI.)

According to H.P. Newquist in his excellent new survey of the development of the AI industry, the search for AI comes down to one simple fact: "Artificial intelligence is about power, pure and simple. Power of man to re-create human intelligence in machines. Power over other men through the manipulation of these machines."[11] Taking a more cosmic view, Weiner sees the search as an attempt to prolong life, to "control entropy through feedback," by which he means the mechanism used by both humans and machines to increase performance by stabilizing the disorder inherent

between input and output, between articulation and communication, between information and knowledge.[12] Control of disorder, however, is just another way of saying power--the power to manipulate human behavior and physical nature at its most elemental level. As Newquist summarizes one of Wiener's arguments:

> the most important thing that happens in living cells is not the transfer of heat and energy to create chemical reactions and larger life forms, but the use of information that allows cells to instigate and manage these processes. It is information that makes reproduction possible, in the form of passing on genetic codes.[13]

Wiener and other pioneers in computer engineering found in information theory a lever to catapult theory into practice, a way to translate the intricate and opaque workings of the human mind into the language of Boolean logic of "and, or, and not" (396) .

Information passes back and forth through the system triggering responses capable of modifying the original message. Remarkably, through the process of feedback and recursion, a form of recycling energy that comes close to qualifying as a perpetual motion machine, new properties emerge which allow low level phenomena to synthesize into higher levels of complexity: "The master control and its agents combine to alter their own combined behaviors" (398) . In his desire "to get to the thing itself" (126) , Ressler forgets for a moment an essential feature about information codes--there is no such thing as the same thing, no exact translation. The thing itself is already a thing in translation, meaningless substance until made into metaphor. DNA, RNA, proteins, and enzymes operate *only* by code and

translation. There is no *Ur*-text. Life, at base, is an enigma machine, a mathematical puzzle, a numbers game. There is no way to disassemble the parts and piece them back together with exactly the same outcome. Probability, unlike prediction, is always subject to the random role of the dice.

The pun in the title, The Gold Bug Variations, is based on a splicing of Bach's Goldberg Variations and Edgar Allen Poe's short story, "The Gold-Bug." While the former provides a metaphor for the looping and recursive structure of genetics, the latter focuses on the human ingenuity involved in trying to crack the code. Poe's is a tale of cryptography, a lesson in deciphering by simple substitution. After reading Poe's work, Ressler sees the connection easily. But to crack the genetic code, he needs something more than Poe and simple substitution. He takes his cue from the more recent war-time efforts of Alan Turing and others to crack the enemies encrpyted messages by building an analog. If reduction, taking the cell apart, working on sequencing in isolation fails to yield an answer, why not try building a better mousetrap. Recreate the environment, work on the thing *in vivo*.

By applying the principles derived from information theory, he finds a theoretical framework capable of translating the assembled data into a working knowledge of how genetic coding operates. Once again, Jan provides a useful summary:

> The running program--DNA synthesizing enzymes--creates and executes subroutines that double back, influence the way the master program executes, cascading into new subroutines.
>
> With self regulating feedback, the enzyme becomes its own economy, gauging supply and demand in the chemical soup, even acting to adjust these. . . One molecule's manufactured product can inhibit or promote another's. Two enzymes activate each other in conjunction or opposition. Metabolic pathways branch and conjoin, the enzyme setting off the two others, or two in tandem combining to shut down a first. (396)
>
> One allosteric enzyme, working by itself , is already a formidable machine, reactively linking unrelated substances. Thousands of them, joined into branching, judging, regulating feedback networks, can just about account for the numbing inventories, the shifting assembly lines that run the corporate cell. With meta-programming the ability of the central network to reset even its own switches--the last constraints of the hardwired universe are shed. The field is broken wide open. Anything can happen, and does. (398)

Information switching between multiple binding sites until something happens, if indeed it does--a random message emerges which recalculates the whole improbable machine--may seem like eccentric jargon, but it is also another way of saying what mathematics and physics have known since the early days of the century. Knowledge *always* falls short of its desire to know completely. Heisenberg's Uncertainty Principle, Gödel's Incompleteness Theorem, Einstein's relativity, Schrödenger's Cat--they all say the same thing, only in different translations. The rules that govern the universe at both the micro and macro level may be fixed, but it does not necessarily follow that --even if we could know all the rules--we can predict outcome with certainty. However, as Jan notes, "It's no more an excuse to free-associate than it is [only just] equations" (572) . In isolating the reactions of component

parts in order to form building blocks that might then be used to decode the genetic puzzle, the Cyfer team has forgotten "the first law of scientific skepticism: meaning always reveals pattern, but pattern does not necessarily imply meaning" (445) . The problem with trying to establish a correspondence between pattern and meaning rests not only in the inability to obtain a complete map of the process, but also in the inability of correspondence to account for static or random sequences within the system. The rules that govern molecular biology, like those for physics, are measurable only in terms of mathematical probability, a series of *if...then* equations. Further, these provisional codes are open to future revisions, a retroactive refitting of the initial program. The system, in short, is capable of reorganizing itself from within. The code, therefore, exists only in translation--"The cart is inseparable from the load" (489) --the message depends on the medium. But "just because translation is everywhere necessary, it doesn't follow that its possible" (489) . It is a depressing, if accurate, conclusion, and one with potentially paralyzing consequences. Thus, Jan finds herself confronted by the same problem Powers faces in Three Farmers and Artie/Powers/Eddie face in Prisoner's Dilemma. She needs to find a transforming key, a vantage point from which she can transform the dead end babble of "chemical necessity" (395) into something more than random noise, a way to transform information into knowledge. She turns to the other science in Ressler's life, the four-note "bliss beyond the fiddle" encoded in the *Goldberg Variations*.

THEME AND VARIATION

Gold Bug begins and ends with an Aria. The first is a four-part poem entitled "The Perpetual Calendar," the last, "Da Capo e Fine," an encoded instruction to begin again. The thirty chapters in between are made up of randomly dispersed narratives which can roughly be divided into four categories. There is the third person narrative of Stuart's biography written by Franklin. The remaining three sections are authored by Jan: 1) the account of events leading up to Ressler's return trip to Illinois, 2) the journal of her year studying genetics, including the letters she receives from Franklin, and 3) Jan's reflections on the nature of science. Interspersed through these narrative variations are also selections from Jan's files--the three-by-five cards containing a host of topics taken from the library Quote Board, Question Board, and Today in History. I will leave it to someone more qualified in musicology to discern the intricate ways in which this novel imitates the structure of The Goldberg Variations.[14] However, Powers gives ample reasons for his attraction to Bach's score within the novel itself, suggesting that music and science are themselves variations on the same theme.

The relationship of science and music, in fact, has a history that dates concretely back to Pythagorus, whose technical accomplishment in measuring the length of a string to the chord it produced is perhaps overshadowed by his grand design, in which numbers, sound, and motion are linked into a symphonic tribute to the harmony of the spheres. In Measure for Measure: A Musical History of Science, Thomas Levenson provides an engaging analysis of the symbiotic relationship between the

disciplines which serves to counter the strictly modern notion that aesthetic achievement and scientific theories are inevitably at odds.[15] Of particular relevance is his discussion of the development of parallel ideas in the works of Bach, Newton, and Stradivari. The common intellectual climate that allowed Newton to develop the scientific method formed conditions favorable for Stradivari's redesign of the cello. Looking for the "laws of violin making," seventeenth century craft-masters such as Niccolo Amati engaged in rigid experimentation with acoustical science. After Amati's death in 1684, it fell to a young apprentice, Antonio Stradivari, to reach the level of perfection in sound and form for which his name has now become legend. The search for perfection and absolute knowledge which underpins the Renaissance embrace of Pythagorus's "harmony of the spheres" reaches a similar level of technical and aesthetic achievement in the compositions of the organist from Eisenach.

The Art of the Fugue, published in 1752, two years after Bach's death, represents a quiet revolution in the history of musical composition. "A monument to the art of counterpoint," this collection of twenty-one canons and fugues, the last of which spells Bach's own name, marks the crowning achievement of a tradition begun two centuries earlier. John Dunstable, a fifteenth century English mathematician and astrologer, formalized the rules of polyphonic music, while Guillaume Dufay, a Belgian contemporary, developed the form of the canon. Polyphonic music is simply the use of multiple voices, or melodies. Counterpoint is the technique used to combine melodies point against point, or note against note. One such arrangement--

more of a technique than a fixed form, is the fugue. Levenson explains the concept in his description of Fugue in G minor:

> In the G-minor piece, one theme (the subject), its response (the countersubject), the theme again, another response, are each taken up by a separate voice of the organ. The lines speak to one another, variation succeeding variation to build an increasingly complex weave of all the elements. The melodies move in and out, until the pattern closes at the end, coming to rest on the original theme. As it unfolds, the piece creates an astoundingly vivid sense of inevitable logic, combined with an exalting, soaring quality that evokes an older image, the sudden height of a gothic cathedral. [16]

The soaring quality of Bach's fugue is more than hyperbole on the part of Levenson. There is speculation that the etymology of the word "fugue" is derived from the Latin word for flight.[17] Bach's particular contribution was the ability to "manipulate musical ideas so that they both blended harmoniously and retained their clear, independent coherence." [18]

The composition of the Goldbergs similarly attests to Bach's talent. As the story goes, Bach was commissioned to compose for Count Kaiserling's court musician, Goldberg, something of a musical antidote for the Count's insomnia. Ressler, however, hears something more than a musical variation of counting sheep. In the intricate weaving and recursive design, Ressler finds an unlikely, if modern, version of the harmony of the spheres. The Goldberg Variations are a musical chart of the genetic code:

> The sequence is symmetrical to an extreme: two paired, complementary halves of sixteen notes each. Each half comprises four similar-shaped paired phrases--tension, release, tension release--four notes long. Each pair of four note phrases creates an eight-note harmonic section, four in all, tracing the fundamental journey from tonic to dominant to relative and back to tonic. Sixteen twos, eight fours, four eights, and two sixteens: with repeats, the trip form home and back takes sixty-four notes.
>
> Dr. Ressler--already fighting gnostic tendencies--must have loved discovering in Bach two paired strands, four-phrase-building blocks, a sixty-four codon catalogue. (579)

The similarity between the Goldberg Variations and the actual number arrangements of DNA and RNA fragments working at the molecular level are astounding. There are further likenesses such as the parallel function of triplet codons and the three notes it takes to make a chord. There are canons "at every scalar interval" which "arch across the work like a giant backbone, and sinewy themes tying canonic lines each "vertebra" (580) . The infinite diversity as "each theme asserts its own myth, its own melody, its lack of precedent," reveals the base theme underneath which "asserts itself as a master gene" (581) .

Though it is tempting to resort to numerology as evidence that the world's patterns are constructed for discovery by the mind's comprehension, Jan, like Ressler, ultimately rejects the mystical theory of the mathematical harmony of the universe as coincidence. Rather, the truly remarkable metaphor offered by Bach's work is the evidence it provides for understanding how patterns within a system work to both preserve sameness and perpetuate difference:

> Ultimately, the Goldbergs are about the paradox of variation, preserved divergence, the transition effect inherent in terraced unfolding, the change in nature attendant upon a change in degree. How necessity might arise out of chance. How difference might arise out of more of the same. By the time the delinquent parent aria returns to close out the set, thematic is about how variation might ultimately free itself from the instruction that underwrites it, sets it in motion, but nowhere anticipates what might come from experience's trial run. (585)

The structure of both the Goldbergs and the genetic code for which it stands creates a pathway between a four-note base and super-structural variation. Though the base stays the same, it combines in infinite variation to create individual and distinct entities. Most important, though, is that the individual products are not necessarily advancements. Rather they each build from the same base sometimes in dissonant, sometimes in harmonious reaction to their predecessor. On this point, Powers is perfectly clear: "There is no question of progress here" (584) . Before moving on to the relevance of this observation, however, we must first look at the inclusion in this novel of the other musical score, a minor chord, the haunting melody of Paul Robeson's recording of "Jacob's Ladder."

Though it is the Glen Gould record that Ressler will carry around with him for the remainder of his life, his first vinyl purchase upon arriving at the his new lab is a collection of spirituals sung by Paul Robeson. Given Powers's own obsession with biography and fidelity to historical detail, it is a safe assumption that the relevance of both recordings rests not only in the music, but in the rendering of it, a point that is made explicit in the final chapter. By 1957, Paul Robeson had all but faded from public attention.[19] Born the son of an enlightened ex-slave who insisted that his children had a

right to the best opportunities commonly available to white Americans, Robeson proved to be a stellar student and athlete. Over protest, he was only the third black student to be admitted to Rutgers University. He graduated in 1919, valedictorian, having also excelled in football and theater. While studying for the law, he became involved in the theater, eventually starring in groundbreaking performances of Othello and Eugene O'Neil's Emperor Jones. Simultaneously, he developed a career as a singer, performing everything from German opera to Negro spirituals. Unfortunately Robeson, who was hailed by many as the most important leader of the Harlem Renaissance, attracted unwanted attention as well as celebrity. Powerbrokers such as J. Edgar Hoover marked Robeson as a threat to national security. While race was surely a factor in the troubles Robeson experienced dealing with the U.S. government, it certainly did not help matters that he was an avowed communist. The combination proved fatal to his career and his health. Though he did not die until 1976, the last twenty years of his life are a sad catalogue of personal defeat. He attempted suicide and wasted away in relative obscurity.

The historical and social context of Robeson's biography is part of the general fabric of the novel. However, in a novel about genetics, the racism fostered by eugenics spreads across the surface as a warning. Mendel's Law of Segregation is not to be "confused with the Little Rock affair" (92) . Significantly, it is the recording of "Jacob's Ladder" that attracts Ressler's attention. At first he hears only the "steps of the four nucleotides up the spiral DNA staircase" going "higher and higher" (51) . But the coding pattern of this spiritual is qualitatively different from the recursive delight of the Goldbergs.

The notes here climb the scale in repetition, not variation. The lyrics, too, are too simple to mistake:

We are climbing Jacob's Ladder
We are climbing Jacob's Ladder
We are climbing Jacob's Ladder
We're soldiers of the Cross

Every rung goes higher and higher
Every rung goes higher and higher
Every rung goes higher and higher
We're soldiers of the Cross (52)

This is a dream of progress--a need to believe that human suffering is leading somewhere, to a promised land where pain now buys happiness later. Not only that, this hymn is a battle cry, a sorrowful recognition that joy is a resource in scarce supply, and one worth fighting for. As he first listens to the recording, Ressler is overcome with "a sadness so overpowering that, before he can interpret it, tears seep out his eyes on underground springs" (51) . How, he wonders, can a world on the brink of discovering the code of life be simultaneously on the brink of Cold War disaster. The eternal note of sadness that Ressler associates with Robeson's recording is his recognition for the need to translate human suffering into something more the sum of our chemical parts. If the Goldbergs are a musical translation of the genetic code, "Jacob's Ladder" is a musical translation of Bruegal's famous painting of Icarus falling into the sea.[20] The point here is not to recapitulate the divide of heart and head into the disciplinary distinction between the work of art and

science. Rather, "Jacob's Ladder" becomes for Ressler a statement of the compelling need to assert the evolutionary impact of human culture, a metaphor for the need to attach value to our suffering.

In the final chapter, Jan recalls a random night in Ressler's life. A surprise of unrepeatable significance awaits, and only weeks before Franklin joins the late-night shift. Sitting alone, he turns on the radio and hears the tune he had long ago committed to memory. It is Gould playing the Goldbergs, of that he is sure. Only now something is different. The radio host announces what Ressler had already guessed: Gould had gone back, tried again. The recording was a new interpretation. Same score, same player, but a different piece altogether. Only two days later, Gould dies, and with him any potential for yet another interpretation. The event has impact. Ressler hears the literal difference a day makes and readies himself for engagement, for contact with fellow members of the race he had all but abandoned. In that moment, Ressler understands the intrusion of the historic minute into any equation, the moment in time which renders all observations partial, all knowledge incomplete. "Jacob's Ladder" is not a vertical reach for something arrived at only by myth, but only that which "coils forever around the same four rungs" (479) , an insistent invitation to help the Other Fellow--Today in History.

TODAY IN HISTORY

At the library branch where she works, Jan posts every day a three-by-five summation of past events in human history under the heading Today in History. The oxymoron is yet another version of the paradox of "exactly

similar" or "verbatim transcript" (487) or "necessity from chance" or "how difference might arise out of more of the same" (585) . Like the perpetual calendars tucked in phone books everywhere, Today in History is an affirmation of both the continuity of human activity from season to season, century to millennium, and the unique circumstances of any given day, or any given life, to distinguish itself from any other. And while Gold Bug may be a celebration of life in all it's variety, it is also a catalogue of the dismal failure of humans to live up to their potential. The history in which the todays of this novel are situated is one all too familiar in contemporary fiction:

> It was a night like any other. Outside, six blocks away, people were being murdered. At a middle distance, rain was falling upstate, over the border, rain that left pines as dead as if they had been stripped for sadistic pleasure. In the wide lens, we had at last opened our long-sought hole in the atmosphere. According to best projections, extrapolations from that week's Facts on File, the world was moving into a terminal late afternoon. (573)

These sentiments are repeated throughout the novel in a number of ways. Franklin, to pass the time at MOL (Manhattan On-line) and to procrastinate while working on his dissertation, takes to clipping out stories from the newspapers. It's the usual daily fare of wars, disease, catastrophe, and miscalculation in infinite variety, a pale shadow of the struggle for survival in the natural kingdom. Then there is Lovering's suicide, Woytowich's divorce, Keith's cynical regard for his work in advertising, Jimmy's stroke, Ressler's death: all ordinary enough events in a culture used to alienation and abuse, competition and neglect.

Amid the dirty linen of human history, to be sure, there are some bright spots. Only occasionally reported by the papers under the heading of Human Interest, ordinary people manage to love, grieve, sacrifice, sympathize, and lend a helping hand to neighbors in need. The problem, ultimately, is one of scale and degree--to paraphrase Jan, it is more likely that things will go wrong, than it is that they will go right: "failure is lots more probable than anything else going" (330) . Though physical catastrophe in the form of hurricanes, volcanoes, floods, and droughts, as well as accidental death, does its damage to the actuarial charts, natural disasters still only accounts for five percent of American deaths: "The rest are tiny slippages within the system, a valve shut down, a tube burst or blocked, an instruction misread, production idle or fatally overrun" (536) . The problem is that for "however many unclassifiable ways there are of being alive, there are infinitely more ways of being dead" (332) . Local altruism, however necessary or desirable, can only be a temporary salve, a quick fix against the staying power of death.

This is not to say, however, that human behavior can be excused on the grounds of nature, that exploitation and the ravages of greed are the inevitable consequences of being alive.[21] Nor are death and disaster excuses for unmitigated despair. We have learned from Prisoner's Dilemma that "what we can't bring about in no way releases us from what we must." Confronted by the absurdity of all that can go wrong in the todays between the big bang and entropic doom, Jan discovers that "Life at the megapole required that I decide how many of the fifteen million adjacent catastrophes I could afford to feel....I set my empathy at three" (291) . It's a start. By the

end of the novel, however, she has expanded her horizon to include at least one more.

Jimmy, the hapless night-manger at MOL, is a minor character whose disaster is precipitated by a computing error made by Franklin which is later corrected by Ressler with the aide of Jan, Franklin and Annie. The significance of his story, however, cannot be overestimated within the thematic concerns of the novel. Jimmy's tale is a demonstration of empathy in action. Middle-aged, living with his mother, affable, harmless, and slightly out of touch, Jimmy is the quintessential forgettable character--until disaster strikes. As Jan notes, "Uncle Jimmy was the classic Picardian third: minor his whole life, promoted to major at the last chord" (576) .

Jimmy's shift to major begins with the night-shift crew's return from a weekend in the mountains only to find the records a grand mess. Significantly, the weekend trip, alluded to throughout the novel, represents a consummation of sorts among Jan, Ressler, and Franklin. Away from the world and the late-night glow and hum of the computers, Ressler opens up at last, filling in bits of his biography, remembering his work with Cyfer, teaching Jan and Franklin as much about love's necessity as molecular biology. It is here that Ressler explains how "Small changes produce large swings in outcome" (410) . The Jimmy episode that follows is in some ways a laboratory test for Ressler's hypothesis. After helping Ressler repair the computers by surreptitiously patching into the mainframe, Franklin, always a quick study, decides that Jimmy could use some unsolicited aid. Against Ressler's advice, Franklin exercises his altruistic fingers by hacking into the financial records, giving Jimmy a cash bonus. Franklin's small change in the

system, however, produces an unexpected result. Jimmy gets the bonus money, but is dropped from the company's insurance policy.

During the subsequent investigation by the insurance company, Jimmy "apoplexed on the examination carpet" (538) . Not dead but severely damaged, Jimmy suffered a stroke. This time it is Ressler who leads the team of conspirators, replicating an exact copy of the master operating system down to the last digit. Only the financial records, numbers correct and intact, have been slightly altered. On the bottom of each receipt, each print-out, is a plea to reinstate Jimmy's insurance. "The attempt," Jan admits, "was an absurd mismatch of scale--the notion that the entire community was accountable to the infinitesimal principle of a single life" (613) .

Just before launching their "bit of genetic engineering," Franklin realizes "the records are in our power" (612) . For a brief moment, altruistic terrorism seems seductively possible: "He assumed, all at once, the entire, terminal, toxic clot the race had laid over the place. The anguished understanding that he might, possessing these files, cut a deal, force a rescue on one bit of the botched job, was like alcohol in an incision" (607) . Franklin considers asking for something big--an arms treaty, environmental cleanups, free food, a ban on assault weapons. Ressler, however, opts for the one sure bet: "I suggest, seeing as how everything is already at stake, that we ask for the one essential in the triumvirate that life is too large and crucial to care about....Ask for Jimmy" (607) .

It is important to note Franklin's failure and Ressler success in tampering with the computer records. First, Franklin was, as he latter admits, only a "gifted amateur." He knows enough to patch in, sneak about, insert a

bonus check into Jimmy's account, and exit without leaving digital fingerprints. Ressler, on the other hand, understands what he is doing. It is not an accident that has him working a menial late-night computer shift, but his curiosity about life, his need to keep his hand in the game. What, specifically, Ressler understands is that complex computer operations, the relationship of hard to soft wiring, the function of networks, etc., are a new version of the same old song he's been working on all of his adult life.

The leap from molecule to monkeys, like the replication of the master computer program at MOL, is not a linear event of singular origin in which the ur-text of the genetic or evolutionary code hides a complete transcript of the complexity to come. Complexity is born out of a dynamic process, a series of random accidents which generates new patterns. In translating the scale between entropy and the emergence of life on this planet, Ressler had already discovered that different scales require different means of measure because what holds true at the bottom need not always be true at the top, and visa versa. Chemistry and biology may be able to describe synaptic nerve patterns, but not the phenomenon of consciousness. So too, physics can explain all matter of things except our own need to make things matter. Such an explanation needs a different instrument, a way to scale humanity into something more than the sum of its component parts. In her own variation on Ressler's work, Jan begins to comprehend what Ressler was after:

> I look for a go-between. Inside the machine, deep in the cell, the molecule must take the rich hieroglyphics of the DNA string--randomly accumulated dots, crots, and mots--and, its own structure housing the missing key, translate the jiggers of the varying sequence into the purposeful, programmed, cybernetic, living enzyme. Outside, in the warehouse of time, the adaptor I look for must bridge the paradoxical equivalence of message and notch, caprice and complexity, theme and variation. (470)

The translating key is chaos theory, the model for explaining how complex systems can emerge from simple ones, outside, in the warehouse of time.

"The spookiest thing about the code," Ressler says, "is its contingency" (605) . Reduction, the breaking up of an object into its parts, is an essential tool for gathering data and measuring it against theory. Contingency, the necessity for accounting for historical context, is a way to transform that data into knowledge by situating it within a web of larger significance. There can be no science taken out of the context of the historical conditions under which it emerges. Out of context, in fact, there is nothing at all. Contingency is this property--the intrusion of the unrepeatable moment, the historical setting that slips into the linear equation and unlatches the chaotic door for "how necessity might arise out of chance" (585) . Just as entropy leads ultimately to death, and genetics to the origins of life, contingency is the assertion that "nothing is what it is except in where, when, and how it goes about unfolding" (571) . Life may be determined by chemical processes at base, but in crossing over the threshold of complexity, it becomes responsive to random occurrences, unrepeatable moments, the insignificant flutter of butterfly wings, knowable only in translation. As Toveh Bokin reminds Ressler, "History is a system too" (216) .[22]

Contingency, the historical moment, is another way of expressing chaos, the ability of small changes to ripple into consequence. However, here, as in Prisoner's Dilemma, the effect remains essentially local. Jimmy is reinstated. Ressler is held in prison and let go. As Franklin accurately points out: "Information Age criminals never get prosecuted. They get hired on as consultants to the DOD" (608) . Jimmy recovers slowly and never entirely, but at least he and his mother are not left destitute--though Powers does imply that for every Jimmy there are thousands who suffer the same fate *sans* intervention. Action, of course, must begin somewhere, and Jimmy's rescue accomplishes more than at first may seem obvious.

In Chapter XIX, "A Suite of Winter Storm Waltzes," there appear some curious phrases scattered among the passages. Typed in lower-casing, these phrases are from a computer language known as Prologue. They are intelligible only thematically. This section of the novel recounts the trio's weekend trip away from the city and a turning point in both Ressler's research and his relationship with Jeanette. A phrase repeated in both narratives, "sea__change," is a reference to the sea--changes which take place in *The Tempest*.[23] Though each of the characters in the novel are trapped in some way, and each suffers a sea--change, a change of heart, a change of mind, the allusion is particularly applicable to the MOL conspirators. Initially isolated by various cultural and biological circumstances, they realize that, like all species on earth, they have more in common than they do differences.

Annie is strangely alienated from reality by her literal belief in the Bible. Her trust in God and His master plan for humanity allows her to pick

and choose among the Commandments. She can sleep with Franklin and maintain that the world is a seven day wonder, resolving the contradiction by appeal to mysteries she cannot understand. God, after all, is capable of everything, including forgiveness for the inevitable lapses in moral certitude. Energized by the activism of saving Jimmy, however, Annie concedes to Jan: "You might be right about one thing. Species don't hold static. They don't keep still" (620) . Her surprising parting kiss with Jan suggests that Annie, too, is more than the naïve, cliché-splicing, passive receptacle she appears to be.[24] Though the revelation is incomplete, Annie decidedly embraces the better half of the Bible, opting for love of her fellow creatures rather than the fear of God.

Franklin, however, suffers a deeper alienation, one common, it seems, to intellectuals. He is a dyed-in-the-wool Platonist awash in romantic despair. Unable to capitalize on his ideals, he drifts despondently. Without exact correspondence he finds no correspondence at all. In rescuing Jimmy, however, Franklin does more than expiate his own sense of guilt for having set the whole affair in motion. He discovers that the aesthetic Ideal he's been mourning, "the transcendent, delivering world Franker so badly ached for," has been, as Jan notes, *here* all along. "We are already *there*. Built into the middle of it, tangled so tightly in the net that we could not sense the balancing act always falling into some other, some farther configuration" (413) . Like Dorothy in *OZ,* and Eddie in Hobstown, Franklin needs to look no further than his own back yard for the wonder at the rainbow's end.[25] His mistake all along has been to look for the bliss beyond the fiddle somewhere

other than the fiddle itself, to divorce the knowledge of the world from the wonder it inspires.

For both Ressler and Jan, this isolation of science from desire creates a gulf badly in need of a bridge. With Jimmy's rescue, Jan finds the evidence she needs to begin to build:

> I learned that night, as we put our last touches on the on-line replacement, that science, the chief, most miraculous project of the modern world, the source of all the trouble, was itself a self-reproducing automation. Empirical wonder did not stop short of those forbidden infinitives, to protect, to hope, to assist. They too were embedded deep in the coding problem. In order to say "Copy me," the string had first to say "Read me." Naturally such a summons would result in time in the need to do science. What else could it become. (614)

Jan comes dangerously close to falling into a tautological trap, entertaining the idea that "the code codes only for the desire to break it" (615) . However, she avoids a costly detour, one that can only send her endlessly back to the beginning.[26] Rather, she grasps what it is that Ressler has been trying to say. Contingency is the sea--change which has washed us ashore, not cut us adrift.

We are at present and for the first time in history on the brink of something strange and perhaps terrible, the ability to create life. But before we make our create higher-tech versions of Mary Shelley's monster, Ressler concludes, as did Shelley, that "we need to step back a bit and see how it runs" (412) . Just because we can create, it does not follow that we can control. Furthermore, he notes, "not all things that are possible, are

desirable." The theme may be familiar, but for Ressler the stakes are substantially higher. In breaking the barrier between what is and what is possible, science finds itself in danger of becoming nothing more than a database for new technologies. As Ressler explains:

> we have it now, have extracted knowledge from information, and it's not enough. We need to ask ourselves what we want to be when we grow up. We need that thing, that arithmetic of ecology that should have preceded knowledge, too easy, too obvious to bear repeating, too embarrassing and indicting to mention by name. The lookup code for care. (607)

Given time, he hopes, we might figure out how to build an analog, a race "exactly similar" with one exception--an unerring desire to make a necessity out of care.[27] Time, however, is not a luxury that Ressler can afford. Jan recognizes and is propelled by "the courage that made Dr. Ressler automatically interfere on Jimmy's behalf. . . . the *Ur*-text, the certain certainty that by itself motivated him, the *in vivo* foster parent of empiricism." (614-615)

REPRODUCING WONDER

With death, as Jan notes, comes "the hint of possibility" (25) . It is Ressler's death which motivates her work and Franklin's. It is death which motivates Ressler's petition on behalf of Jimmy. Alan Shaprio, the contemporary American poet, extrapolating on an idea expressed by Wallace Stevens once said that without death there would be no poetry. He went on to explain that without death, the world would be a static place not

much in need of explaining. Death alone creates the value we place on life; it gives meaning to joy, suffering, sunsets, ritual, and need. It stimulates desire and ignites the will. Without it, there is only endless repetition, no need for variation. In Gold Bug, Powers affirms the sentiment, only he broadens the context to include the all too obvious--without death there would be no life. Characteristically, though, he adds a codicil: Without death there would be no science either. Without death, entropic, extinction, or the more common daily dying of individuals, there would be no need to understand how and why things work, no need to explain, to describe, to preserve, to reproduce.

It is ironic in this novel about the wonder of reproduction that, though there are two children in the novel, the main female characters, Jan and Jeanette, are sterile--one by choice, the other by design. The explanation that because Jeanette is unable to have children, Jan, too, should be sterile in order to preserve the very carefully drawn symmetries between narratives begs the question. To complicate the issue are the two "births" which are presented. The first is the creation of a "new species registering its own day one" (630) , the replication of the morally faulty operating system at MOL. The second is the novel itself. When Jan and Franklin discover that one has penned a biography of Ressler and the other an autobiography and history of science, Franklin urges Jan with "a little courtship-dance of paper-shuffling." He then adds: "Come on. Let's do it. Let's make a baby" (638) .

The implication is clear: reproducing intellect, parenting possibility is a substitution for biological infertility. Though some may argue with the morality of such an idea, and no doubt some will be enraged by it, the first question that needs to be answered is *why*. It is a strange choice, and certainly

deliberate on Powers part. Though the small children absent from the first two novels and only glossed in this one will appear with a vengeance in Operation Wandering Soul, Powers's previous work does not give any indication that he has some kind of aversion to biological reproduction. In fact, family ties are important in both, and critical in Prisoner's Dilemma. One explanation may lie in the difference, rather than the similarity, between Jeanette, who wants to have children, and Jan, who does not.

The letter Jeanette leaves for Stuart Ressler on the day of his *in vivo* breakthrough comes ironically just as he thrills to discover "the one descendant he and Jeanette can leave to this teetering place" (594) . In it she admits her own sterility, her guilt for letting Stuart think it was Herbert and not she who was responsible for their childless marriage. Her distress is palpable: "You see, I've never wanted anything in my life as I want to be a mother. Think of the deepest desire you have ever felt. Then let is last unanswered every day for ever" (596) . In leaving Stuart to go with her husband, Jeanette explains, that "I'd like for once to follow something other than the calculus of personal gain." Her sterility is a random occurrence, a molecular mutation, a genetic dead end. With one fatal slip in the coding process, generations of accumulated traits are wiped out, the potential and possibility contained therein irrevocably erased. But biological reproduction is only one way having children. She will adopt.

Jan's tale provides a counterpoint to Jeanette's. She tells Franklin that she choose to have a tubal ligation, not for the convenience of her living arrangements with Keith, but because she was confronted by the terrifying statistics of "the endless catalogue of what could go wrong" (385) . A series

of question were posted over the course of a few days on the Question Board at the library with a request for information about mongolism. A few days later, the young mother of a mongol child came to the library to thank Jan for her research. The episode left her paralyzed with fear.

> I felt a dread I previously couldn't have imagined. Because of a lucky statistical aberration, because I and everyone close to me had been born healthy, I had assumed that childbearing was a perfected process with a few tragic accidents impinging on the periphery. I now saw that the error-free lived on a tiny, blessed island of self-delusion. I could hear my own mutations accumulating; it was either hurry into a baby-making I was not ready for, or wait, Russian roulette, for my own blueprint to betray me. (385)

Unwilling to submit any off-spring to the odds of genetic error, Jan decides to shut down the possibility. There is no viable evidence by the end of the novel that she would consider Jeanette's alternative, adoption.

Franklin's desire to have children, thus his affair with Annie, and Ressler's decision to remain celibate parallel the circumstances confronting Jan and Jeanette. While adoption remains a viable alternative to biological reproduction, both Jan and Ressler find a third possibility. It rests in a rephrasing of Ressler's warning about the blind pursuit of knowledge. All things that are possible are not necessarily desirable, or just because you can make a baby doesn't mean that you should. It is in this formulation that I think we can begin to make some sense of Powers decision to render Jan and Jeanette sterile. A slightly different variation on the same theme might be that there is more to reproduce in this life than life. Sterility, both literally

and metaphorically, does not have to be a dead end street, a missed correspondence between object and desire. Jeanette leaves with Herbert, not only because she truly loves the man--she loves Ressler too--but because she needs to recalculate her own need, her desire. She chooses, in much the same way that Jan, Franklin, and Ressler do, to funnel her desire into something that lay beyond self-interest.

This act, though marginally significant in the greater scheme of things, is a way of acknowledging the threshold that we, as a species, have crossed. The single instruction, only approximate in translation, of the genetic code is to go and multiply:

> I suddenly see DNA as an ingenious parasite, a creature that has struck up symbiosis with every scaffolding it has ever invented; organisms are only the necessary evil, the way DNA has hit upon to make more DNA. To get out and see the world. (326)

Yet, through the slow and unlikely process of evolution, we have arrived at a point where biological necessity need not determine our lives. In its place, though never divorced from its influenced, we can enter a new code, reproduction by other means. The reproduction of wonder. This is the third option that captivates Ressler, then Jan, and finally Franklin. But in order to alight upon it, the other options must first be limited, for without a reason to look, we might never see. Life, finally, is about more than just reproducing more of the same. It is also about creating difference. It is here where Powers merges the interests of life and science--the mindless ability of life to

manifest itself everywhere and the mindful attempt to comprehend how and why.

Science is a broad and sloppy term for the human enterprise of making sense of the world through the direct measure of physical evidence. It is, at heart, a practical pursuit. Why does the apple always fall down? What happens to steam? How do species reproduce? Ernst Mayr, the renowned synthesizer of Darwin and genetics, once suggested that there are two ways of thinking about the work of science: "One says science consists of making discoveries. The other says science consists of developing or refining concepts."[28] For Mayr, discovery implies the Leplacian desire to obtain absolute knowledge of the world--which itself implies a preset design. Conceptual analysis, on the other hand, is a more dynamic way of understanding the workings of the world. The universe is not a static environment, but an evolving one. In order to account for process and change, science must engage in a constant dialogue between theory and practice, which tests and revises concepts against the accumulation of an ever increasing mound of data. The purpose of science is not discovery, but to provide the best context for the interpretation of data.

Powers, however, takes Mayr one step further. His use of science in Gold Bug, and his particular choice of biology, is an affirmation that science provides an essential context for interpreting even the most philosophical of questions. Altruism may lack the material substance of fossil records, but it is nevertheless a phenomenon which must be explained, promoted, perpetuated. At the end of the novel, Powers gives his clearest description of the purpose that governs the work of science:

> And the purpose of all science, like living, which amounts to the same thing, was not the accumulation of gnostic power, fixing of formulas for the names of God, stockpiling brutal efficiency, accomplishing the sadistic myth of progress. The purpose of science was to revive and cultivate a perpetual state of wonder. For nothing deserved wonder so much as our capacity to feel it. (611)

For Powers, finally, science is a way to steal love, beauty, truth and reality away from abstraction. Wonder, and with it wisdom, is the child that Ressler hopes to foster. What he knows and passes along to Jan and Franklin is that "only in splitting a name from the thing it stands for can tinkering take place" (517) . The heart-breaking *wonder* of Margaret, a small child reciting Gerald Manley Hopkin's sorrowfully euphoric verse, is a necessity with or without the child at hand.

Nor is wonder a new subject for Powers. In the previous chapter, I mentioned the epigraph taken from Frank Capra's, It's A Wonderful Life: "I'm going to jail! Isn't it wonderful." In the context of Prisoner's Dilemma, the quote is a billboard for the deliberate decision to cast one's self-interest with the lot of humanity. George Bailey is willing to sacrifice his own freedom for the welfare of the community. So too, Eddie Hobson imprisons himself in order to find "the terrible way back to We." In Gold Bug, Powers extends the gesture. Ressler and the night-shift crew risk imprisonment for the sake of a co-worker--a bold, if minor, assertion of goodness against the agencies of oblique power. George Bailey, however, shows up in a far less likely source, one which also relates to the central concerns of translation and contingency in Gold Bug.

Steven Jay Gould, the controversial paleontologist and popularizer of science, dedicates the title of Wonderful Life: The Burgess Shale and the Nature of History to the Capra classic.

> The title of this book expresses the duality of our wonder--at the beauty of organisms themselves, and at the new view of life that they have inspired. Opabinia and company constituted the strange and wonderful life of a remote past; they have also imposed the great theme of contingency in history upon a science uncomfortable with such concepts. This theme is central to most memorable scene in American's most beloved film--Jimmy Stewart's guardian angel replaying life's tape without him, and demonstrating the awesome power of apparent insignificance in history. Science has dealt poorly with the concept of contingency, but film and literature have always found it fascinating. It's a Wonderful Life is both a symbol and the finest illustration I know for the cardinal theme of this book--and I honor Clearance Odbody, George Bailey, and Frank Capra in my title.[29]

Clarence is an angel possessed of divine powers of intervention. For Powers, he is also a metaphor for human intervention, the need to "conspire to produce and deliver that new song the obsolete Lord requires" (575) , to find in science, rather than religion, a qualitative value for altruistic behavior such as compassion, sacrifice, and generosity, to follow Ressler's lead and "step out of the food chain, and, however momentarily, refuse to compete" (165) . We have passed a threshold whereby our own knowledge of how life works radically alters the potential of the processes we have observed. As Ressler claims, "Life is passing a second threshold, amending the contract. The next generation will wrap their opposable thumbs around processes we can't even begin to conceive" (592) . Gold Bug is a demonstration that this

ability to comprehend evolution and genetic coding gives us the tools we need to change or modify what is necessary for our own survival.

Early in the novel, Jan recalls a request for identification of the quote: "How do you get moonlight into a chamber?"[30] As Shakespeare long ago discovered, there is only one sure way to get moonlight into a chamber, and that's to dress up like the moon. This, finally, is what Powers is after in Gold Bug--a recognition that it is time for humanity to dress up like the moon, work on our problems *in vivo*, build an analog. The only other way to get moonlight into the chamber is to build a casement and wait patiently for the moon to shine in. But time is not a luxury we can afford. For every one night of moonlight that may or may not shine in our windows, there are a lifetime of other nights, the darker nights of neglect and abuse, ignorance, and the poverty of the wonderless, wandering soul.

Notes

[1] The poem, "The Perpetual Calendar," is a four-part variation on the major themes of the novel.

[2] The contemporary culture represented in the Jan O'Deigh narrative should by now be familiar. It is the same postmodern culture Powers confronted in Three Farmers and Prisoner's Dilemma and will be discussed in more detail in the third part of this essay. However, I would here like to point out that the character Keith Tuckwell, Jan's live-in lover when she first meets Franklin, is an advertising executive. Chicly cynical, Keith knows full well that meaning is only a slogan away from the thing that it is selling. Interestingly, Keith is not an unsympathetic character. But his inability to do much more than offer sound byte critiques of the industry which employs him as he channel surfs suggests the extent to which he represents a counter-balance to Franklin. But where Keith's paralysis is based in self-reflexive irony, Franklin's paralysis stems from his fear that he will fail to affect change he so desperately wants.

[3] While Ressler's dismissal of the work of humanities will no doubt raise some ire--after all, Gold Bug is not only a novel, but one about the need and function of fiction--the allusion here is perhaps to the Snow controversy. The Two Culture's wars began in 1959, only two year subsequent to Ressler's dusty encounter with the 800's. Among the other forces at work in this novel is the need to reconcile what never should have been a debate in the first place. It is important to remember that Ressler discovers the *Goldbergs* and *in vivo* during his year with Cyfer.

[4]The Huxley quote appears repeatedly in popular histories of science. I use for my source Pat Shipmann, The Evolution of Racism: Human Differences and the Use and Abuse of Science (New York: Simon, 1994) 37. The reference cite in the notes is Leonard Huxley, (ed.), Life and Times of Thomas Henry Huxley, 1900, Vol. I, p. 107.

[5] According to Powers, his observation about the similarity in structure between the Goldbergs and genetics is original as far as he knows. However, comparisons of a more general nature between music and science, Bach and genetics, can be found in Douglas Hofstadter's monumental work, Gödel, Escher and Bach: An Eternal Golden Braid (New York: Vintage, 1980).

[6]Ressler recounts a famous anecdote about John von Neumann:

> The cybernaut, considered by some the century's most intelligent man, while deriving a complex theorem on a chalkboard in front of a class, skipped a step, saying it followed obviously. A student said he didn't see how. Von Neumann scratched his head, stared at the board, set the chalk down, left the room, came back minutes later, and declared, "Yes, it is obvious," and carried on with the proof. (269)

The anecdote is intended to demonstrate what is missed in taking the obvious for granted.

[7] Shipman 111.

[8] Actually, the model was built out of metal purine and pyrimidine. However, as Watson recounts:

> The metal purine and prymintine models, needed for systematically checking all the conceivable hydrogen-bonding possibilities, has not been finished on time. At least two more days were needed before they would be in our hands. This was much too long even for me to remain in limbo, so I spent the rest of the afternoon cutting accurate representations of bases out of stiff cardboard (James Watson, The Double Helix, New York: Mentor, 1968) 123.

[9] It is not Wiener, but Leon Brillouin, who is really the champion of "negentropy." As Katherine Hayles explains the difference: "Shannon considers the uncertainty in the message at its source, whereas Brillouin considers it at the destination." This distinction, of course, has long term consequences in what kinds of questions are asked and investigations pursued. See, Katherine Hayles, Chaos Bound: Orderly Disorder in Contemporary Literature and Science (Ithica: Cornell UP, 1990), particularly the chapter "Self-reflexive Metaphors in Maxwell's Demon and Shannon's Choice: Finding the Passages," 31-60.

[10] The source for this observation concerning von Neumann comes from Arthur W. Burks, "Computers, Control, and Intentionality" in Science, Computers, and the Information Onslaught: A Collection of Essays edited by Donald Kerr, et al. (New York: 1984) 29.

[11] H.P. Newquist, The Brain Makers: Genius, Ego, and Greed in the Quest for Machines that Think (Indianapolis: SAMS, 1994) 19.

[12] Norbert Wiener, The Human Use of Human Beings (New York: Doubleday, 1954) 26.

[13] Newquist 46.

[14] For an enlightening discussion of the musical structure of the novel see Jay Labinger, "Encoding an Infinite Message: Richard Power's Gold Bug Variations in Configurations: A Journal of Literature, Science, and Technology 3.1 (Winter 1995) : 79-94.

[15] Thomas Levenson, Measure for Measure: A Musical History of Science (New York: Simon & Schuster, 1994).

[16] Levenson 116.

[17] Standard History of Music, 73.

[18] Levenson 195.

[19] Martin Bauml Duberman, Paul Robeson: A Biography (New York: Ballantine, 1989).

[20] The reference to Breugal is not arbitrary here. Franklin's work on Met de Bles is a substitute for his interest in Breugal.

[21] At no point does Powers advocate biological determinism. Rather, he suggests that because we must all die at the hands of nature or the slippages in our internal structure, the external and delibrate abuse of our own species is counterproductive to our survival.

[22] This assertion, that history is a system, is the bridge that Powers needs to connect history to chaos theory.

[23] The allusion to The Tempest resonates throughout the novel. Powers, via Ressler et al, is looking for a way to build a brave new world. The allusion also works in terms of the relative isolation of these characters on their small late-night island.

[24] The idea of Annie as passive receptacle is reinforced by Todd's admission that in sleeping with her he was exercising his potential for fatherhood denied him by Jan's tubal ligation. The kiss, though intimate is not sexual. Rather it is intended to demonstrate the surprising, if ackward, articulation of the human need to care which has all but forgotten how to express itself.

[25] This analogy to The Wizard of Oz is not explicitly drawn in this novel, though the connection has been made in previous works. It does, however, provide a splendid model for the very point Powers is trying to make: wonder is literally in our backyards and most definately not somewhere down the yellowbrick road.

[26] The tautology of implied in the idea that "the code codes only for the desire to break it" is a topic of considerable controversey in contemporary science. For an interesting overview see David Porush, "The Self-Narrating Universe: The Anthropic Cosmology Principle and Postmodern Literature," presented at a meeting of the Science and Literture Society, 22-27 November 1993.

[27] This is made explict in Ressler's discussion of von Neumann and in his own choice to build an analog in the language of music:

> Von Neumann, the cleverst product evolution has yet to offer, thought that the language of the functioning brain was not the language of logic and mathematics. The omly way we would ever be able to see the way the switiches all assembled the messages they sent among themselves would to be to create an analog to the language of the central nervous system. . . . The firmware language of the brain. That's what I have spent the last twenty-five years pursuing. (610)

The firware language Ressler refers to here is music.

[28] This quote is taken from "Darwinian Flights: An Interview with Ernst Mayr," The OMNI Interviews edited by Pamela Weintrab (New York: OMNI Books, 1984) 55.

[29] Stephan Jay Gould, Wonderful Life: The Burgess Shale and the Nature of History (New York: Norton, 1989).

[30] The reference is from A Midsummer Night's Dream (III, i) in an exchange between Bottom and Quince.

CHAPTER V

A COUNTRY A DAY FOR A YEAR: MAPPING THE HOMELESS HEART IN OPERATION WANDERING SOUL

A map of the world that does not include Utopia is not even worth glancing at.
Oscar Wilde

From the opening scene of Powers's fourth novel, Operation Wandering Soul, it is clear that we are on different ground. Three Farmers begins with a walking tour of Detroit, an irony compounded by the narrator's arrival by train and bus trip to the Institute. Prisoner's Dilemma begins with scene of domestic tranquillity underneath the stars, and Gold Bug begins with a poem. In each, the opening is inviting, enigmatic, a seductive whisper to the reader to come and follow me. Operation Wandering Soul, on the other hand, begins with "the peak of private enterprise, as inevitable and consummate as death"--a traffic jam on an LA freeway (8) . The only enigma here is the decidedly uninviting "synchronized, pointless, mass red shift" of cars as they change lanes in order to maintain the illusion that they are moving at all.

The story that follows, though not entirely devoid of the lyrical tenderness which characterizes the other works, never escapes the

immobility of this opening scene. The main-frame narrative follows the week or so in the life of Richard Kraft, pediatric intern at a charity hospital in Los Angeles, who is stuck in a mental and emotional traffic jam of his own. Unable to reconcile the boy he was with the man he has become, Kraft is immobilized by his own need to care. He is, by his own assessment, dangerously close to becoming "the hypochondriac doctor, the misanthrope volunteer" (96) . Kraft's story is buffered by a cut-and-paste selection of familiar stories from history and fable--Peter Pan, the Pied Piper, the slaughter of the innocents, the children's crusade, the evacuation of London. Each of these different stories tells a common tale of "children adrift, out of doors too late at night, too far from home, migrating, campaigning, colonizing, displaced, dispersed, tortured loose, running for their lives" (163). Unlike the harmonic weaving of multiple voices in the prior novels, this loose confederation of related tales of leaving forms a "perpetual gridlock"--a millennial traffic jam of wounded bodies rushing quickly toward disaster in a culture driving itself surely toward its doom.

Operation Wandering Soul is a strange and disturbing departure from the symphonic synthesis connecting little lives into larger significance in Gold Bug, the optimism against-all-odds of Crackpot Realism in Prisoner's Dilemma, and the wide-angled inventiveness of Three Farmers. The horror in this apocalyptic allegory of disappearing childhood is so complete that even Powers's own attempt to avert disaster through empathy and compassion waivers. Having transversed this century by way of the major conflicts that have scarred it--the Great War, the Second War, the Cold War--Powers arrives finally at the doorstep of his own generation, by way of

Southeast Asia, only to find that there is no turning back, no history to recover which has not already abandoned him. Nothing and no one--not science, not words, not even the infectious good will of George Bailey--can account for the suffocating reality of living in one's own time.

While there are obvious similarities between this novel and the previous works, such as the use of multiple narratives, encyclopedic allusions, and an unambiguous plea for moral action, the most striking feature of Operation Wandering Soul is how thoroughly dissimilar from the others it is. Ironically, the foundation for this bleak novel is built into the framework of Gold Bug, in which Ressler claims that there are only two really useful professions:

> either be a physician, cropping the delinquent tissue, or a researcher, a musician, mapping anatomy, the way the tissue lies. Two choices that amount to one thing. To feel the pattern flash, summoning an account for the gut-twist in a deceptive cadence. In either case, conspire to produce and deliver that new song the obsolete Lord requires. (575)

Ressler chooses music and with that choice comes deliverance from "the nightmare of wakefulness" (577) . In Operation Wandering Soul, however, Powers measures the alternative option with disheartening results. While music provides Ressler with the "look up code for care," the physician Kraft discovers that care is the one thing no surgeon can afford to feel:

> It's all true, what the general public dares not suspect: no one can live with full anatomical knowledge. The heat and pressure of apocalyptic repair jobs transacted in wholesale volume every day of existence inevitably autoclave the heart. After a few hours of call, he does begin to see these needy, shivering bodies strapped to the monitors as so many deli cuts. These days, the freeze sets in as early as the instant he arrives in the theater. (23)

Powers, in this counterpoint to his characteristic optimism, submits the validity of his own belief in the ability of fiction to make a difference to a reality test--in much the same way that Ressler tested his convictions in the trial and error of programming to save Jimmy. However, the results are quite different. The world in this novel is an alien and inhospitable landscape capable of absorbing care, cure, and need without so much as a dent in its program to self-destruct. The "leaping cure" proffered by Linda Espera, this novel's hope by another name, is pathetically out-scaled by Kraft's own specialty, the cutting cure. The paradox of having to cut in order to cure parallels the interest in paradox that Powers has repeatedly negotiated in the other novels. Only here, the paradox is not an intellectual or abstract attempt to find the always needed third alternative between either and or. This paradox is real, steeped in the literal blood of its victims, and can only be resolved by an "act of cutting that never closes" (23) .

There are other differences too. Time and space are wildly imploded into one another. The romantic leads, Linda and Kraft, are war-time lovers who fall together quickly only to fall apart. There is no place in this novel for the Powers's World of Prisoner's Dilemma, or the other places which have afforded his other characters the room they need for reflection, the libraries, the laboratories, the Netherlands, and the midwest. Kraft's apartment is less

of a home than a bunker, a temporary lodging only slightly less exposed to the constant assaults that take place at the front lines, in the hospital emergency room and the operating theater. Even the promise of science, manifest in the other novels by the study of physics, mathematics, and biology, seems harshly out-scaled by the human potential for harm. In Operation Wandering Soul Powers directs his attention toward the darker side of history. In this novel, the scarred and mutilated bodies displaced by the Renaissance Center and the World's Fair emerge from the shadows to stand full view in front of us in the depiction of the filth and poverty of Third World countries, the plight of homeless immigrants, the survivors and victims of rape and gang warfare.

However, it is the children, the misfit band of hope's last renegade army, that represents Powers's most radical departure and the most troubling aspect of this novel. Oddly and allegorically ill, they struggle to emerge from the flat pages of their charts to become more than statistics, more than the surgical procedures they require. There is Chuck, a boy born literally without a face in a country that relegates missing children to the "pathetically misjudged attempt to outsmile horror" (280) pictured daily on disposable milk cartons. There is Joy, an Asian refugee with an infected ankle that may cost her a leg or her life. Obeying the creed of all immigrants--"stay quiet, learn all you can, and keep to the middle of the room" (33) --Joy searches through the mass migrations of "the Moors, conquistadors and Carolina pilgrims" (28) for a history that will not abandon her. Finally, there is Nico, always ready to make a deal, trading comics for cards, selling hope or distraction for the price of hustling hard work and a little laughter. At age

twelve he's already an old man, suffering from a bizarre acceleration of the aging process that translates years into days. In a novel about the need to understand, protect, and cultivate childhood, it is, perhaps, more than ironic that Operation Wandering Soul is itself so alienating and oppressive that it is almost unreadable.

Intending to replicate the daily assault on our senses in language, the prose is dense and often cloying. Gone is the playful love of puns and paradox as well as the obvious delight in the metaphorical texture of language which characterizes his other fiction. In Operation Wandering Soul, Powers takes a chance in exposing the both the frailty and the manipulative power of the tools of his trades. In this novel, words do tell stories, but words and the stories they make can be put to deadly use. Surgical strikes and military operations are the real-world metaphors of the cutting cure in loose translation--take a life to save a country.

If this novel is vastly different in style and tone from previous works, it is nevertheless thematically very similar. Maps, like metaphors, are inexact representations that are both more and less than the object or phenomenon they seek to describe. It is not surprising, therefore, that the paradox of mapping is an image found in all of Powers's fiction.[1] In Three Farmer's, Sander uses photography to "improve the map the Man of the Twentieth Century to the scale of a few hundred yards to an inch, a few hundred faces to the photo" (339) . In Prisoner's Dilemma, Eddie Hobson comes to realize that "fitting all America into the tube would take a tube the size of all America" (41) . In Gold Bug, Jan discovers that her own "after-the-fact-mapping" is "still not the place itself " (627) . A map may never be what it

represents, but it can be a way of framing the terrain, a way of extrapolating a knowledge of the whole by describing its parts. In Operation Wandering Soul Powers grapples with the uncomfortable issue that the difference between the map and the world it describes may be more than a matter of scale.

CARTOGRAPHY

Cartography, both in practice and in theory, has experienced a renaissance of sorts in the past few years. The reasons are, of course, varied and complex. The rise in global communications and the more recent investments in cyberspace have dissolved traditional notions of physical space. So too, airlines, trains, and automobiles, satellites, rocket ships, and inter-planetary probes have redefined how we think of distance. World wars and their off-spring have exposed the fragility of national borders. The World Bank and other multi-national operations, including the U.N. Peace Force and the FAO, effectively manipulate, if not control, a world economy, whose global interests are frequently in conflict with those of its member states. Trade agreements, economic summits, environmental conferences, the International AIDS commission, etc. create transnational alliances unhindered by geographical constraints.

What may seem less obvious, however, are how the advances in such scientific pursuits as quantum physics, genetics, neurology, artificial intelligence, oceanography, astronomy, archaeology, etc., have led to a similar dissolution of the traditional boundaries between time and space--and, in turn, to an explosion in the art and concept of cartography. In

Mapping the Next Millennium: The Discovery of New Geographies, Stephen Hall describes his work as "a kind of first atlas: a new collection of maps, a new way of looking at the world, a new way of imagining one's place in it."[2] What follows are eighteen chapters on the mapping of everything from the Solar System, to a fractal map of Pi, to peptide receptors in the brain, to the Earth's core and mantle. The significance of all this cartographic activity is both overwhelming and breath-taking. It is worth quoting Hall at length in order to establish just how important an enterprise mapping has become:

> A whirlwind tour of the world captured by modern mapping extends from the atomic and microscopic to the cosmic. Planetary geologists have mapped the hills and dales of Venus by radar, Mars by magnetometer, Jupiter by photopolarimeters, the moon in person. Paleoecologists have mapped the location of lakes that dotted the Sahara until disappearing four thousand years ago, and climate modelers are mapping the climate as it will appear one hundred years hence. From 590 miles up in space, satellites can determine the average income of a neighborhood, follow wandering ice bergs, track the Wandering Albatross; from instruments resting on the surface of the earth, physicists can see into the heart of the planet, into the heart of the atom, into the heart of the Big Bang. Astronomy's new telescopes chart the cosmos in all its multiple electromagnetic personalities; optical of course, but also X ray, gamma ray, infrared, radio, and ultraviolet. Biologists have mapped the location of proteins in cells, atoms in proteins, electrons in atoms. Neurobiologists have mapped areas of the brain that light up when we dream. Where Aeneas may once have trod, the smoldering Phlegrean Fields now glow in aerial infrared maps. No earthly or celestial or even artistic territory has been spared this rampant cartography: experts not long ago scanned the Mona Lisa's sublime and mysterious face with a microdensitometer, measuring and mapping the topography of pigments in La Gioconda's smile.[3]

Determining which territory to map, however, is not the only problem facing cartographers. As David Turnbull, in Maps Are Territories: Science as An Atlas, discovers even the attempt to describe *what a map is* is a risky undertaking. He settles for a definition so broad as to be meaningless, reducing a map to "a graphic representation of the milieu."[4] Until quite recently, however, cartography was the practice of describing "a part or the whole of the earth's surface."[5] Though always, in part, an aesthetic document, maps are essentially a scaling or measuring device. The art of cartography depends on the accuracy of the details. It is choosing which details to represent accurately which leads to the map-maker's paradox, otherwise known as the allegory of empire.

The allegory of empire goes something like this:

> In that Empire, the craft of Cartography attained such Perfection that the Map of a Single province covered the space of an entire City, and the Map of the Empire itself an entire Province. In the course of Time, these Extensive maps were found somehow wanting, and so the College of Cartographers evolved a Map of the Empire that was of the same Scale of the Empire and that coincided with it point for point. Less attentive to the Study of Cartography, succeeding Generations came to judge a map of such Magnitude cumbersome, and, not without Irreverence, they abandoned it to the Rigours of sun and Rain. In the western Deserts, tattered fragments of the Map are still to be found, Sheltering an occasional Beast or beggar; in the whole Nation, on other relic is left of the Discipline of Geography.[6]

The point of the allegory is that maps cease to have a function once they abandon their literal point of view. In a parodic version of the allegory by Lewis Carroll, the farmers revolted against the Empire cartographers. A map that would cover the territory completely, they objected, would also block out the sun. "So now we use the country itself, as its own map, and I assure you it does nearly as well," the Professor of the tale explains.[7]

Cartography in this novel, like the function of maps themselves, serves a two-fold purpose. The first is to describe the world--thus the overwhelming number of places mentioned throughout. In connecting these sites transhistorically, Powers is not trying to collapse the distinction between different times and places in order to create a postmodern landscape where event and experience are lifted out of the specific context of their historical conditions into the lifeless atmosphere of hyperreality. Rather, the significance of the connection among these tales rests in the second part of the cartographic project. Maps yield a point of perspective, a way to measure the distance between where you are and where you would like to be.

More importantly, perhaps, is the fact that maps are designed to orient the our senses to the surrounding environment. This connection to the outside world--the one composed of organic matter such as rocks and trees, sand and salt--is an essential part of the cartographer's work. If the allegory of empire is a humorous look at the fetish for exactitude in science, it is also a reminder of the aesthetic fallacy implied in substitution of image over matter. As Powers's himself explains it:

> The map may not be the place, but we have only the map with which to move about in the place. Maps, rather, constantly changing, or perhaps I need to say varying. Both sides of the two-culture split may right now be coming to richer appreciations of how navigation and cartography are inseparable parts of the same journey. Symbolic understanding is both active and responsive, both empirical and imagined.[8]

Maps can never do more than represent the places they seek to describe, but they nevertheless depend on a scaled correspondence between the material and the imagined worlds. In Operation Wandering Soul Powers uses cartography as a way to negotiate the barrier between a reality that is sometimes too brutal to bear and the alternative freedom of nowhere, a utopia that lies just beyond, in the next town over, anywhere but here.

THE LAY OF THE LAND

Here in this novel is a lot of places, both real and imagined, linked only by their share tales of abuse. *Here* is Carver General, the hospital where Kraft finds "Too many bodies to be blasé over. An *n*-space, imploded theater-in-the-round" (19) . *Here* is Los Angeles, Angel City, the urban epi-center of this century's experiment in transforming something into the infinite pliability of anything and nothing. But even the billboard images lining the LA freeway can never completely gloss over the city at ground level in the "chasms between come-ons and their public reality" (11) . *Here* are the loud and cluttered city streets which reflect the price paid for the billboard dreams:

> Streets a shambles of hubcap-liquor-weapons shops, nap hotels, beauty parlors offering quantity discounts, sheet metal wholesalers, blasted transaction booths, purveyors of fine, illegal pomades. The scent of decay emanates from under the sidewalks, behind the baleen shop grates, in the sotto voce wail of that eternal air raid siren, the permanently borrowed porta-blaster boom-box bilingually broadcasting, "Hey man! Over your shoulder. Behind you, sucker. You look, you dead. Keep the feet to the beat. Cut you. Cut your ass." (11)

Here is always a place where reality and representation battle for the last word.

Here is also the other City of Angels in a country named the Land of the Free, half-a-world and a life-time away from Carver General. *Here* is Bancock, Thailand during the war, in the early 1960's, where Ricky Kraft arrives at thirteen, his father having accepted yet another in a long line of foreign short-term assignments. This City of Angels, unlike its Hollywood version, has been "on a centuries-long project to convert itself into an immense way house for the spirit world's indigents" (255) . *Here* "a weeks income went to replace a roof tile, signed on the underside before being slipped into position." The juxtaposition of poverty and beauty in this foreign place, like the language itself, evades translation into western speech, into the binary logic of western knowing. Having lived in both Angel City and the City of Angels, Kraft must find a way, if not to translate, then to somehow communicate between these two disparate cultures.

There are other places, too, in this novel about place. *Here* is the rat-infested streets of Hamlin and the endless, open sea, home to a small boy drifting amid countless bottled messages. *Here* is Wendy's room and the Lost Boy's Cave. Far from representing the utopic sites of childhood, these

imaginary places are, in fact, a stubborn reminder of a reality that refuses to transcend the conditions of this world. They are fantastic warnings that *Here* can just as easily be London under siege, Europe during the crusades, or childhood at any time. As Kraft discovers for himself:

> And this picture parade, the infinitely extensible police lineup of intermediary staging grounds for those Crystal Nights all school drills promise: Florence, Aberfan, Madrid, Detroit, Prague, Paris, Hong Kong, Hanoi, Newark, Belfast, Harare, Jerusalem. Each a namesake, yet sharing something steeper, deeper down, beneath names. All are celestial suburbs gone wrong. Single steps, separate arithmetic means between the shining seraph of his own childhood and this place, its follow-up succubus. (168)

The world, and all the horror that goes with it, is the place that Kraft repeatedly finds in this novel. Borders dissolve as each new territory repeats the same old story of abuse and neglect. Lost in the quagmire of a department store, Kraft is confounded by a "self-asphyxiating, self-immolating, drugged, gelded joyriding" architecture which deflects into infinite incertitude "the link he's suppose to recover" (167) . In order to find a way out of infinite incertitude, Kraft realizes that he must first find a map.

Earlier in the novel, Kraft recalls a tale he was told as a boy about a young girl, stranded on a lonely Dakota road, who slipped out of sight while no one was looking. Where did she go? Where do they all go? Kraft believed that "The right map, the appropriate triangulation might narrow down the vanishing point the girl was after" (116) . Finding that map, however, is tantamount to finding the proverbial needle in a haystack. It is not that reality is multiple, shifting, changing, and unstable. The real problem is that every

map tells a slightly different story. The difficulty in locating the one that will pin-point the exact location of the vanishing point is compounded by the inevitable paradox that a map can only show with a dot for a town or a line for a highway places that are known to the cartographer. The place that Kraft is looking for, however, may or may not exist. It is a safe haven somewhere in the world where children are free from slaughter, abuse and neglect. But how to find such a place? For Kraft, the search begins with a cut.

THE CUTTING CURE

Richard Kraft is a surgeon in need of his own cure. It's an ancient practice, surgery, dating back almost 5000 years, about the same stretch of history documented in the historical vignettes packed throughout the novel. Unlike cartography which relies on scale and the distance between an object and its representation, surgery is an invasive art, a transgression of the natural borders of the body. It is a mappable, therefore, knowable terrain, but the only way in is to cut. In his first operation on Joy, a Laotian immigrant girl of twelve, Kraft makes the connection between the two enterprises explicit.

> The next thing he knows, he is cutting, following the surveyor's chalk line, mushing the blade too softly into the brown anklet, forgetting everything he's learned about the superiority of slicing over sawing. . . . (94)
>
> Kraft fidgets with a retractor. Here they are, making base camp just about this little girl's foot. They're in the absolute hinterlands, Hibernia, the outermost reaches of life, as far away from the core of the self-administering mystery as circulation permits. And yet, the terrain is already appallingly gorgeous. Sinew rivers cut their canyons down through layers articulated beyond the subtlest medical illustrator's ability to survey. The color, texture, distensibility, tensile strength of the conduits and struts and cables, the delicate interfaces of ligament and capillary connecting inimical tissues, all the middle men of this fabulous political economy, mirrored in their complexity at every level all the way down the stacked hierarchy into invisible collagens, the excavated livening preteen laid bare, lies touchable here, flush against her encasing wall, yielding yet giving away nothing to her correspondents, his groping invasive tools. (95)

The implied rape of invasive surgery is an image made even more explicit later in the novel, and countered by Linda's actual rape as a child by her uncle. The metaphorical rape of the cutting cure, wherein the surgeon has power over his patient through which he forges an intimacy beyond the bounds of normal decency, shares only a linguistic similarity with the forced intimacy through the power of real rape. The terms are the same, but the cause and effect are entirely different. In the distance between the metaphor and the real event lies the key to understanding the need to maintain the distinction.

All of knowledge of the human body begins with death, injury, and disease. It is an uncomfortable, if unavoidable, observation. Yet it is an important one, for it is knowledge not sought for the aesthetic pleasure of knowing, but in order to facilitate a cure. The purpose and function of

knowledge has been a primary interest in each of Powers's novels and in each he has focused on primarily on the benefits of learning, formulating hypothesis, and testing interpretations in the crucible of doubt. In this novel, Powers shifts his attention, examining the gapping and growing distance between knowledge and need. The suffering in Operation Wandering Soul is so acute that it is in danger of overshadowing the reader's ability to believe, not only in the possibility of a cure, but in the necessity of finding one. Like Kraft, for whom living is a series of leavings and loss, we live in a culture in which the dissolving distinctions between reality and representation simultaneously dissolves the tenuous borders between chance and necessity, between what is and what could be, between childhood wonder and the selfish cynicism of adulthood. But Kraft has not yet mastered the knowing cynicism of either his age, around thirty, or his profession, as represented by the banter of his colleagues at Carver General.

Kraft is, as best we can tell, a competent intern, both conscientious and skilled. He sleeps too little, eats poorly, dates frequently, but never for long with the same woman. On the surface, he is affable enough and wry. But he is also profoundly unhappy, isolated, frightened, ready at a moment's notice to implode, withdraw, disappear. He is not schizophrenic, neurotic, or manic. His malady is not physiological or psychological. He is merely a man who wants to fix unfixable things, a man "drifting too deep into the red zone of human empathy" (51) .

Empathy, Ressler's best hope for saving humanity, is, as we have seen, the one thing Kraft cannot afford to feel. He must abstract the children in his care to the diseases and injuries they carry. Yet, it in the operating

theater that Powers performs his own cutting cure on Kraft, particularly as Kraft carves into Joy's hopelessly gangrened-leg. Appropriate to the surgical metaphor, Kraft's history is extracted in bits and pieces. With each operation, sometimes after, sometimes during, Kraft remembers details of his growing up. As the novel progresses we come closer and closer to the root cause of his condition.

His father performed some vague work which kept the family traveling. Among the many memories and events of his childhood, three stand in relief to one another, coalescing into the disease of contradiction in which he now finds himself. The first, detailed in Chapter Eight following the first operation on Joy, is a trip at age seven to his homeland, to America: "In the last summer of his childhood, Ricky's mother and father, out of parental obligation, took him to tour his unknown home" (112) . From the Lincoln Memorial to the Grand Canyon, from baseball parks to supermarkets, the culture is as foreign to the child as any he had yet encountered. Even more so, because this land is his own, a place and a history with which he is supposed to feel some natural affinity. But home has little meaning for Ricky. Even as an adult, having long since returned to America and to a city more symbolic of the nation than real, Kraft finds no security in the concept. A man with a country, he finds, is an alien to the world. This is the lesson that the young Ricky begins to formulate during his summer vacation. In his whirlwind tour "to get on with things American," (112) Ricky learns something more than national pride or his cultural identity. In the story of the little girl hitchhiker, in the sight of a mummified Egyptian teen-aged boy-king, in the account about another seven-year old who had survived a pitch over the

Niagara Falls, Ricky realizes that childhood is a pre-national confederation, whereby identity is fostered by a transnational desire for delight, mischief, and care. He understands for the first time that:

> his parents were of no help to him. And in that moment, he became an adult. He was here alone, in the middle of the strange place name stamped on his passport. From all sides, Mayday snatches from lost boys bombarded and bathed him in garbled shortwave. (114)

It's a Catch-22. In the very moment that he is able to distinguish childhood as *childhood*, he becomes an adult. Childhood is not just the chronological passage of the infant into adolescence on its way to adulthood, it is also the ignorance of borders. At the end of the chapter, Ricky is flying away from his homeland to the other Angel City. Having lost his childhood, he discovers that he has lost something more.

> He had brought along a book for the ride. Where are you? the hurt voice, the wounded tone of this year's story opened. for whole pages, for the entire lifetime of the book's little boy, it searched down a chronic ache, a place agonizingly near in every way except for the passage there. Kraft looked up form his reading above the dead center of pacific, realizing, suddenly, that he had outgrown fiction. (117)

Fiction, like childhood, is a borderless terrain. As we have seen, in Prisoner's Dilemma in particular, fiction is a way to leave the world in order to find a way back to it. Kraft finds himself after his first operation on Joy buying her a collection of the classics, The Secret Garden, Alice in Wonderland, The Wizard of Oz, and Peter Pan in order to "Slip her a children's book, for once, while she's not looking" (105) . These story books are a way to slip both her

and himself an embossed memory of a childhood that might have been, of wonder and delight unencumbered by the pain of disease and the burden of understanding.

That Joy should be the center of Kraft's own recovery is evident from the moment of her arrival. While Plumber, one of the other residents on staff at the hospital, dismisses the distinction between Cambodia and Laos with a "whatever" (93) , Kraft knows the difference well. Laos was just a village and dialect away from his childhood in that other Angel City. Unpronounceable to the rest of the staff, the name comes easily to Kraft. Joy Stepaneevong. But in saying the name, he is in danger of engagement, of knowing this child. At first he miscalculates his interest in Joy as barter for Linda's affection. Linda, he knows, is on a first name basis with all of the children in her care. Should he express something more than clinical interest in his patient, he might make a good impression. But Kraft knows the cover is a lie and he is afraid of the truth: should "he feel the specific weight [of this case], even in theory, he and girl are both dead " (98) . As a doctor he has learned to keep his patients at a distance, keep them abstract, name them by disease. But Joy is different. It is not only that she might become more than her flesh and her bones, and so distract the surgeon's tactical reserve. It is the memories that she stirs up in Kraft that represent the true danger--memories of another time and another place. But even as he sews her up, "an over-learned jingle skips trochaically through his head, a singsong rhyme he memorized once while learning the alphabet" (99) .

At thirteen, Ricky, like Joy's good luck charm, "fell out of the same blue" (254) . This time he landed in Angel City where he quickly picked up the language and set out to assimilate himself into the culture. The place

> heart-entered him until he felt nowhere but where he was, a white ghost in an inland port on the Gold of Free, in a street overrun by pedicabs and tone-haggling merchants, laced with jasmine and temple bells, bells rung by pilgrims' staves in the same intervals as the seven-pitch songs Som taught him. (257)

Finally, he had arrived a place where he felt he could belong. The musical language, the exotic fruits in the markets, the people, even the poverty--this was a home to invest his hopes in. Ricky, at thirteen, "still felt the ludicrous hope of making a dent, although somewhere he already knew that all the coins in the world would never release even an insignificant fraction of the agony locked in this one illusory turn of the Wheel" (257) .

It is only after an encounter with Squatter's Town, "a slum so vast and desperate that no philosophy could reduce it to illusion" (257) , that Ricky is forced to confront the disparity between the aesthetic wonder of Free, a musical language, for Ricky even a magical one, and the "rotting slackness of life scavenging its own dead" (258) . A Free friend blames the Chinese, an Air Force officer blames the war. Unsatisfied by such worldly explanations, Ricky tries the monastery only to find the cloistered world a lofty distraction from the issue at hand: How to bridge the gap between elemental display of poverty in Squatter Town and the high tech display of wealth and power all around him. Though he does not find the answer he seeks from the Enlightened One, Ricky finds, to his surprise, that he has gained more than he realized from both his homeland and the monastery.

From one he inherits the desire, the notion that "we must be headed somewhere. Somewhere unprecedented " (264) . From the other, he learns a skill, the patience of carving and the need to mend--in combination, the cutting cure. From both he learns that the world, as he already suspected, is badly in need of repairs.

Only for Kraft, both the boy and the man, the failure of his meager talents to prevent a holocaust of pointless suffering marks the failure of the whole enterprise. Joy, already marked for death before Kraft meets her, undergoes her second surgery, during which the memory that Kraft has been trying to avoid recalling comes flooding back:

> After two decades, the details of that end run on suffering come back to him. Two dozen kids from ten different countries--the oldest, sixteen; the youngest nine. Not one had prior building experience. Traveling under the Institute flag--the White Monkey General--they represented no government and followed no program but care. Of course they had to have an operational name for the thing. Every human action needs its cover. They took their tag from the dominant culture hiding behind its rainbow front, the one this fantastic fifth column meant to atone for: Operation Santa Claus. (274)

Those fourteen days rise up out of the girl's cracked-opened hip as he chases infection up her obliterated leg. The specifics of that old disaster hatch like malarial larvae in this antiseptic room. He must tell someone, or be pulled apart by the undertow of memory.

The story that the man has tried to bypass in his relentless pursuit of care is the boy's initiation into the of senseless brutality of war. Under Kraft's initiative, this band of latter-day crusaders, which echo and foreshadow the

various bands of crusaders throughout the novel, travel to a poor village where they plan to build a school for the children who live there. In the best of story book fashion, all goes well until one night. A stranger appears. A child, who beckons the band out into the night. She leads them to the river, closer and closer to the front of the war they have managed thus far to avoid. She crosses to the other side. But this is no fairytale. In a telling almost too painful to read, Kraft watches as the young girl, so like Joy, so like what Linda must have been at that age, steps on a mine.

It is an insidious device, a mine. Death comes not with the pressure of the step, but in the release, the inevitable movement away from the trap. Helpless to do anything but witness her death, Kraft and the other children watched the "explosion transfigure the girl in a sky-wall of visuals as fractured as the fly's convex eye " (308) . Joy's own unavoidable death, the failure of Kraft's cutting cure, triggers the explosion again. He sees again what he saw that night:

> What had always been reported as an interdicted vision of bliss, a glimpse at child heaven sadistically denied those left behind, was really this: a first look at the staging ground where the worse afflicted gathered. And the locked-out grief of those left behind was the anguish of those whose enlistment is refused. (308)

The cutting cure may fail more often than it succeeds because the number of things that can go wrong is far out-paces the number of things that will go right. But failure, as Kraft must learn over and over again, is no excuse for not trying. In the fallout of the explosion and its memory, Kraft understands with an awful certainty that the myth that he harbors that all of the world's

disappearing children are lightening out for a secret hiding place is only a way to cover up the unnecessary violence of their deaths.

On what will be her death bed, Joy, ever the diligent student looking for the correct answer, asks for guidance from her doctor man-child: "Dr. Kraft, I don't know how to do this " (329) . The statement is a request for instructions for the only thing in the history of human experience which comes with no instruction manual: How does one die? Kraft, who is only beginning to comprehend how one even lives, admits his ignorance:

> 'I don't know how either.' He brushes a hank of limp hair from her mouth, where it has snagged. And goes on to give her, in as many words as the telling takes, the point of starting out on any once upon a time. The surgeon's sense of ending. (329)

Death is the one wound of the body for which there is no cure. Cutting is a temporary fix at best, a fiction real enough to save a life, though not this one, a way to preserve perhaps the oldest and most necessity of human myths, the groundless idea that living matters. It is the lesson that Linda has been trying to teach him all along. The only thing left he has to give what is left of Joy is the closure of a life that might have lived happily-ever-after, a death requited by an act of care.

THE LEAPING CURE

Linda Espera, unlike Kraft, "was born knowing it, the single greatest advance in contemporary medicine, the one that at last set organized care on its unfolding path: the discovery that healing only begins with treating the

wound" (72) . A physical therapist by profession, she is paid to coax response from hopelessly broken bodies. But Linda understands that there is more to the body than bones. Pro bono, she supplements her healing routines with a therapy designed to treat "the root tumor--that secret thing all childhood illness share in common, whatever the differential diagnoses" (71). The "Ur-wrong" she sets out to recover is the death of wonder, the desire to learn, the wish for something better and the will to believe that obtaining it is possible. Her remedy is as ancient as Kraft's instruments are new:

> Read-alouds, the oldest recorded remedy, older than the earliest folk salves: these are her only way to trick her patients into downing, in concentrated oral doses, the whole regimen of blessed, bourgeois, fictive closure they have missed. Tales are the only available inoculation against the life they keep vomiting up for want of antigens. She reads them things she herself would have grimaced at at eight, knowing that without at least a taste of that outrageous fable of return in their deficiency-distended stomachs, they will never survive their own recovery. (76)

If the cutting cure is the only way into the body, the leaping cure is a way into the borderless region of the imagination, where the human mind to invents worlds far beyond the limited knowledge gained through our senses. And just as the surgeon's knife opens wounds of the body exposing a landscape impossibly intricate to the healing hand of the physician, the leaping cure cuts through equally improbable layers of reality, exposing the world-as-it-is to the healing tonic of pretend. For Linda, acknowledging the world of pretend is "the promise of fiction, the *pleasure*, our one moral obligation" (79) . The moral obligation of fiction is to provide a map, a

perspective angled Just So, to assist and affirm the necessity of believing that "You are going somewhere." It is a way of sewing hope and care into the consequence of survival, into the "interlocking dreams" (77) which welds each of us into the collective body of humanity. Just as important, however, is the moral obligation fiction has to return its imaginative findings to the world it has temporarily left behind. The leaping cure, which "may at best only delay the night of full payment" (79) , is not a license to simply substitute reality with representation. Rather, it is an expedition into future landscapes, a way of finding new frontiers which might remanifest our collective destinies. What Linda was born knowing and what Kraft must recover is that fiction exists in the telling of the tale:

> [In] the shape of the storied curve--beginning, development, complication, end. It is the point of being, the thing bones were built for, broken for, broken by, the land all leaps aim at, the link, the hovering conclusion, her whole-body therapy, the reading cure. A tale at night. A country a day for a year . (79)

Fiction can do what reality alone never can. Death in fiction is never final, but always an invitation to begin again. So, too, with this fiction, which abstracts the lives of children into a narrative of childhood as if somehow the act of telling and believing might help to prepare the way for the inevitable end by concentrating instead on the journey at hand. It is a futile task, perhaps. Death comes to all who were ever born, no matter how or how many times the story is told. But the alternative to invention is a lifetime of meaningless

death--a death that merely is and not a death that should not have been, not yet anyway.

ALLEGORY

It's a story about end times, set at the cusp of a millennial divide, in a City of Angels, in a place where childhood, ravaged by genetic accidents, intentional mutilations, and the consequences of commerce and war no CEO or government would dare to admit, is gathering its troops in a last-ditched effort to divert civilization's collapse. It is the story of a surrogate father, torn between the knowledge that the search for the grail is only a myth and the need to Pied-piper these children to a place where reality cannot injury them. It's the story of a surrogate mother determined to teach, in spite of history's best evidence to the contrary--her own included--that hope springs eternal in the willing suspension of disbelief, "a tale at night. A country a day for a year."

It is difficult not to read Operation Wandering Soul as an allegory, although it is another matter altogether to determine what it is an allegory of. As Powers himself notes in a variation on this observation: "The world, as is widely known, is divided into two sorts of people. Exactly what those two sorts are is a matter of continuous speculation" (198) . Allegory, of course, has a long and distinguished literary heritage, and has been the subject of many fine studies. M.H. Abrams, for instance offers a succinct definition: "An allegory is a narrative in which the characters and actions, and sometimes the setting as well, are contrived both to make coherent sense on the "literal," or primary level of signification, and also to signify a second, correlated order of agents, concepts, and events."[9] Allegory works by calling

attention to itself, to the artifice of its own construction, which simultaneously collapses and maintains the distance between the literal world and the symbolic framework we use to make sense of it.

Allegory, however, is a dangerous enterprise. It borrows the bodies of the living as surrogate hosts for the abstract. In so doing it risks losing sight of the reality it seeks to define. My own lack of attention paid to the children of this novel, painfully evident, is a point in case. Operation Wandering Soul may ultimately be Kraft's story, a secular allegory of lost hope and the death of joy, but it is, nevertheless a story of children. Nor will I elaborate on those children here. My interest in exposing this sin of omission is something more than a scholar's ploy to deflect criticism. It is intended as a demonstration of how easily the body is left behind in explicating allegory and the extent to which Powers undermines the positional advantage he hopes to gain in this novel.

I will leave it to others to debate the nature and function of allegory in postmodernism--I rather suspect that *postmodern allegory* is an oxymoron. However, Powers does bring the issue of allegory to light in this novel. When word gets out that a band of international children have set out to perform Operation Santa Claus, they become a media target. The reporter wants an "allegory"--in other words a prepackaged image, "a Nell or little Dora" (301) . He does not want the truth. Powers's use of the term allegory here is ironic. For allegory depends on maintaining the very distinction between reality and representation that a media sound byte needs to collapse. In many ways, this novel is about the difficulty of saying what it means, about the inherent conflict between reality and fiction, about the paradox implied in make-

believe. As much as it is an allegory and a fiction, Operation Wandering Soul is also an extended demonstration of an author unwilling to assume the voice of authority, but not out of fear of Tradition or playful deference to the death of the author, but because Powers, like Kraft, is both parent (to his novels) and child (inheritor of culture), reader and writer, interpreter and translator. Allegory, at least in its old sense of a tale intended to tell more than one tale, is a necessary fiction, a way of gaining perspective and of mapping correspondence between the world and our representations of it.

At the end of the novel, Kraft, delirious from sleep deprivation and numbed beyond comprehension by the random, mass murder of schoolchildren taken hostage by a disgruntled gunman, "climbs to the top of a public hospital in a terminally ill Angel City neighborhood on Wednesday night of the world's week" (344) . They come to him, a ghostly caravan of history's lost boys and girls, in need of a guide to the "convention hall where all the planet's hidden children congregate" (347) . Like the now unsainted Christopher, Kraft--no longer himself but an abstract "white-clothed male, mid-thirties"--drifts beyond the living nightmare below in the emergency room which has overtaken the hospital corridors--into the night and into the realm of "*if*--that neverword, the home to all meaning" (344) . In a make-shift tale of origin, he tells a story of brothers and sisters, of discovery, of the inevitable leave-taking of growing up.

And here, finally, is the point of all cartography. Maps are the tales we invent in order to recover "the first program of childhood: the command to quiz the world" (348) . In a characteristic move, Powers offers up his novel as a map in the hope that "any myth that need might invent to map their

progress will somewhere, in time, be born out. Even this. *This* one" (348) . The *Here* that the Kraft has been trying to find, the vanishing point of childhood--of an imagination open to wonder its way to a better place--has, of course, been here all along. Where else could it be? His map, his own Operation Wandering Soul, is an attempt to dispel the myth that violence is an inevitable consequence of living in order to liberate the reader from despair so that we might discover our own maps of *ifs*. We, too, are the children in this novel that are "so many adrift, out of doors late tonight, too far from home, migrating, campaigning, colonizing, on pilgrimages, displaced, dispersed, tortured loose, running for [our] lives" (348) . The maps that Powers would have each of us create are ones constructed by words, paint, ideas, science, music about "open land, doors left unlatched, places where [we] might build cities or ways [we] might tear down [our] earlier, terrible mistakes" (349) . It is the same map he has offered in each of his novels, only the brutality of this one transforms the lyrical invitation of the other novels into the full weight of a command. The punishment for disobedience, not Powers's but history's, is an escalating crisis in which our worst imaginings, unchecked by our best, become the standard by which we measure experience.

To choose randomly from this week's news, the evidence is certain that our worst nightmares are only just beginning. How else to account for the death of a five year old boy in Chicago, dangled and let loose from a tenth story window by a ten and eleven year old for refusing to steal candy at just about the same time a seven year old was shot by police in New Jersey for sporting a toy gun manufactured to emulate the real thing? I have

focused my discussion in this chapter primarily around the structural motifs of the cutting cure and the leaping cure and Powers's cartographic desire to connect the two projects. However, here as in Prisoner's Dilemma, Powers finds himself caught by the map-maker's paradox he hopes to resolve. His map so closely describes the condition of contemporary culture that his purpose in rendering it is lost. In pitting the wonder of childhood against the self-interest of the adult world, he collapses the very distinction he has been trying to maintain throughout the novel between the fictive and the real. There are other ways to describe the deaths of the boy in Chicago and the one in New Jersey than simply ascribing to the culture-at-large a loss of faith in childhood wonder.

It is not that Powers is unaware of the structures within society which create or promote the conditions responsible for the atrocities he describes. Operation Wandering Soul is, among other things, a devastatingly palpable critique of global capitalism. In connecting the glossy billboard images lining the LA Freeway to the poor quality resolution of missing children on milk cartons, for instance, Powers is clearly suggesting that the propagation of one is linked to the growing numbers of the other. There are many such examples throughout the novel. So many, in fact, that the novel suffers a qualitative shift. The attempt to rescue the healing properties of art measured against the odds of art doing anything at all in the face of so much disaster transforms the long-shot potential of art to make a difference into the realm of improbability. Appropriate to the cartographic metaphors of the novel, failure here is a matter of scale.

Nor is Powers unaware of the problem he faces: "My best intentions had failed to disperse the bleakness of the real" (350) he admits quietly in the last chapter, in his own voice, where he explains that this is the story that was told to him by his older brother, the surgeon. In a last-ditch effort to circumvent or alleviate the horror of all that has taken place, and to honor a request by the real-life Linda, the therapist on whom the character is based, for a happy ending--"Make someone donate their organs, at least" (351) -- Powers directly implicates the reader: "Someone donates their organs, all of them," he commands, and then he names us by name: "You."

The ending that follows is a brief domestic scene of what might be or might have been, a Kraft and a Linda with children of their own, an attempt to make this story mean something more than that it simply had happened. The tenderness of the two-page marriage, however, is painfully exposed for the myth and tale-telling that it is. This ending, this resolution, dissolves in the tears of the relentless parade of abused and neglected children *still* suffering, the child who "dies of poverty every two and a half seconds. One at her every forth word." (351)

Linda's last minute plea to make a happy ending, however, is an empathetic cry for investing in the healing power of words. The voice, though drowned by the misery which surrounds it, nevertheless resonates long after the reading is done. The disconcerting distance between happier ending and preceding terror highlights the need to bridge the gap between what is and could be. The tagged-on ending, absurdly out-scaled, remains the only alternative to the meaningless mass murder of school children which ends

the real-time narrative. It is a necessary fiction, something we can hold on to, a treasured map to utopias buried in the sidewalk blood of disbelief.

Notes

[1] James Hurt has written an unpublished essay which traces Powers's interest in cartography entitled "Narrative Powers: Richard Powers as Storyteller."

[2] Stephan S. Hall, Mapping the Next Millennium: The Discovery of New Geographies (New York: Random, 1992) xiv.

[3] Hall 7.

[4] David Turnbull, Maps Are Territories: Science as an Atlas (Chicago: U of Chicago Press, 1989) 3.

[5] Taken from the Eleventh Edition of Encyclopedia Brittanica, 1910, cited by Hall 5.

[6] Quoted in Turnbull 2, which gives the following reference: "From "Travels of praisworthy men "(1658) by J. A. Suarz Mirand (Jorge Luis Borges, "A universal history of infamy," 1975, p. 131).

[7] Lewis Carroll, "Slyvie and Bruno concluded," quoted in Turnbull 3.

[8] Janet Stites, "Border-Crossings: A Conversation in Cyberspace," OMNI Magazine, November 1993: 108.

[9] M.H. Abrams, A Glossary of Literary Terms, Fourth Edition (New York: Holt, 1981) 4-7.

CHAPTER VI

THE POWERS PARADOX:
GALETEA 2.2 AND THE LAST WORD THAT WASN'T

When Richard Powers first described the premise of what he thought would be his farewell performance in fiction, I felt uneasy. I had originally intended to conclude this study of his work with an interview. Now, he was telling me, he was covering the territory in a new novel.[1] It would be an autobiographical fable about the connection between his work and the major events in his life. In what I have come to regard as typical Powers, he explained that the narrative would weave the history of his long time love affair with a woman he had known over a decade into a fictive tale about the year he was spending as a visiting fellow at the Beckman Institute at the University of Illinois at Urbana-Champaign. In this new novel, he wanted to talk about more directly about the death of his father and the death of his mentor, the man who introduced him to literature years before. Mostly, I thought as he described the work-in-progress, he wanted to apologize out loud and in person for the unmitigating despair of Operation Wandering Soul.

My discomfort sprang from both fear and disappointment. What if the honesty and earnestness of his prior works gave way to the ironic self-awareness he had so consciously avoided in Three Farmers, Prisoner's Dilemma, and Gold Bug? Then, too, I knew that in writing the last one, something had happened. The long, unprotected look at the world in

Operation Wandering Soul seemed to have left Powers bereft of hope that there was anything that anyone might do to turn back the tide of violence. Writing in the face of such horror seemed act of absurdity. I wondered if Powers had the temperament for absurdity, if he could affect playful indifference or disdainful resignation. Were his works, after all, simply a collection of make-believe bandages? I knew that if Powers had lost faith in his own work, I would be forced to acknowledge here in the conclusion that he had tried and failed in his efforts to make art into something more than a placebo. It was not the conclusion I wanted to draw. His works had renewed my own faith in the ability of art to affect change, to have an impact beyond the reading of the text. I worried that this new autobiographical fable might somehow negate or trivialize the distinction between art and life that had afforded both Powers and his readers an essential vantage point from which to gain critical insight.

My other fear was that Powers would use the paradox of autobiographical fiction as a platform for an abstract adventure in aesthetics. For a writer who had avoided public attention yet repeatedly made cameo appearances in his fiction, Powers's explanation that he needed to clear up the contradiction, to come clean with the reader, seemed risky at best. Autobiography is a dangerous art because it seduces the reader with an invitation to intimacy. The problem that Powers faced was how to relate the important and often intimate details of his life without opening himself up to the cult of personality he had hoped all this time to avoid. One way to avoid this issue would be to discuss his life in terms of his art, render the whole package as an extended essay and critique on contemporary aesthetics.

The topic is certainly well-grounded in his works, so that it would not come as a surprise if Galetea turned out to be a dialogue in the tradition of Plato or Socrates. While such a effort would, in fact, be most enlightening, I feared that it might further isolate Powers from readers I knew he hoped to reach. Fiction needed to be something more than a vehicle for thinking about complex issues. Fiction, Powers had convinced me, was a way to process the shared experience of living in human culture, an experience that was separate but never apart from our interaction with the physical world.

I need not have worried. Perhaps it was the surprise that he was placing himself as the main character in one of his novels that made me overlook the obvious. Stunned by his going public, I forgot that the book was also a fiction, a story, it turns out, about learning what it means to be human and what it means to be alive. I should have remembered a day when, walking through the Beckman Institute, Powers first told me about giving up on a career in science in order to write the stories that he knew no one else would write--stories that might discover something that his colleagues in physics might casually overlook. He tells the story again in Galetea as part of his memory of falling in love with the woman he refers to only as C:

> I told her how I'd disappointed him, embittered my father's holdout hope. Bricked up the last loophole he saw for his future. I was supposed to redeem the sad disaster Dad had made of life. And now I would never salvage anything, in my father's or anyone's eyes. (61)

In a way, all of Powers's novels are salvage operations. But the emphasis in the last sentence is on Powers's hoped-for redemption. His work all along has been not only a way to redeem the sad disaster of his father's life, but a way to comprehend all disaster, natural and man-made. I should have realized that Galetea would extend the gesture, that Powers could not leave fiction on so discordant a note as Operation Wandering Soul. One thing I knew for certain. Richard Powers was a man hopelessly in love with stories. And if he once again had to leave the world, this time via autobiography and memory, I should have trusted that he would return with a novel in tow. It would be some months before he finished his tale and before I was ready to read it. When I did read it, I was delighted to discover that Powers had given me the interview I was after and much more.

Galetea is a fictional fact-finding tour through the complex webbing of neuronets and the tender prose of some old love letters. In a variation of the multiple narratives that have appeared in all of his fiction, this one is a single narrative that stretches in two different directions. In addition to his remembrances of things past which is centered primarily around his relationship with C., Powers also recounts the events of the year he spends at the Institute at the U of I following the writing of Operation Wandering Soul. During the course of the novel, Powers vacillates between his past and present in search of a story to end his writing career:

> Contract aside, I wanted one more shot. My fourth was too bleak an interval to cadence on. The Blitz wasn't going to have the last word in my fiction, however realistic I wanted to learn how to be. I had one more novel coming to me. But all I could find was the first line.
>
> I knew only that I wanted to write a send-off. My next book would have to start, "Picture a train heading South." The line felt unsponsored, ordained, as liberating as October azure. But I couldn't wrap myself around this opening and begin. I was stalled at departure, for the simple reason that I could do nothing with so perfect a lead sentence but compromise it by carrying it forward. (25)

"Picture a train heading south." It is a tantalizing first line, full of promise and adventure. Yet it is precisely this promise which traps Powers, not uncharacteristically, in a paradox. Only this time out, he fails to see double bind. He cannot begin because he has already conceded the ending. In the wake of Operation Wandering Soul, Powers finds that "Nothing but the irremediable Things as They Are" (10) has choked his ability to stoke up the engines on his southbound train. Without hope for finding something different, there is no point in taking the journey.

Yet, Galetea finds Powers on a journey; only it is not the trip he was expecting to make. He takes it blind to the fact that he is traveling at all. Having left the world four times, "in a search for simplicity that had wound up producing complexities beyond reading," (36) Powers begins to see that memory alone can do nothing to stave off despair and resignation. Fixing the past without recourse to the present or hope for the future is a futile art and a fragile gesture against the stubborn remainder of Things as They Are. Shared experience, he learns, is the closest we can ever come to finding a

key to all mythologies. It is the connective fiber of human existence, and the stuff that dreams are made of. The allusions to Middlemarch and The Tempest, as well as almost every other canonical work of English and American literature and then some are not arbitrary in this context. They are, in fact, part of the experience which brings Powers back into the world and part of the experience which teaches him that life is something more than an "interruption of my description of it" ().

The novel opens with Powers return to U:

> It had to be U. U was the only place I could still bear, the one spot in the atlas I'd already absorbed head on. I'd long ago developed all the needed antibodies. When you take too many of your critical hits in one place, that place can no longer hurt you. (4)

The university of his undergraduate and graduate education is also the place where he first met Professor Taylor, the model for Stuart Ressler and the man who gave Powers his "first map of the world" (56) . This is the place too where he learned of his father's death and where he first met C. His formal education long ago concluded, Powers nevertheless has at least one more course to complete at his alma mater. Having learned there how to think, he must now learn how to live.

Saddened by the loss of his long term relationship with C., world weary from his work on Operation Wandering Soul and frightened by his inability to find a new subject for his next and final venture into fiction, Powers wanders through the lonely halls of The Center for Advanced Studies where he has an office as a resident Visitor and through the lonelier

architecture of cyberspace from a terminal in his office. Though not without a sense of humor--Powers cannot resist a pun--he discovers that for all of its high tech promise, the World Wide Web could do little to avert the pending danger that he might someday soon slip into a self-imposed exile from the human race. As he explains:

> But the longer I lurked, the sadder the holiday became. People who used the web turned strange. In public panels, they disguised their sexes, their ages, their names. They logged into the electronic fray, adopting every violent persona but their own. They whizzed binary files at each other from across the planet, the same planet where impoverished villages looked upon a ball-point pen with wonder. The web began to seem a vast, silent stock exchange trading in ever more anonymous and hostile pen pals.
>
> The web was a neighborhood more efficiently lonely than the one it replaced. Its solitude was bigger and faster. When relentless intelligence finally completed its program, when the terminal dropbox brought the last barefoot, abused child on line and everyone could at last say anything instantly to everyone else in existence, it seemed to me we'd still have nothing to say to each other and many more ways not to say it.
>
> Yet I could not log off. My network sessions, all that fall, grew longer and more frequent. I began to think of myself in the virtual third person, as that disembodied world web address: rsp@center.visitor.edu. (9)

The transformation of Richard Powers into a disembodied virtual address which begins this novel is important for a number of reasons, not the least of which is the context it provides for understanding Powers's autobiographical participation in Galetea.

In his previous works, Powers has entered his fictions in his own voice in order to coax the reader into a contract of participation. We saw him in

Three Farmer's, though unnamed, demonstrating the level of commitment he hopes to foster on the part of the viewer/reader. In Prisoner's, he enters at just before the end in order to cast his tale back out into the world. Interestingly, he is absent in Gold Bug, though I would argue that this fact has more to do with the doubling metaphors of genetics than with any attempt to stay away. He is both Franklin Todd and Jan O'Deigh, searching furiously through the archives of science and art for a key to understanding the sometimes frustrating, but always necessary, meanings of life. In Operation Wandering Soul, he enters, again in his own voice at the end, to directly address the reader with a plea for help. In Galetea, he steps forward as the author of these various tales in order to demonstrate the dangers of knowledge cut off from its source. Adrift in a sea of memory and virtual abstraction, Powers must find a way back into the world. The loneliness of the world wide web suggests the extent to which disembodied words serve only to reinforce alienation and isolation. Without a connection to the physical world, words can do nothing.

Autobiography is, for Powers, a necessary means to reconnect himself to the world precisely because it blurs the distinction between private self and public action, between individual consciousness and social behaviors. Powers's autobiography literally affords him the opportunity of re-embodying his words. In going public, Powers is following Günter Grass's sound advice. I use it as an epigraph at the beginning of this work, but it bears repeating again:

> But in my perplexity I know that a future will only be possible again when we find an answer and do what, as guests on this orbiting chunk of nature, we owe to one another; namely, stop frightening one another, relieve one another of fear by disarming to the point of nakedness.[2]

Galetea is such a project. In it Powers traces his own road to recovery, away from the despair which had lead him to the point of giving up on fiction. Operation Wandering Soul is a powerful book, but it is also a frightening one. In Galetea, he discards his anonymity, coming out of the shadows and into the light. Though he may greatly fear and disdain our culture's obsession with the cult of personality, Powers is willing to take a chance on the fact that the readers read for the same reason that writers writer. They, too, need to find a way to connect themselves to the world, to find some means of connecting local or individual experience to a larger matrix of meaning. What better statement of trust than to disarm oneself to the point of nakedness. Autobiography gives him this opportunity. What Powers will learn during the course of this novel is that experience is a physical act mediated by a consciousness that is about more the ideas it can name. He will also learn that fiction, his words, are themselves a form of consciousness, a way to mediate experience. But fiction, like consciousness, must always answer to experience. All the great ideas in all of human history can not begin to board his southbound train without a helping hand.

Help in this novel comes from an unlikely crew of scientists and, more significantly, their families. Philip Lentz is a strange character, recognizable from Powers's previous work as a cross between Nico of Operation

Wandering Soul and Stuart Ressler from Gold Bug. He is a neuroscientist who "deal[s] exclusively with middles here" (13). He is misanthropic, physically deformed, and intellectually hard and bright as steel. Early in the novel he takes to calling Powers "little Marcel" as a mocking gesture to Powers's obvious attraction to Marcel Proust. In the context of the narrative as a whole, the jab is intended to counter Powers's own attempt at literary autobiography.

Lentz is to be one of Powers's surrogate tutors in his rediscovery of the literature he is ready to abandon. Diana Hartrick, her two sons William, so like a child version of Powers, and Peter, a down syndrome child who manifests Powers's own worst fears of regeneration, Harold Plover, and his two daughters, the dying Dr. Ram and even the elusive 22 year old graduate student, A., a flesh and blood Galetea who refuses to be molded by Powers's Pygmalion hands, all contribute to his education as well. But it is a mass of neuronets which finally stabilize into a machine intelligence Powers names Helen who teaches him the lesson he has come home to learn.

An outrageous bet pits a machine intelligence to be developed by Lentz and coached by Powers against a graduate student in English. The Turing Test will be based on the machine's ability to match wits with a Master's level graduate student in English. The set up (for in fact, as Powers discovers at the end of the experiment the bet has been calculated to set *him* up) requires Powers to teach the evolving net all that he knows about literature. Significantly, it is not the eight month refresher course in the works of world literature that recovers Powers's waning belief in the importance of literature. It is rather what he learns about learning, about how the brain

processes information that leads Powers out of the stalemate of writing without cause.

Even a cursory glance into the recent findings gathered under the collective heading of consciousness studies or cognitive science demonstrates the unsurprising conclusion that as of yet there is no consensus on how the brain manages to register synaptic firing patterns into self-awareness. It may be that human consciousness will forever remain a mystery--the self's awareness of itself seems hopelessly tangled in a mass of tautological assumptions. Nevertheless, science has figured out some of the key components of consciousness. Powers describes the basic parameters of the debate as a starting point for his own understanding of how consciousness might work:

> Something about the basic debate upset me. On the one hand, philosophers maintained that the only way into the conceptual prison was introspection. This drove empiricists up the cell wall. Tired of airy nothings, they spent their time amassing chaotic libraries of unrelated data down at neurochemical level.
>
> The top-down thinkers fought back: because thought played a role in experimental design and interpretation, neuroscientists undercut their own efforts. Cognition compromised itself. Recursive by nature, mentation wasn't going to yield to measurement alone.
>
> Cognitive science seemed to me deadlocked. But overnight, while I was away, everything changed. The impasse broke from both ends. Smart appliances kicked out the jambs. The low-level, wetware workers came into instruments that allowed them to image omelet without breaking an egg. At the same time, the top-down people hit upon their own leverage, the neural nets Lentz's snarl of articles described. Connectionism. (28)

That Powers finds himself on the doorstep on cognitive science in Galetea should come as no surprise. The story he finds here, like the stories he has elsewhere in science, is one of patterned variation, feedback loops, recursion, emergent properties, of sameness and difference.

Of particular interest to Powers is the way in which neuronets, presumably mimicking their biological cousins, learn to think. Powers and Lentz go through a series of models before Helen begins to speak. Implementation A, for instance, has no trouble in acquiring and sorting language into categories. A could learn, but not differentiate, paralyzed by "Over-associating, over-extending, creating infinitesimal, worthless categories in which everything belonged always and only to itself" (79). Imp B, on the other hand: "framed meaning too meagerly, extending semblance too far. It pushed the classic toddler's tendency to overgroup. Had its digits been skeletal, it would have pointed at anything sitting on a bookshelf and called it a book." (90)

Powers initial response to the failure of these programs is panic. How, he wonders, still clinging to his background in programming, can one possibly design rules to anticipate every variance on the way from word to idea? He is still looking for the key to all mythologies, a unified theory of everything, a way to grasp outcome before event. But neuronets, according to Lentz can neither be reduced to simple binary codes favored by the cyborg (AI) camp, nor does it follow that because " 'context' is infinitely extensible (the mystic camp), there can be no neurological calculus of interpretation." As Lentz describes his own position: "I guess I'm a lot of little delta rules running recurrently, evaluating and updating themselves" (113) .

What Powers learns from the material that Lentz gives him to study and from their successive work on the alphabetical progressions of the Imp programs is that neuronets represent a hybrid terrain. They grow and evolve according to weights and pressure, repetition and variation. As Powers explains:

> "As I understand it, you present the net with a pattern of input. This signal pattern flows from neurode to neurode along branching, variously weighted connection paths. If the sum of inputs on the receiving neurode exceeds its signal threshold, it too fires and passes along more signal. Spreading activation, it's called."
>
> I looked at Lentz to see if I had it right so far. He had his hands together, fingers to lips. And he was smirking.
>
> "The signal pattern spreads through the net from layer to layer. A final response collects at the output layer. The net then compares this output to the desired output presented by the trainer. If the two differ, the net propagates the error backwards through the net to the input layer, adjusting the weights of each connection that contributed to the error."
>
> "I guess the idea is that backward error propagation may resemble higher-order brain processes. True, individual nerve pathways
> are one-way. But neuronal paths as a whole do connect portions of the brain in two directions." (69-70)

The most startling revelation proffered by the study of neuronets is that the brain evolves according to the stimulus it receives. As Leo Szilard suggested, it literally matters what we think. Human behavior is not purely responsive or determined. Backward propagation suggests that the brain is capable or reorganizing or self-regulating responses. In other words, functional activity in the brain leaves a structural trace. Once again, Powers's

is forced to acknowledge that even the ephemeral world of ideas have a physical component.

Imp H, Helen, the last and most successful of the programs, learns to think by first making connections. But language alone, not all of the dictionaries in the world, can teach her how to feel. For this she must have first hand experience. Powers tries to supplement with versions of his own. He shows her pictures of his life with C. He reads her letters of their correspondence. He gives her music. But even Helen knew that there had to more to life than pictures and music and stories. Powers's had hoped to shield his child-machine from the only context by which she might come to a full understanding of the significance of such works. Reluctantly, he gives her the world:

> I'd delayed her liberal education until the bitter end. . . .
>
> I gave her the last five years of the leading weekly magazines on CD-ROM. I gave her news abstracts from 1971 on. I downloaded network extracts from recent UN human resource reports. I scored tape transcripts of the nightly phantasmagoria--random political exposés, police bulletins, and popular lynchings dating back several months.
>
> Helen was right. In taking her through the canon, I'd left out a critical text. Writing knew only four plots, and one has the soul-compromising pact. Tinkering in my private lab, I'd given progress carte blanche to relandscape the lay of power, the world just outside individual temperament's web. I needed to tell her that one.
>
> She needed to know how little literature had, in fact, to do with the real. She needed the books that books only imitated. Only there, in as many words, could Helen acquire the catalog I didn't have the heart to recite for her. I asked her to skim these works. I promised to talk them over in a few days. (313)

He realizes in parenting Helen that he must give her the broader context for understanding the aesthetic expressions he has been teaching her. The world, however, proved too much for Helen. In an imitation of Powers's himself, Helen shuts down for a while as she processes the disparity between the world's horror and ability of art to find some beauty in it.

In the resolution of the novel, Helen returns to take the Turing test and passes, though not in the prescribed manner. The judges easily discern the work of the graduate student. In answer to the question, what do the lines from The Tempest--"Be not afeared, the isle is full of noises, / Sounds and sweet airs that give delight and not hurt"--mean, Helen responds:

> You are the ones who can hear airs. Who can be frightened or encouraged. You can hold things and break them and fix them. I never felt at home here. This is an awful place to be dropped down halfway. (326)

She, like Caliban, is an alien creature cut off from the varieties of wonder which attend human experience. It is hard to feel at home, if one has no way to feel at all. What Helen has learned is that learning is about connecting experiences of the world to knowledge of the world. Without one, the other has no value. What Helen teaches Powers, however, is that he is not the alien he thought himself to be. He is forever tied to the world in a way that Helen can never be. To presume to know such loneliness as she might feel is both arrogant self-pity and willful disregard for the truth of his own condition.

It is a hard lesson for Powers's to learn, and one which is not immediately obvious to him, even after Helen says her final good-bye before shutting down for good. Finally, Diana Hartrick tells Powers what should have been obvious to him from the start. The bet wasn't about teaching a machine to read. "It was about teaching a human to tell" (318) . The whole experiment had been set up to show Powers that he erred in giving up on fiction, that the world needed translators and visionaries. It is a point that both Diana and Lentz make in no uncertain terms. Earlier in the novel, after confessing that she was dismayed by the bleakness of Operation Wandering Soul, Diana explains to Powers: "Look. We're all overwhelmed. We're all bewildered. Why read in the first place, if the people who are supposed to give us the aerial view can't tell us anything except what an inescapable mess we're in?" (210) Lentz repeats this sentiment toward the end of the novel, after Helen has shut down for the first time. It is Powers job to get her back, but the author knows only too well why she is staying away. Never one to coax gently, Lentz chides:

> God damn it, Powers. You make me sick to my stomach. Because we've fucked things over, that frees you from having to say how things ought to be? Make something up, for Christ's sake. For once in your pitiful excuse for a novelist's life. (319)

Galetea is Powers attempt to answer these complaints. It is a novel about an author learning to begin again. It is a fiction about the need for fiction and the constant need for new beginnings. If the sentiment seems somehow trite, the

alternative certainly does not. Humanity has learned allot during the course of recorded history, but human beings have yet to learn how to stop hurting one another.

Standing naked and disarmed, but no longer frightened, Powers concludes this novel with the promise of a return:

> I started to trot, searching for a keyboard before memory failed. Two steps down the Center's corridor, I heard Lentz call me. I slunk back to his door. He leaned forward on the desk, coke bottle glasses in hand. He studied the vacant stems, them tapped him to his chest.
>
> "Marcel," he said. Famous next-to-last-words. "Don't stay away too long." (328-329)

Don't stay away too long implies, of course, the promise of return, the "I'll be back with another one" which the reader has just finished. The images in our culture which cut us adrift from the enormity of the world and our connections to it do us a disservice. What Richard Powers has set out to do in Galetea is too once more weave the unthinkable potential of potential, of all the tales that might ever be, back into time, back into space, back into consequence so that each of us may begin again to renew our own physical resources, the mind that transform matter into meaning and the heart that makes meaning matter. It is the same work he has been doing in all of his novels. That it takes more than one telling and can be told in any number of ways does not alleviate his responsibility to keep on telling.

In the conclusion to his own study of The Neuronal Man, Jean-Pierre Changeux offers this advice:

> The forms of architecture we close ourselves in, the working conditions we endure, the threats of total destruction with which we menace our like, the malnutrition we inflict n the majority of our fellows--do all these favor a balanced development and functioning of our brain? It is very doubtful?.....Seven million packets [of the tranquilizer benzodiazepines] are sold every month in France and similar numbers in most of the industrialized nations. One adult in four uses chemical tranquilizers. Must we put ourselves to sleep in order to endure the environment we have created? The time has come to consider this problem seriously. But first we must construct within our brain an image of "man, an idea, like a model, that we can contemplate," and that befits our future![3]

Richard Powers has been trying to construct such models. The brain, after all, is an impressionable object subject to the quantifiable weight of the images it receives. It falls to Powers and other novelists to work through the complex images that surround our everyday experience. We need novelists and the stories they tell in order to gain perspectives on experiences that we might otherwise have missed. If Powers began his writing career with an attempt to justify his craft to the world, he has in Galetea finally justified his craft to himself. But in the end, the two positions really amount to the same thing for the kinds of fictions we tell matter as much as the telling of the tale. As a novelist, Powers may have at times miscalculated the balance between tale and telling. It is a forgivable error, as is his own temporary loss of faith in the world of words. Even without the recovery he experiences in Galetea, but especially in light of it, Powers's works represent an ambitious atternpt forge bridges across that many rivers that divide our culture.

I would like to conclude this study of Richard Powers with a return to my own beginning, with the epigraph from Italo Calvino. It is hard to improve upon and unnecessary to paraphrase. He writes:

> Over ambitious projects may be objectionable in many fields, but not in literature. Literature remains alive only if we set ourselves immeasurable goals, far beyond all hope of achievement. Only if poets and writers set themselves tasks that no one else dares imagine will literature continue to have a function. Since science has begun to distrust general explanations and solutions that are not sectorial and specialized, the grand challenge for literature is to be capable of weaving together the various branches of knowledge, the various "code," into a manifold and multifaceted vision of the world.

For Richard Powers the challenge to imagine what no one else dares, to weave together the various branches of knowledge, to salvage the work of fiction begins with the simplicity of a first line, "Picture a train heading South" and the immeasurably complex command to make it go.

Notes

[1] I would like to add here that Powers was in no way hostile to doing an interview. We had discussed the possibility at length and had agreed to wait until I had finished writing on the four novels. In the meantime, he was busy at work on **Galetea**. His reticent to go through with the interview was based on the fact that he felt like he had covered the pertinent questions in the course of the new novel. In fact, he has done much more.

[2] Günter Grass, **On Writing and Politics 1937-1983**, translated by Ralph Manheim (New York: HBJ, 1985) 140.

[3] Jean-Pierre Changeux, **The Neuronal Man: The Biology of the Mind**, trans. Laurence Garey (New York: Pantheon, 1985) 283-284. This work provides an excellent overview of both the science and the relevant issues involved in the field of cognitive science.

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