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Computational Technologies and Images of the Self*

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COMPUTERS offer themselves as models of mind and as "objects to think with" for thinking about the self. They do this in several ways. There is, first of all, the world of artificial intelligence research—Marvin Minsky once called it the enterprise of "trying to get computers to do things that would be considered intelligent if done by people." In the course of this effort, some artificial intelligence researchers explicitly endeavor to build machines that model the human mind. Second, there is the world of computational objects in the culture—the toys, the games, the simulation packages, the computational environments accessed through Internet connections. These objects are evocative; interacting with them provokes reflection on the nature of the self.

For many decades computers had a clear cultural identity as linear, logical, mechanistic machines. Here I tell a story of a change in the cultural identity of the computer and consequently in the kind of mirror that computers offer for thinking about the self. Computational theories of intelligence now support decentered and emergent views of mind; experience with today's computational objects encourages rethinking identity in terms of multiplicity and flexibility.

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I. Artificial Intelligence and Models of Mind

Artificial intelligence (AI) first declared itself a discipline in the mid-1950s. From its earliest days the field was divided into two camps, each supporting a very different idea of how machine intelligence might be achieved. One group considered intelligence to be entirely formal and logical and pinned its hopes on giving computers detailed rules they could follow. The other envisioned machines whose underlying mathematical structures would allow them to learn from experience. The proponents of "emergent" AI conceived of these underlying structures as independent agents and believed that intelligence would emerge from their interactions and negotiations. From the perspective of this second group of researchers, a rule was not something you *gave* to a computer but a pattern you *inferred* when you observed a machine's behavior.

In the mid-1960s the second, emergent model seemed as promising as the rule-driven, information-processing approach. By the end of that decade, however, emergent models had been largely swept aside in the field of professional AI. Several factors were in play. For one thing, the emergent models relied on the simultaneous interactions of multiple independent agents, but the computers of the era could only handle one computation at a time. Additionally, simple emergent systems were shown to have significant theoretical limitations, but more sophisticated mathematical techniques for hooking up parallel programs were not well developed. As information-processing models came to dominate AI, the implications for general psychology were significant, particularly since a subset of AI researchers now saw brain and computer as different examples of a single species of information-processing device.

In the late 1950s, Allen Newell and Herbert Simon, pioneers of information-processing AI, wrote a program called the General Problem Solver (GPS) that attempted to capture human reasoning and recode it as computational rules. As the GPS became well known in academic circles, some psychologists began to wonder why it should not be possible to ask similar questions about how *people* solve logical problems. In the intellectual atmosphere of the early 1960s, this train of thought was counter-cultural. American academic psychology was dominated by behaviorism, which rigidly excluded discussion of internal mental states. Orthodox behaviorists insisted that the study of mind be expressed in terms of stimulus and response. What lay between was a black box that could not be opened. So, for example, behaviorists would not refer to memory, only to the *behavior of remembering*. But computer scientists had, out of necessity, developed a vocabulary for talking about what was happening inside their machines. And AI researchers freely used mentalistic language to refer to the internal states of their computer systems—referring to a program's "thoughts," "intentions," and "goals." If the new machine minds had internal states, common sense suggested that people must have them too. Computers supported an intellectual climate in which it was permissible to talk about aspects of the mind that had been banned by behaviorism, and by the end of the 1960s, the machines had played an important role in legitimating the study of memory and inner states within psychology.

The new computationally influenced psychology for describing inner states came to be known as cognitive science. By the mid-1970s, cognitive science had been widely embraced by academic psychology, but the spread of information-processing ideas about the human mind met with significant resistance when people thought in personal terms about their *own* minds. In my own studies of popular responses to the computer in the late 1970s to mid-1980s (Turkle, 1984), I found that one common reaction was for people to agree with the premise that human minds are *some kind* of computer but then to find ways to think of people as something more. They conceded to the rule-based computer some power of reason and then turned their attention to the soul and spirit in the human machine, a position summed up in the remark of one college student: "Simulated thinking can be thinking but simulated love is never love." It was, in a certain sense, a time of a "romantic reaction" to the information-processing images of mind offered by computers. People's sense of personal identity became focused on whatever they defined as "not cognition" or "beyond information."

In the mid-1980s, a group of researchers known as connectionists presented a serious challenge to the hegemony of the information-processing approach in artificial intelligence. Connectionists claimed that the best way to build intelligent systems was to simulate the natural processes of the brain as closely as possible (Rumelhart, 1990, p. 134). They argued that a computer system modeled after the brain would not be guided by top-down rules and procedures. It would make connections from the bottom up, as the brain's neurons are thought to do. They spoke in terms of artificial neurons and neural nets. The artificial systems they described would learn by developing a large number of different network connections, and in this sense they would be unpredictable and nondeterministic. When connectionists spoke of unpredictable and nondeterministic AI, they met the romantic reaction to artificial intelligence with their own brand of "romantic machines."

The resurgence of connectionist models was closely tied to a new, more general enthusiasm about the possibilities of modeling brain processes on parallel-processing computers. By the mid-1980s, computers with significant parallel-processing capacities were becoming economically and technically feasible. Additionally, it was possible to simulate parallel-processing computers on ever more powerful serial ones. In this technical and intellectual climate, researchers in cognitive psychology, neurobiology, and connectionist AI began to think of their pursuits as more than sister disciplines but as branches of one discipline—united by the study of emergent, parallel phenomena in the sciences of mind, separated only by the domains in which they looked for them.

Information-processing AI had provided a context for experimental psychology to return to the consideration of inner process; connectionism, with its language of neural pathways designed on the template of biology, opened the way for new ideas of nature as a computer and of the computer as part of nature. It thus suggested that traditional distinctions between the natural and artificial, the real and simulated, might dissolve. Emergent systems that learned, grew, and evolved through training and experience seemed lifelike indeed.

The Appropriability of Emergent AI

By the late 1980s it was clear that even those who had been most critical of information-processing AI could be disarmed by connectionism—and in particular, its language of nondeterminism and its emphasis on learning through experience. Philosophers opined that neural networks "may show that Heidegger, later Wittgenstein and Rosenblatt [an early neural net theorist] were right in thinking that we behave intelligently in the world without having a theory of that world" (Dreyfus and Dreyfus, 1988, p. 35). In general, connectionism received good press as a more "humanistic" form of AI endeavor. Emergent theory opened possibilities for artificial intelligence to form intellectual alliances that had been closed to information processing.

Among these alliances, one of the most surprising was between AI and the psychoanalytic tradition. Freud built his original theory around the notion of drive, a centralized demand that is generated by the body and provides the energy and goals for all mental activity. Later, when Freud turned his attention to the ego's relations to the external world, he began to describe a process by which we internalize important people in our lives to form inner "objects." So, for example, the superego, conceived of as such an inner object, was formed by internalizing the ideal parent.

In Freud's work, the concept of inner objects coexisted with drive theory; we internalize objects because our instincts impel us to. But later psychoanalytic theorists were less committed to Freud's notion of drive than to the idea that the mind is built up of inner objects, each with its own history. These "object relations" theorists began to describe societies of inner mental agents—"unconscious suborganizations of the ego capable of generating meaning and experience, i.e., capable of thought, feeling, and perception" (Ogden, 1983, p. 227). For Melanie Klein, these inner agents could be seen as loving, hating, greedy, or envious; for W. R. D. Fairbairn, the inner agents could think, wish, and generate our sense of "self" from their negotiations and interactions.

During the years of the hegemony of information-processing AI, psychoanalysts had been hostile to the enterprise (if indeed, they thought about it at all). In their eyes, the premise of information processing reduced the Freudian search for meaning to a search for mechanism, as for example, when AI researchers would reinterpret Freudian slips as "information-processing errors." Emergent AI struck a different chord. Marvin Minsky's (1987) language of mind as a "society" seemed to evoke the inner agents of the object-relations school; and to some, connectionism's language of decentralized associations resonated with a French school of psychoanalytic theory that argues against the existence of a centralized, "knowing" ego.

A paper by the psychoanalyst David Olds (1994) argues a family resemblance between psychoanalysis and emergent AI. Indeed, Olds goes further and suggests that contemporary psychoanalysts *need* connectionism. For one thing, connectionism presents analysts with a way to describe the ego in terms of the brain and thus enables them to forge new links to the science of biology. For another, connectionism, which recasts the ego as an emergent and distributed system, can help analysts undermine old-fashioned views of the ego as centralized and unitary. Olds acknowledges that psychoanalysts may have a problem appropriating connectionist models because understanding the theory requires a "mathematical sophistication" that most analysts don't have. "Very few people, including most psychologists, have even a sketchy understanding" of what the theory is actually saying. But he points out that innocence of technical details has never kept psychology from mining scientific fields for their metaphors. Freud borrowed the language of hydraulics; today's analysts should borrow the language of parallel, emergent, computational intelligence.

> Many libido theorists probably did not know a great deal about steam engines; they made conceptual use of the properties which interested them. This is even more true with the early computer model; very few analogizers know a motherboard from a RAM, nor do they care. The way we *imagine* the machine handles information is what counts.
>
> The point is that what gets transferred from one realm to the other is a set of properties which we attribute to both entities (Olds, 1994, p. 590).

In the heyday of information-processing AI, Marvin Minsky justified the AI enterprise with the quip, "The mind is a meat machine." The remark was frequently cited during the late 1970s and early 1980s as an example of what was wrong with artificial intelligence. It provoked irritation, even disgust. At the time, much of what seemed unacceptable about Minsky's words had to do with the prevailing images of what kind of meat machine the mind might be. Those images were mechanistic and deterministic. Connectionism's broad appeal as well as its appeal to psychoanalysts was that it proposed an artificial meat machine made up of biologically resonant components. With a changed image of what machines could be, the idea that the mind could be one became far less problematic.

When the prevailing image of artificial intelligence was that of information processing, many who criticized the computer as a model of mind feared that it would lead people to view themselves as cold mechanism. When they looked at the computer, they had a "not me" response. Emergent AI provokes a different reaction. When people look at emergent computer models they meet the idea that the "I" might be a bundle of neuron-like agents in communication. Emergent AI offers a view of the computer that makes it easier to see the machine as kin to the human and the human as kin to the machine. The "not me" response turns into a "like me" response.

II. Experiences with Computational Objects

I have said the explicit models offered by artificial intelligence are only one of the ways in which computers influence our thinking about mind. Experiences with computational objects are another. Ten years ago, most people who worked closely with computers interacted with programs whose structure encouraged a model of thinking about the self that was linear and logical. Today, we project ourselves into a far wider variety of computational landscapes. We interact with programs, games, and simulations that present themselves as driven by evolution. And we create multiple representations of ourselves by developing personae in virtual environments on the Internet. The images of self that are evoked by such experiences are fluid and multiple, with the line between the natural and artificial more permeable than before.

In the case of the Internet, people are able to join on-line communities that exist only through computer-mediated communcation. One type of virtual community is known as a MUD (short for "multi-user dungeons" or "multi-user domains"). When you join a MUD, you create a character or several characters and specify their genders and other physical and psychological attributes. In traditional role-playing games in which one is physically present, people step in and out of character; MUDs, in contrast, offer a parallel life. Most people who spend a lot of time in virtual communities such as MUDs work with computers all day at their "regular" jobs. When they participate in virtual communities, they will periodically put their characters to sleep, thus remaining a presence in the virtual space as they pursue "real world" activities. In this way, they break up their days, "cycling through" between the physical world and a series of virtual ones. MUDs may seem exotic, but they are, in fact, illustrative of the social and psychological dynamics of most on-line sociability. The key elements of "MUDding," the creation and projection of personae into virtual spaces and the fact that you can move in and out of these spaces, also characterize the more "banal" forms of on-line community such as "chat" rooms.

"Cycling through" in MUDs and other virtual environments is made possible by the existence of what have come to be called "windows" in modern computing. Windows facilitate a way of working with a computer that makes it possible for the machine to place you in several contexts at the same time. As a user, you are attentive to only one of the windows on your screen at any given moment, but in a certain sense, you are a presence in all of them. When writing a paper in bacteriology, for example, you are "present" to a word processing program on which you are taking notes and collecting thoughts, "present" to communications software that is in touch with a distant computer for collecting reference materials, and "present" to a simulation program that is charting the growth of bacterial colonies when a new organism enters their ecology. Each of these activities takes place in a window and your identity on the computer is the sum of your distributed presence. In practice, windows have become a potent metaphor for thinking about the self as a multiple, distributed system. According the this metaphor, the self is no longer simply playing different roles in different settings, something that people experience when, for example, a woman wakes up as a lover, makes breakfast as a mother, and drives to work as a lawyer. The life practice of windows is of a distributed self that exists in many worlds and plays many roles at the same time.

This notion of the self as distributed and constituted by a process of "cycling through" undermines traditional notions of identity. Identity, after all, from the Latin *idem,* literally refers to the sameness between two qualities. On the Internet, however, one can become many, and one usually does. If, traditionally, identity implied oneness, life on today's computer screen implies multiplicity and heterogeneity.

A Case Study: Self States and Avatars

Case, a thirty-four-year-old male graphics designer, plays a series of female characters in MUDs whom he describes as "Katharine Hepburn types—strong, dynamic, 'out there' women." He says that they remind him of his mother. "She says exactly what's on her mind and is a take-no-prisoners sort." Case describes his father in different terms, as a "Jimmy Stewart type." His parent's style has left its legacy: he sees assertive men as bullies but assertive women please him. Case says he likes MUDding as a female because it makes it easier for him to experiment with assertiveness both on-line and off.

> There are aspects of my personality—the more assertive, administrative, bureaucratic ones—that I am able to work on in the MUDs. I've never been good at bureaucratic things, but I'm much better from practicing on MUDs and playing a woman in charge. I am able to do things—in the real, that is—that I couldn't have before because I have played Katharine Hepburn characters.

For Case, life on the screen provides what the psychoanalyst Erik Erikson called a "psycho-social moratorium," a central element in how Erikson thought about identity development in adolescence (1963). Although the term *moratorium* implies a "time out," what Erikson had in mind was not withdrawal. On the contrary, the adolescent moratorium is a time of intense interaction with people and ideas. It is a time of passionate friendships and experimentation. The moratorium is not on significant experiences but on their consequences. It is a time during which one's actions are not "counted" in quite the same way as they will be later. In this context, experimentation becomes the norm rather than a brave departure, facilitating the development of a "core self," a personal sense of what gives life meaning that Erikson called "identity."

Erikson wrote extensively about the life cycle in terms of stages of development, but never in the spirit of suggesting stages as rigid sequences. He was well aware that with incompletely resolved stages people simply move on, trying to do the best they can. They use whatever materials they have at hand to get as much as they can of what they have missed. Case's ability to use on-line life to work through issues about assertiveness and gender identity illustrates how cyberspace has come to play a significant role in the life cycle dramas of self-reparation. Time in cyberspace reworks the idea of the moratorium because it may now exist on an always-available computer window.

Case tells me his Katharine Hepburn personae are "externalizations of parts of myself." In one interview I use the expression "aspects of the self," and he picks it up eagerly, for MUDding reminds him of how Hindu gods could have different aspects or subpersonalities, all the while having a whole self. Case's gender-swapping has enabled his inner world of aspects to achieve self-expression, but in his view, without compromising the values he associates with his "whole person." In response to my question, "Do you feel that you call upon your personae in real life?" Case responds:

> Yes, an aspect sort of clears its throat and says, "I can do this. You are being so amazingly conflicted over this and I know exactly what to do. Why don't you just let me do it?" MUDs give me balance. In real life, I tend to be extremely diplomatic, nonconfrontational. I don't like to ram my ideas down anyone's throat. On the MUD, I can be, "Take it or leave it." All of my Hepburn characters are that way. That's probably why I play them. Because they are smart-mouthed, they will not sugarcoat their words.

In some ways, Case's description of his inner world of actors who address him and are capable of taking over negotiations is reminiscent of the language of people with multiple personality disorder (MPD). But the contrast is significant: Case's inner actors are not split off from each other or his sense of "himself." They hold no secret knowledge; they do not need to be isolated. On the contrary, Case experiences himself very much as a collective self, not feeling that he must goad this or that aspect of himself into conformity. To use Marvin Minsky's (1987) phrase, Case feels at ease in his "society of mind."

Objects-to-Think-With

Appropriable theories, ideas that capture the imagination of the culture at large, tend to be those with which people can become actively involved. They tend to be theories that can be "played" with. So one way to think about the social appropriability of a given theory is to ask whether it is accompanied by its own objects-to-think-with that can help it move out beyond intellectual circles.

For instance, the popular appropriation of Freudian ideas had little to do with scientific demonstrations of their validity. Freudian ideas passed into the popular culture because they offered robust objects-to-think-with. The objects were not physical but almost-tangible ideas, such as dreams and slips of the tongue. People were able to play with such Freudian "objects." They became used to looking for them and manipulating them, both seriously and not so seriously. And as they did so, the idea that slips and dreams betray an unconscious started to feel natural.

In Freud's work, dreams and slips of the tongue carried the theory. Today, life on the computer screen carries theory. In on-line life, selves are made and transformed by language and the notion of a decentered identity with multiple aspects is concretized by virtual experiences. In making this claim I am not implying that on-line life is causally implicated in the dramatic increase of people who exhibit symptoms of multiple personality disorder, or that people on MUDs have MPD, or that MUDding (or on-line chatting using a series of different user personae) is like having MPD. What I am saying is that the many manifestations of multiplicity in our culture, including the adoption of multiple on-line personae, are contributing to a general reconsideration of traditional, unitary notions of identity. On-line experiences with "parallel lives" are part of the cultural context that supports new theorizations about multiple selves.

In thinking about the self, *multiplicity* is a term that carries with it several centuries of negative associations. Contemporary social theorists tend rather to describe a *flexible* self, an idea that can serve as an intellectual Trojan Horse for smuggling in an acceptable notion of multiplicity into the discussion of normality (Gergen, 1991; Martin, 1994; Lifton, 1993). Their flexible self is not unitary, nor are its parts stable entities. A person cycles through its aspects and these are themselves ever-changing and in constant communication with each other. Daniel Dennett (1991) speaks of the flexible self in his "multiple drafts" theory of consciousness. As when several versions of a document are open on a computer screen, a user is able to move among them at will. Knowledge of these drafts encourages a respect for the many different versions and imposes a certain distance from them. Donna Haraway (1991a), too, argues the salutary side of a split self. For Haraway, a "split and contradictory" self is a "knowing self." She is optimistic about its possibilities: "The knowing self is partial in all its guises, never finished, whole, simply there and original; it is always constructed and stitched together imperfectly; and *therefore* able to join with another, to see together without claiming to be another." Both Dennett and Haraway are describing split selves where (in contrast to the fragmentation of multiple personality) the lines of communication among the aspects of the self are open. The open communication encourages an attitude of respect for the many within us and the many within others.

In the psychoanalytic tradition, too, there is an effort to use the trope of "flexibility" as a way to introduce nonpathological multiplicity. Analysts are trying to think about healthy selves whose resilience comes from having access to their many aspects. Philip Bromberg (1994), an analyst who writes in this tradition, argues that our ways of thinking about "good parenting" must shift from an emphasis on confirming a child in a "core self" toward helping a child develop the capacity to negotiate fluid transitions between self-states. For Bromberg, the healthy individual knows how to be many but also knows how to smooth out the moments of transition. He says: "Health is the ability to stand in the spaces between realities without losing any of them—the capacity to feel like one self while being many" (Bromberg, 1993, p. 166).

Cyborg Doubles and Cy-dough-plasm

On-line life is not the only manifestation of the computer culture that encourages ideas about identity in terms of multiplicity and "cycling through." Computational objects such as toys and simulation games are also playing this role. One place to see their impact is in the ways children use them to construct new notions of what it is to be "alive."

In Jean Piaget's classic studies of the 1920s on how children thought about what was alive, the central variable was motion. Simply put, children took up the question of an object's "life status" by asking themselves if the object could move of its own accord. When in the late 1970s and early 1980s I studied children's reactions to a first generation of computer objects that were physically "stationary" but that nonetheless accomplished impressive feats of cognition (talking, spelling, doing math, and playing tic-tac-toe), I found that the focus had shifted to an object's psychological properties when children considered the question of its "aliveness" (Turkle, 1984). The presence of computational objects disrupted the classical Piagetian discourse about aliveness, but the story children told about computational objects in the early 1980s had its own coherency. Faced with intelligent toys, children took a new world of objects and imposed a new world order, based not on physics but on psychology.

By the mid-1990s, that order had been strained to the breaking point. Children will now talk about computers as "just machines," but describe them as sentient and intentional. When they talk about the life status of computational objects, children cycle through a discourse about evolution as well as psychology and physics. They resurface old ideas about the relationship between life and physical motion in terms of the communication of bits across a network. Faced with ever more complex computational objects, today's children act as theoretical tinkerers. The make do with whatever materials are at hand, whatever theory can fit a prevailing circumstance.

My current collection of comments about "what is alive" by children who have played with small, mobile robots and with computer programs that evoke evolution (such as the games of the "Sim" series and a computer simulation known as Tierra) includes the following notions: the robots are in control but not alive, would be alive if they had bodies, are alive because they have bodies, would be alive if they had feelings, are alive the way insects are alive but not the way people are alive; the digital creatures in Tierra are not alive because they are just in the computer, could be alive if they got out of the computer and got onto America Online, are alive until you turn off the computer and then they're dead, are not alive because nothing in the computer is real; the digital creatures in the "Sim" games are not alive but almost-alive, they would be alive if they spoke, they would be alive if they traveled, they're alive but not "real," they're not alive because they don't have bodies, they are alive because they can have babies, and finally, for an eleven year old who is relatively new to SimLife, they're not alive because these babies don't have parents. She says: "They show the creatures and the game tells you that they have mothers and fathers but I don't believe it. It's just numbers, it's not really a mother and a father."

In the short history of how the computer has changed the way we think, it has often been children who have led the way. For example, in the early 1980s, children—prompted by computer toys that spoke, did math, and played tic-tac-toe—disassociated ideas about consciousness from ideas about life, something that historically had not been the case. These children were able to contemplate sentient computers that were not alive, a position that grownups are only now beginning to find comfortable. Today's children are taking things even further; they are pointing the way towards a radical heterogeneity of theory in the presence of computational artifacts that evoke "life." Different children comfortably hold different theories, and individual children are able to hold different theories at the same time.

Additionally, today's children speak easily about factors that encourage them to see the "stuff" of computers as the same "stuff" of which life is made. A nine-year-old showed an alchemist's sensibility in describing "shape shifting": "In the universe, anything can turn to anything else when you have the right formula. So you can be a person one minute and a machine the next minute." From the youngest ages, children play with "transformer toys" which can be configured as machines, robots, or animals (and sometimes as people). Children play with these plastic and metal objects and in the process learn about the fluid boundaries between mechanism and flesh.

I observed a group of seven-year-olds playing with a set of transformer toys that can take the shape of armored tanks, robots, or people. The transformers can also be put into intermediate states so that a "robot" arm can protrude from a human body or a human leg from a mechanical tank. Two of the children were playing with the toys in these intermediate states (that is, in their intermediate states somewhere between being people, machines, and robots). A third child insisted that this was not right. The toys, he said, should not be placed in hybrid states. "You should play them as all tank or all people." He was getting upset because the other two children were making a point of ignoring him. An eight-year-old girl comforted the upset child. "It's okay to play them when they are in between. It's all the same stuff," she said, "just yucky computer 'cy-dough-plasm.'" This comment is the expression of a cyborg consciousness as it expresses itself among today's children: a tendency to see computer systems as "sort of" alive, to fluidly "cycle through" various explanatory concepts, and to willingly transgress the boundaries between the natural and the artificial.

In his history of artificial life, Steven Levy (1992, pp. 6–7) suggested that one way to think about artificial life in relation to the traditional concept is to envisage a continuum in which a computer simulation that demonstrates evolutionary properties would be more alive than a car but less alive than a bacterium. My observations of how children are dealing with their new computational objects-to-think-with suggests that they are not constructing hierarchies but are heading toward parallel definitions, which they alternate through rapid cycling. Parallel definitions, like thinking about one's identity in terms of parallel lives, gets to be a habit of mind.

Adults, too, use the strategies of parallel definitions and cycling through to think about significant aspects of self, although they do so with far more discomfort. In *Listening to Prozac* (1993), Peter Kramer, a psychiatrist, writes of an incident in which he experienced this discomfort. After prescribing an antidepressant medication for a college student, the patient appeared at the next therapy session with symptoms of anxiety. Kramer was not concerned since it is common for patients to respond with jitters to the early stages of treatment with antidepressants. Sometimes the jitters disappear by themselves, sometimes the prescriber changes the antidepressant or adds a second, sedating medication at bedtime. As Kramer explained this to his patient, the patient corrected him. The patient "had not taken the antidepressant. He was anxious because he feared my response when I learned he had 'disobeyed' me" (p. xii).

> As my patient spoke, I was struck by the sudden change in my experience of his anxiety. One moment, the anxiety was a collection of meaningless physical symptoms, of interest only because they had to be suppressed, by other biological means, in order for the treatment to continue. At the next, the anxiety was rich in overtones . . . emotion a psychoanalyst might call Oedipal, anxiety over retribution by the exigent father. The two anxieties were utterly different: the one a simple outpouring of brain chemicals, calling for a scientific response, however diplomatically communicated; the other worthy of empathic exploration of the most delicate sort (p. xii).

Cycling through different and sometimes opposing theories has become how we think about our minds, just as cycling through different aspects of self has become a way of life as people move through different personae as they jump from window to window on their computer screens.

Today's adults grew up in a psychological culture that equated the idea of a unitary self with psychological health and in a scientific culture that taught that, when a discipline achieves maturity, it has a unifying theory. So when adults find themselves cycling through varying perspectives on themselves ("I am my chemicals" to "I am my history" to "I am my genes"), they, like Kramer, often become uneasy. But today's children are learning a different lesson from their computational objects and on-line experiences. Donna Haraway characterizes irony as being "about contradictions that do not resolve into larger wholes . . . about the tension of holding incompatible things together because both or all are necessary and true" (1991b, p. 148). In this sense, today's children, growing up into irony, are becoming adept at holding incompatible things together. They are cycling through cyberspace and cy-dough-plasm into fluid and emergent conceptions of self and life.

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