The Second Self: Computers and the Human Spirit

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Introduction (1984): The Evocative Object

On a cold January dawn in 1800, a boy of about thirteen came out of the woods near the village of Saint-Sernin in the Aveyron region of southern France. No one knew where he had come from. To all appearances he had survived alone, finding food and shelter in an inhospitable mountain climate since early childhood. He could not speak, and he made only weird meaningless cries.

The Wild Child was human, yet he had lived apart from culture and language. He walked out of the woods to enter history and, what is perhaps more to the point, to enter modern mythology as someone with a secret to tell. As a human being who had lapsed back to the animal condition, he was thought to embody the "natural." His way of thinking, if he could be taught to communicate, would testify to the condition of "man in nature." The life of the Wild Child became the occasion for what has been called "the forbidden experiment," the experiment that would reveal what human beings really are beneath the overlay of society and culture.[1] Are people "blank slates," malleable, infinitely perfectible, or is there a human nature that constrains human possibility? And if there is a human nature, what is it? Are we gentle creatures ill-equipped for the strains of life in society? Or are we brutish and aggressive animals barely tamed by the demands of social life?

A young French doctor, Jean-Marc-Gaspard Itard, tried to teach the Wild Child, rechristened as Victor. Itard undertook the forbidden experiment. But even after seven years of the most painstaking, systematic, and often inspired pedagogy, the boy never learned to speak, to read, or to write. He never told what he knew. He never told if he knew.

Although the experiment resolved nothing, the story of the Wild Child did not lose its power. The forbidden experiment did not settle opposing views about nature and nurture, about the innate and the social, but it provided a concrete image with which to think about them. People could

imagine themselves in the story, they could say, "I am Itard. I have the job of teaching the Wild Child. What am I going to try? What do I think will happen? And why?" And when they went through the thought experiment, their ideas about what people are and how they develop came to the surface.

The Wild Child appeared soon after the French Revolution. It was a time when theories about human nature seemed up for grabs. It mattered desperately whether our nature was forever fixed or could be reformed. Fascination with the forbidden experiment and fascination with playing through its possibilities in one's mind were fed by widespread uncertainties. Now, as during that time, we are plagued with questions about who we are. Now, as then, we are drawn to whatever permits us, or forces us, to think the problem through. Not surprisingly, we have of late "rediscovered" Victor's story. There has been a flood of new studies of the Wild Child: historical, literary, psychological. The story is still evocative, "good to think with." But there is something new. There is a new focus for a forbidden experiment. A new mind that is not yet a mind. A new object, betwixt and between, equally shrouded in superstition as well as science. This is the computer.

We asked of the Wild Child to speak to us about our relationship to nature. But of the computer we ask more. We ask not only about where we stand in nature, but about where we stand in the world of artifact. We search for a link between who we are and what we have made, between who we are and what we might create, between who we are and what, through our intimacy with our own creations, we might become.

The schoolbook history of new technologies concentrates on the practical. In these accounts, the telescope led to the discovery of new stars, the railroad to the opening of new territories. But there is another history whose consequences are deep and far-reaching. A new sense of the earth's place in the solar system made it necessary to rethink our relation to God; the ability to cross a continent within days meant a new notion of distance and communication. Clocks brought more than the ability to measure time precisely; they made time into something "divisible" and abstract.[2] Time was no longer what it took to get a job done. Time was no longer tied to the movement of the sun or the moon or to the changing of a season. Time was what it took for hands to move on a mechanism. With digital timekeeping devices, our notion of time is once more being touched by technical changes. Time is made more abstract still. Time is no longer a process; time is information.

Technology catalyzes changes not only in what we do but in how we think. It changes people's awareness of themselves, of one another, of their

relationship with the world. The new machine that stands behind the flashing digital signal, unlike the clock, the telescope, or the train, is a machine that "thinks." It challenges our notions not only of time and distance, but of mind.

Most considerations of the computer concentrate on the "instrumental computer," on what work the computer will do. But my focus here is on something different, on the "subjective computer." This is the machine as it enters into social life and psychological development, the computer as it affects the way that we think, especially the way we think about ourselves. I believe that what fascinates me is the unstated question that lies behind much of our preoccupation with the computer's capabilities. That question is not what will the computer be like in the future, but instead, what will *we* be like? What kind of people are we becoming?

Most considerations of the computer describe it as rational, uniform, constrained by logic. I look at the computer in a different light, not in terms of its nature as an "analytical engine," but in terms of its "second nature" as an evocative object, an object that fascinates, disturbs equanimity, and precipitates thought.

Computers call up strong feelings, even for those who are not in direct contact with them. People sense the presence of something new and exciting. But they fear the machine as powerful and threatening. They read newspapers that speak of "computer widows" and warn of "computer addiction." Parents are torn about their children's involvement not only with computers, but with the machines' little brothers and sisters, the new generation of electronic toys. The toys hold the attention of children who never before sat quietly, even in front of a television screen. Parents see how the toys may be educational, but fear the quality of children's engagement with them. "It's eerie when their playmates are machines." "I wish my son wouldn't take his 'Little Professor' to bed. I don't mind a book, would welcome a stuffed animal—but taking the machine to bed gives me a funny feeling." I sit on a park bench with the mother of a six-year-old girl who is playing a question-and-answer game with a computer-controlled robot. The child talks back to the machine when it chides her for a wrong answer or congratulates her for a right one. "My God," says the mother, "she treats that thing like a person. Do you suppose she thinks that people are machines?"

This mother shows us the shock of a first encounter. But the computer is evocative in an even more profound way for those who know it well, who interact with it directly, who are in a position to experience its second nature.

From them, there is testimony about the computer's "holding power." They say the machine is fascinating. They say it is hard to put away. For some, the "hold" is a source of puzzled amusement: a lawyer whose Wall Street firm has installed a computer system in the office and who finds himself "making work" to use it, comments, "It's a cross between the Sunday *Times* crossword and Rubik's Cube." For others, the feelings are more intense, even threatening. They speak of being grabbed in a more compelling, even more intimate way than by almost anything else they have ever known. A variety of people, ranging from virtuoso programmers to those whose contact with computers goes no further than playing video games, compare their experiences with computers to sex, to drugs, or to transcendental meditation. The computer's reactivity and complexity stimulate a certain extravagance of description. "When I play pinball," says a thirty-five-year-old account executive who plays several hours of video games a day, "I am playing with a material. When I play Asteroids, it's like playing with a mind."

The computer is evocative not only because of its holding power, but because holding power creates the condition for other things to happen. An analogy captures the first of these: the computer, like a Rorschach inkblot test, is a powerful projective medium. Unlike stereotypes of a machine with which there is only one way of relating—stereotypes built from images of workers following the rhythm of a computer-controlled machine tool or children sitting at computers that administer math problems for drill—we shall see the computer as partner in a great diversity of relationships.

In this book, the diversity is dramatic because I choose to look at settings where the computer can be taken up as an expressive medium. Not all encounters between people and computers are as open. But as computers become commonplace objects in daily life—in leisure and learning as well as in work—everyone will have the opportunity to interact with them in ways where the machine can act as a projection of part of the self, a mirror of the mind.

The Rorschach provides ambiguous images onto which different forms can be projected. The computer, too, takes on many shapes and meanings. In what follows, we shall see that, as with the Rorschach, what people make of the computer speaks of their larger concerns, speaks of who they are as individual personalities.

When different people sit down at computers, even when they sit down at the same computer to do the "same" job, their styles of interacting with the machine are very different. Nowhere is this more true than when

they program.[3] For many, computer programming is experienced as creating a world apart. Some create worlds that are highly predictable and use their experiences in them to develop a sense of themselves as capable of exerting firm control. Others have different needs, different desires, and create worlds whose complexity is always on the verge of getting out of hand, worlds where they can feel themselves to be wizards of brinkmanship.

But of course there is a difference between the computer and the Rorschach. The blots stay on the page. The computer becomes part of everyday life. It is a constructive as well as a projective medium. When you create a programmed world, you work in it, you experiment in it, you live in it. The computer's chameleonlike quality, the fact that when you program it, it becomes your creature, makes it an ideal medium for the construction of a wide variety of private worlds and, through them, for self-exploration.[4] Computers are more than screens onto which personality is projected. They have already become a part of how a new generation is growing up. For adults and for children who program, play computer games, who use the computer for manipulating words, information, and visual images, computers enter into the development of personality, of identity, and even of sexuality.

As this happens, experiences with computers become reference points for thinking and talking about other things. Computers provoke debate about education, society, politics, and, most central to the theme of this book, about human nature. In this, the computer is a "metaphysical machine." Children too are provoked. The computer creates new occasions for thinking through the fundamental questions to which childhood must give a response, among them the question "What is life?"[5]

In the adult world, experts argue about whether or not computers will ever become true "artificial intelligences," themselves capable of autonomous, humanlike thought. But irrespective of the future of machine intelligence, computers are affecting how today's children think, influencing how they construct such concepts as animate and inanimate, conscious and not conscious.

Some objects, and in our time the computer is preeminent among them, provoke reflection on fundamentals. Children playing with toys that they imagine to be alive and adults playing with the idea of mind as program are both drawn by the computer's ability to provoke and to color self-reflection. The computer is a "metaphysical machine," a "psychological machine," not just because it might be said to have a psychology, but because it influences how we think about our own.

I came to this study of computers and people in 1976, shortly after joining the faculty at MIT. I was struck by the psychological discourse that surrounded computers, and by the extent to which it was used by my students and my faculty colleagues to describe the machine's processes. A chess program wasn't working. Its programmers spoke of its problems as follows: "When it feels threatened, under attack, it wants to advance its king. It confuses value and power, and this leads to self-destructive behavior." Even the most technical discussions about computers use terms borrowed from human mental functioning. In the language of their creators, programs have intentions, try their best, are more or less intelligent or stupid, communicate with one another, and become confused. This psychological vocabulary should not be surprising. Many people think of computers as mathematical objects, but when you get closer to them you realize that they are information objects, manipulators of symbols, of language. You inevitably find yourself interacting with a computer as you would with a mind, even if a limited one. This is why the language that grows up around computers has a special flavor. Computer jargon is specifically "mind jargon."

And not only is the computer thought of in human mental terms. There is movement in the other direction as well. People are thinking of themselves in computational terms. A computer scientist says, "my next lecture is hardwired," meaning that he can deliver it without thinking, and he refuses to be interrupted during an excited dinner conversation, insisting that he needs "to clear his buffer." Another refers to psychotherapy as "debugging," the technique used to clean out the final errors from almost-working programs, and to her "default solutions" for dealing with men.

These people are not just using computer jargon as a manner of speaking. Their language carries an implicit psychology that equates the processes that take place in people to those that take place in machines. It suggests that we are information systems whose thought is carried in "hardware," that we have a buffer, a mental terrain that must be cleared and crossed before we can interact with other people, that for every problem there is a preprogrammed solution on which we can fall back "by default," and that emotional problems are errors that we can extirpate.

"Hardwired," "buffer," "default," "debug"—these were among the computer metaphors I met within the MIT computer culture. Others, that came before them, have already moved out into the common language, for example the very notion of programming. When I was in the earliest stages of writing this book I had lunch with a friend to whom I tried to explain this process of computational ideas moving out. My problem was solved

when two young women sat down at the table next to us. "The hard part," said one to the other, "is reprogramming yourself to live alone." The language of computers has moved out so effectively that we forget its origins. But although we may forget, we do not so easily escape the new assumptions that our language carries about what we are and how we can change.

Amid this discussion of minds as machines and of machines having minds I felt some of the dislocation and change of perspective that can make being a stranger in a foreign place both difficult and exciting. For the anthropologist this experience brings more than the shock of the new. There is a privilege and a responsibility to see the new world through a prism not available to its members, and (and this is the part that is often the most difficult) to use the new lenses to see one's own world differently as well. In this book I try to meet both of these responsibilities. And in the end, the second became even more central to my concerns than the first. Because as I worked, it became clear that what I was studying was not confined to computer experts and computer professionals. The computer was moving out into the culture as a whole.

When I began my work, studying the computer culture meant working with easily identifiable groups of people, among these virtuoso programmers known as "hackers," members of the artificial intelligence community, and the first generation of people who owned home computers. But my subject had a special quality. Unlike most ethnographies, which explore a well-defined and delimited community, whether it be a primitive society or a rural commune, I was studying a moving target. When I began my work, personal computers had just come on the market. The first computer toys and games had not yet appeared. Most people had never heard the phrase "artificial intelligence." As this book goes to press, computer toys are commonplace in toddler playrooms, college freshmen arrive on campus with computers rather than electric typewriters, and the importance of a "fifth-generation" supercomputer has become a theme of public debate.

Thus, this book became a study of a culture in the making. A computer culture that in one way or another touches us all. And because it affects our lives in so many ways, this book takes its questions about this nascent culture from many perspectives.

From the perspective of psychological development I ask how computers enter into the process of growing up. Computers affect children very differently at different ages.

I found three stages in children's relationships with computers. First there is a "metaphysical" stage: when very young children meet

computers they are concerned with whether the machines think, feel, are alive. Older children, from age seven or eight on, are less concerned with speculating about the nature of the world than with mastering it. For many of them, the first time they stand in front of a computer they can master is when they play their first video game. I discuss games—the computational medium that first made it into the general culture—and then I follow elementary-school-age children out of the games arcade and into the classroom, where they are learning to master computers by programming them.[6] These children are all involved with the question of their own competence and effectiveness. When they work with computers they don't want to philosophize, they want to win. The second stage is one of mastery.[7]

In adolescence, experience is polarized around the question of identity, and the child's relation to the computer takes on a third character.[8] Some adolescents adopt the computer as their major activity, throwing themselves into programming the way others devote themselves to fixing cars. But there is a more subtle and widespread way that computers enter the adolescent's world of self-definition and self-creation. A computer program is a reflection of its programmer's mind. If you are the one who wrote it, then working with it can mean getting to know yourself differently. We shall see that in adolescence computers become part of a return to reflection, this time not about the machine but about oneself.

A psychological perspective also led me to study what computers come to mean for different kinds of people. I look at differences of gender, of personality, and I look most carefully at what seems to place some people "at risk." In particular, there is the risk of forming a relationship with the computer that will close rather than open opportunities for personal development. While for some children the computer enhances personal growth, for others it becomes a place to "get stuck." For adults as well as children, computers, reactive and interactive, offer companionship without the mutuality and complexity of a human relationship. They seduce because they provide a chance to be in complete control, but they can trap people into an infatuation with control, with building one's own private world.

I describe metaphysics, mastery, and identity as organizing issues for children as they grow up. I return to them from another perspective, an anthropological one, when I write about cultures within the computer world where one or another of these issues emerges as a central theme. I look at the culture of artificial intelligence, the culture of virtuoso programmers, and the culture of personal computer owners.

The connection between artificial intelligence and the "metaphysical computer" is apparent. As soon as you take seriously the idea of creating an artificial intelligence, you face questions such as whether we have any more than sentimental reasons to believe that there is something about people that makes it impossible to capture our intelligence in machines. Can an intelligence without a living body, without sexuality, ever really understand human beings? Artificial intelligence researchers study minds in order to build programs, and they use programs to think about mind. In the course of exercising their profession, they have made questions about human intelligence and human essence their stock in trade. For the "hacker," the virtuoso programmer, what is most important about the computer is what you can make it do. Hackers use their mastery over the machine to build a culture of prowess that defines itself in terms of winning over ever more complex systems. And in talking to personal computer owners I heard echoes of the search for identity. I found that for them the computer is important not just for what it does but for how it makes you feel. It is described as a machine that lets you see yourself differently, as in control, as "smart enough to do science," as more fully participant in the future.[9]

My style of inquiry here is ethnographic. My goal: to study computer cultures by living within them, participating when possible in their lives and rituals, and by interviewing people who could help me understand things from the inside.

The people I describe in the chapters on computer cultures are not "average" computer users. Computers are a larger part of their lives than for most people. I write about them in order to present portraits of what can happen when people enter very close relationships with this machine. My method shares the advantage of using "ideal types"—examples that present reality in a form larger than life.[10] Ideal types are usually constructed fictions. My examples are real. Yet they isolate and highlight particular aspects of the computer's influence because I have chosen to write about people in computer cultures that amplify different aspects of the machine's personality. Studying people within these cultures allows us to look at the issues of metaphysics, mastery, and identity in adults' relationships with computers in a sharp, clear way. But what we see today "larger than life" within computer cultures will not remain within their confines. As the computer presence becomes more widespread, relationships between people and computers that now take place within them prefigure changes for our culture as a whole—new forms of intimacy with machines, and a new model of mind as machine.

Because the computer is no longer confined to expert subcultures, this book addresses yet another kind of question: How do ideas born within the technical communities around computation find their way out to the culture beyond? This is the province of the sociology of knowledge. Ideas that begin their life in the world of science can move out; they are popularized and simplified, often only half understood, but they can have a profound effect on how people think. This diffusion has special importance in the case of the computer. The computer is a "thinking" machine. Ideas about computation come to influence our ideas about mind. So, above all, what "moves out" is the notion of mind as program, carried beyond the academy not only by the spoken and written word, but because it is embedded in an actual physical object: the computer.

My approach to theories about mind as program is not that of a philosopher. My concern is not with the truth of such theories, but with the way in which they capture the popular imagination. What happens when people consider the computer as a model of human mind? What happens when people begin to think that they are machines? I report what people think, what they say, how they struggle to find new resolutions. When I look at computational ideas as they move out, I explore a "sociology of superficial knowledge": the study of how such knowledge plays a role in the lives of individuals and cultures that is not at all superficial.

These efforts to capture the impact of the computer on people involve me in a long-standing debate about the relationship between technology and culture. At one pole there is "technological determinism," the assertion that technology itself has a determinative impact, that understanding a technology allows us to predict its effects. "What does television do to children?" The question assumes that television, independent of its content or its social context, has an effect, for example, that it creates a passive viewer, or that it breaks down the linear way of thinking produced by the printed word. At the opposite pole is the idea that the influence of a technology can be understood only in terms of the meanings people give it. What does it come to represent? How is it woven into a web of other representations, other symbols?[11]

My method, attentive to the detail of specific relationships with computers as they take place within cultures, provides a kind of evidence that undermines both extreme positions. Technological determinism is certainly wrong: there can be no simple answer to the question "What is the effect of the computer on how people think?" As we shall see, computers evoke rather than determine thinking. The consequences of interaction with them are dramatically different for different people. But the idea that

what is changing is "all in the mind" does not hold up, either. The impact of the computer is constrained by its physical realities. One such reality is the machine's physical opacity. If you open a computer or a computer toy, you see no gears that turn, no levers that move, no tubes that glow. Most often, you see some wires and one black chip. Children faced with wires and a chip, and driven by their need to ask how things work, can find no simple physical explanation. Even with considerable sophistication, the workings of the computer present no easy analogies with objects or processes that came before, except for analogies with people and their mental processes. In the world of children and adults, the physical opacity of this machine encourages it to be talked about and thought about in psychological terms.[12]

In my interviews I heard discourse about computers being used to think about free will and determinism, about consciousness and intelligence. We shall see that this is not surprising from a philosophical point of view. But I was not talking to philosophers. I was talking to sophomores in high-school computer clubs, five-year-olds playing with computer games and toys, college freshmen taking their first programming course, engineers in industrial settings, and electronics hobbyists who had recently switched from building model trains to building computers from kits. In this book I report on interviews with over four hundred people, about half of them children and half of them adults. The computer brought many of them to talk about things they might otherwise not have discussed. It provided a descriptive language that gave them the means to do so. The computer has become an "object-to-think-with."[13] It brings philosophy into everyday life.

For children a computer toy that steadily wins at tic-tac-toe can spark questions about consciousness and intention. For adults such primitive machines do not have this power. Since almost everyone knows a mechanical strategy for playing tic-tac-toe, the game can easily be brought under the reassuring dictum that "machines do only what they are programmed to do." Tic-tac-toe computers are not metaphysically "evocative objects" for adults. But other computers are. Conversations about computers that play chess, about robotics, about computers that might display judgment, creativity, or wit lead to heated discussions of the limits of machines and the uniqueness of the human mind. In the past, this debate has been carried on in academic circles, among philosophers, cognitive psychologists, and researchers working on the development of intelligent machines. The growing computer presence has significantly widened the circle of debate. It is coming to include us all.

Steve is a college sophomore, an engineering student who had never thought much about psychology. In the first month of an introductory computer science course he saw how seemingly intelligent and autonomous systems could be programmed.* This led him to the idea that there might be something illusory in his own subjective sense of autonomy and self-determination.

Steve's classmate Paul had a very different reaction. He too came to ask whether free will was illusory. The programming course was his first brush with an idea that many other people encounter through philosophy, theology, or psychoanalysis: the idea that the conscious ego might not be a free agent. Having seen this possibility, he rejected it, with arguments about free will and the irreducibility of people's conscious sense of themselves. In his reaction to the computer, Paul made explicit a commitment to a concept of his own nature to which he had never before felt the need to pay any deliberate attention. For Paul, the programmed computer became the very antithesis of what it is to be human. The programmed computer became part of Paul's identity as not-computer.

Paul and Steve disagree. But their disagreement is really not about computers. It is about determinism and free will. At different points in history this same debate has played on different stages. Traditionally a theological issue, in the first quarter of the twentieth century it was played out in debate about psychoanalysis. In the last quarter of the twentieth century it found itself playing out in debate about machines.

The analogy with psychoanalysis goes further. For several generations, popular language has been rich in terms borrowed from psychoanalysis, terms like "repression," "the unconscious," "the Oedipus complex" and, of course, "the Freudian slip." These ideas make a difference in how people think about their pasts, their presents, and their possibilities for change. They influence people who have never seen a psychoanalyst, who scarcely understand Freudian theory, and who are thoroughly skeptical about its "truth." So, when we reflect on the social impact of psychoanalysis, it makes more sense to speak of the development of a psychoanalytic culture than to talk about the truth of particular psychoanalytic ideas.[14] What fueled the development of a psychoanalytic culture is not the validity of

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* "Steve" is a made-up name. My policy in this book has been to provide pseudonyms for my informants and, where necessary, change the details in descriptions that might identify them. I use real names when I cite published material and when I cite public statements by members of the scientific community.

psychoanalysis as a science, but the power of its psychology of everyday life. Freud's theory of dreams, jokes, puns, and slips allows people to take it up as a fascinating plaything. The theory is evocative. It gives people new ways to think about themselves. Interpreting dreams and slips allows us all to have contact with taboo preoccupations, with our sexuality, our aggression, our unconscious wishes.

My interpretation of the computer's cultural impact rests on its ability to do something of the same sort. For me, one of the most important cultural effects of the computer presence is that the machines are entering into our thinking about ourselves. If behind popular fascination with Freudian theory there was a nervous, often guilty preoccupation with the self as sexual, behind increasing interest in computational interpretations of mind is an equally nervous preoccupation with the idea of self as machine.

The debate about artificial intelligence has centered on the question "Will machines think like people?" For our nascent computer culture another question is more relevant: not whether machines will ever think like people, but whether people have always thought like machines. And if the latter is true, is this the most important thing about us? Is this what is most essential about being human?

The computer stands betwixt and between.[15] In some ways on the edge of mind, it raises questions about mind itself. Other marginal objects carry their own questions: the figure of the clown and the madman, both within and outside the normal social order, the myths of Dracula and Frankenstein, both within and outside our normal categories of what is alive. And then, on the border between nature and culture, there is the image of the Wild Child of Aveyron, the child who grew up in nature, never, it was believed, having had the influence of society, language, and civilization.

The Wild Child of Aveyron was an evocative object, inciting self-reflection, not because of anything that he did, but because of who he was, because of his position on the border between nature and culture. The computer too stands on a border. Its evocative nature does not depend on assumptions about the eventual success of artificial intelligence researchers in actually making machines that duplicate people. It depends on the fact that people tend to perceive a "machine that thinks" as a "machine who thinks." They begin to consider the workings of that machine in psychological terms. Why this happens, how this happens, and what it means for all of us is the subject of this book.