

Evocative Objects

Things We Think With

edited by Sherry Turkle

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INTRODUCTION: THE THINGS THAT MATTER

Sherry Turkle

I grew up hoping that objects would connect me to the world. As a child, I spent many weekends at my grandparents' apartment in Brooklyn. Space there was limited, and all of the family keepsakes—including my aunt's and my mother's books, trinkets, souvenirs, and photographs—were stored in a kitchen closet, set high, just below the ceiling. I could reach this cache only by standing on the kitchen table that I moved in front of the closet. This I had been given permission to do, and this is what I did, from age six to age thirteen or fourteen, over and over, weekend after weekend. I would climb onto the table in the kitchen and take down every book, every box. The rules were that I was allowed to look at anything in the closet, but I was always to put it back. The closet seemed to me of infinite dimensions, infinite depth.

Each object I found in the closet—every keychain, postcard, unpaired earring, high school textbook with its marginalia, some of it my mother's, some of it my aunt's—signaled a new understanding of who they were and what they might be interested in; every photograph of my mother on a date or at a dance became a clue to my possible identity. My biological father had been an absent figure since I was two. My mother had left him. We never spoke about him. It was taboo to raise the subject. I did not feel permitted to even think about the subject.

My aunt shared the small apartment with my grandmother and grandfather, and sometimes one of them would come into the kitchen to watch me at my investigations. At the time I didn't know what I was looking for. I think they did. I was looking, without awareness,

for the one who was missing. I was looking for a trace of my father. But they had been there before me and gotten rid of any bits and pieces he might have left—an address book, a business card, a random note. Once I found a photograph of a man standing on a boardwalk with his face cut out of the picture. I never asked whose face it was; I knew. And I knew enough never to mention the photograph, for fear that it too would disappear. It was precious to me. The image had been attacked, but it contained so many missing puzzle pieces. What his hands looked like. That he wore lace-up shoes. That his pants were tweed.

If being attentive to the details of people's lives might be considered a vocation, mine was born in the smell and feel of the memory closet and its objects. That is where I found the musty books, photographs, corsages, and gloves that made me feel connected. That is where I determined that I would solve mysteries and that I would use objects as my clues.

Years from then, in the late 1960s, I studied in Paris, immersed in the intellectual world of French structuralism. While I was away, my grandparents moved out of their apartment, where the contents of the memory closet had been so safely contained. Much of the closet's contents were dispersed, sent to an organization that collected books to be read to the blind. Far away from home, I was distressed at the loss of the objects but somewhat comforted to realize that I now had a set of ideas for thinking about them. In Paris, I read the work of the anthropologist Claude Lévi-Strauss, who described *bricolage* as a way of combining and recombining a closed set of materials to come up with new ideas.¹ Material things, for Lévi-Strauss, were goods-to-think-with and, following the pun in French, they were good-to-think-with as well. While in France, I realized that during my many hours with the memory closet I had done more than daydream ideas into old photographs. When I first met the notion of bricolage, it already seemed like a childhood friend.

Ideas about bricolage were presented to me in the cool, cognitive light of French intellectual life. But the objects I tried to combine and recombine as a child had been clues for tracing my lost father, an experience of bricolage with a high emotional intensity. So, from my first introduction to the idea in the late 1960s, I began to consider bricolage as a passionate practice.

We find it familiar to consider objects as useful or aesthetic, as necessities or vain indulgences. We are on less familiar ground when we consider objects as companions to our emotional lives or as provocations to thought. The notion of evocative objects brings together these two less familiar ideas, underscoring the inseparability of thought and feeling in our relationship to things. We think with the objects we love; we love the objects we think with.

In this collection of autobiographical essays, scientists, humanists, artists, and designers trace the power of objects in their lives, objects that connect them to ideas and to people. Some of the objects described in this book are natural: an apple. Some are artifacts: a train. Some were made by the author: a knot. Others were presented ready-made: *The World Book Encyclopedia*. Certain authors reflect on an object's role in a significant life transition—an object serves as a marker of relationship and emotional connection. In other essays, the balance shifts to how an object tied the author to intellectual life—to building theory, discovering science or art, choosing a vocation. In every case, the object brings together intellect and emotion. In every case, the author's focus is not on the object's instrumental power—how fast the train travels or how fast the computer calculates—but on the object as a companion in life experience: how the train connects emotional worlds, how the mental space between computer keyboard and screen creates a sense of erotic possibility.

This collection begins with essays on the theme of discovery and learning, and then, following the arc of the life cycle, the essays discuss the opportunities and challenges of adulthood—the navigation of love and loss—and finally, the confrontation with transcendent issues such as spirituality and the sublime. Life, of course, is not lived in discrete stages, nor are the relationships with objects that accompany its journey. Objects have life roles that are multiple and fluid.

We live our lives in the middle of things. Material culture carries emotions and ideas of startling intensity. Yet only recently have objects begun to receive the attention they deserve.

The acknowledgment of the power of objects has not come easy. Behind the reticence to examine objects as centerpieces of emotional life was perhaps the sense that one was studying materialism, disparaged as excess, or collecting, disparaged as hobbyism, or fetishism, disparaged as perversion. Behind the reticence to examine objects as centerpieces of thought was the value placed, at least within the Western tradition, on formal, propositional ways of knowing. In thinking about science, certainly, abstract reasoning was traditionally recognized as a standard, canonical style; many have taken it to be synonymous with knowledge altogether.

Indeed, so highly valued was canonical abstract thinking, that even when concrete approaches were recognized, they were often relegated to the status of inferior ways of knowing, or as steps on the road to abstract thinking. It is poignant that Claude Lévi-Strauss and the psychologist Jean Piaget, who each in their way contributed to a fundamental reevaluation of the concrete in the mid-twentieth century, also undermined the concrete thinking they promoted.² Piaget recognized that young children use a style of concrete reasoning that was too efficacious to be simply classified as “wrong.” His response was to cast children’s “close-to-the-object” approach as a stage in a progression to a formal think-

ing style.³ Lévi-Strauss recognized the primitive’s bricolage as a science of the concrete that had much in common with the practice of modern-day engineers. He said he preferred to call it “prior” rather than “premature”; yet it was not fully equal.⁴

Beginning in the 1980s, concrete ways of thinking were increasingly recognized in contexts that were not easily dismissed as inferior, even and perhaps especially in the world of science, the very place where the abstract style had been canonized. Scientific laboratories were shown to be places where discoveries are made in a concrete, ad hoc fashion, and only later recast into canonically accepted formalisms; Nobel laureates testified that they related to their scientific materials in a tactile and playful manner.⁵ To this testimony from science studies was added the work of feminist scholars who documented the power of concrete, contextual reasoning in a wide range of domains.⁶ Indeed, there has been an increasing commitment to the study of the concrete in a range of scholarly communities.⁷ To this conversation, *Evocative Objects* contributes a detailed examination of particular objects with rich connections to daily life as well as intellectual practice. Each author has been asked to choose an object and follow its associations: where does it take you; what do you feel; what are you able to understand?

A jeweled pin, simple, European, clearly of the old country, ties a daughter to her mother and her mixed feelings about their immigrant status. An immersion in the comic books of youth teaches a man how to read the lessons of superheroes in midlife. A lonely graduate student is comforted by her Ford Falcon. The car feels like her “clothing” in the world of the street, a signal of her taste and style. When she becomes a mother, it’s time for a trade-in and a BMW station wagon.

Some objects are experienced as part of the self, and for that have a special status: a young child believes her stuffed bunny rabbit can read her mind; a diabetic

is at one with his glucometer. Other objects remind us of people we have lost.⁸ An artist dies, his collection of Chinese scholars' rocks is left behind. A rock of meditation, "The Honorable Old Man" becomes a presence in the life of his widow, who describes it as she would her artist-husband—"obsession, looking, openness to being surprised and moved, dignity."

Most objects exert their holding power because of the particular moment and circumstance in which they come into the author's life. Some, however, seem intrinsically evocative—for example, those with a quality we might call *uncanny*. Freud said we experience as uncanny those things that are "known of old yet unfamiliar."⁹ The uncanny is not what is most frightening and strange. It is what seems close, but "off," distorted enough to be creepy. It marks a complex boundary that both draws us in and repels, as when, in this collection, a museum mummy becomes an author's uncanny "double." Other objects are naturally evocative because they remind us of the blurry childhood line between self and other—think of the stuffed bunny whose owner believes it can read her mind¹⁰—or because they are associated with times of transition. Transitional times (called "liminal," or threshold, periods by the anthropologist Victor Turner) are rich with creative possibility.¹¹ In this collection, we follow a young man from the Australian outback as he boards the Melbourne train, finally a passenger on a long-imagined journey. On the train, poised between states of being, everything solid and known can be called into question

Evocative objects bring philosophy down to earth. When we focus on objects, physicians and philosophers, psychologists and designers, artists and engineers are able to find common ground in everyday experience.

Each narrative in this collection is paired with a short excerpt drawn from philosophy, history, literature, or social theory. The authors of these excerpts

range from Lewis Thomas to Umberto Eco, from William James to Susan Sontag. These texts begin to describe the kinds of connections that help us investigate the richness of objects as thought companions, as life companions.

The excerpted theorists engage the essays across a wide range of ideas. I have already noted some. *There is the power of boundary objects and the general principle that objects are active life presences.* Lévi-Strauss speaks of tinkering; Jean Piaget, of the child as scientist. With different metaphors, each describes a dynamic relationship between things and thinking. We tie a knot and find ourselves in partnership with string in our exploration of space. *Objects are able to catalyze self-creation.* When Igor Kopytoff writes about the "biography of things," he deepens our understanding of how a new car becomes a new skin, of how a change of jewelry can become its own voyage to a new world. *Objects bring together thought and feeling.* In particular, objects of science are objects of passion. Essayists who raise this issue are paired with writings from philosophy (Immanuel Kant and Edmund Burke, on nature's sublime) and also from anthropology (Mary Douglas, on the passion behind our need to classify).

I have also touched on the idea that *we often feel at one with our objects.* The diabetic feels at one with his glucometer, as increasingly we feel at one with the glowing screens of our laptops, our iPods, and our BlackBerries. Theorists as diverse as Jean Baudrillard, Jacques Derrida, Donna Haraway, Karl Marx, and D. W. Winnicott invite us to better understand these object intimacies.

Indeed, in the psychoanalytic tradition, both persons and things are tellingly called "objects" and suggest that we deal with their loss in a similar way. For Freud, when we lose a beloved person or object, we begin a process that, if successful, ends in our finding them again,

within us. It is, in fact, how we grow and develop as people. *When objects are lost, subjects are found.* Freud's language is poetic: "the shadow of the object fell upon the ego." The psychodynamic tradition—in its narrative of how we make objects part of ourselves—offers a language for interpreting the intensity of our connections to the world of things, and for discovering the similarities in how we relate to the animate and inanimate. In each case, we confront the other and shape the self.

For me, working with these ideas, editing this book, combining the narratives with literary and theoretical texts, and seeing them refracted through different prisms, became its own object discipline, my own practice of bricolage. In this sense, *Evocative Objects: Things We Think With* became for me an evocative object. Its elements were new, but the activity of working on it was familiar, as familiar as carefully handling the objects in the memory closet I knew as a child.

Walt Whitman said: "A child went forth everyday/ and the first object he look'd upon, that object he became." With generosity of intellect and spirit, the authors in this collection engage with the objects of their lives. For every object they have spun a world. They show us what they looked upon and what became the things that mattered.

Objects of Design and Play

MY CELLO

Tod Machover

The playing adult steps sideward into another reality; the playing child advances forward to new stages of mastery. I propose the theory that the child's play is the infantile form of the human ability to deal with experience by creating model situations and to master reality by experiment and planning. It is in certain phases of his work that the adult projects past experiences into dimensions which seem manageable. In the laboratory, on the stage, and on the drawing board, he relives the past and thus relives leftover affects; in reconstructing the model situation, he redeems his failures and strengthens his hopes. He anticipates the future from the point of view of a corrected and shared past.

No thinker can do more and no playing child less. As William Blake puts it: "The child's toys and the old man's reasons are the fruits of the two seasons."

—Erik Erikson, *Childhood and Society**



*Source notes for all epigraphs begin on p. 364.

My mother tells me that I started music training when I was two. She was my teacher, helping me make music at the piano and find music all over the house. Each week, we set out on expeditions of her devising, discovering household objects that made interesting sounds, that could in turn be combined to create new textures, emotions, and narratives. Then followed the task of making a “picture” of our new composition so that we could recreate it the following week. I learned to invent music from these first principles: sound, structure, score.

As I began to listen to orchestral music (I remember Leonard Bernstein’s *Young People’s Concerts*), I yearned for an instrument that had the feel of those natural, malleable objects around the house. I wanted my instrument to be able to sing, expressing as much between the notes as on them. The piano, with its special precisions, simply didn’t appeal. By the time I was eight, I had chosen the cello, embracing it before learning the details.

Cellos, I found, are the perfect size. Violins are too petite, fingers stepping on fingers; the double bass is a struggle, hands stretched and muscles flexed. But the cello is the size of a human body, reaching the ground as its scroll grazes the top of the head of the seated musician. The cello range is identical to the human voice—that is, the male and female voice combined. The lowest cello note is at the bottom range of a *basso profundo*, and although the cello can actually scream higher than any singer, it has a more normal top range that competes with a diva *coloratura*.

Seated at the cello, my body assumes a calm, natural position—my shoulders relaxed, letting gravity help bow pressure. Yet I can feel the instrument vibrate from head to foot as I draw my bow across its strings, a throb-

bing through my chest, a buzzing through my legs and feet, a tingling to my fingertips. Sensitive to an extraordinary range of touch, cellos respond to the almost motionless gliding of a gentle *legato* as well as to the human crunch of a raspy *sforzato*. The cello is big enough to put up a fight, yet is the largest instrument that you can comfortably carry, or not so comfortably, as I learned when I took it trekking in Nepal and on the New York subway in rush hour.

Unlike the violin that can screech in the hands of beginners, the cello always has a mellow sound and seldom is truly ugly, yet there is an infinite gradation of tone quality and therefore infinite scope for improvement. Because the physical position one takes with the cello is so natural, it is easier to play than the violin and harder than the bass. Both hands and arms are given independence, working in synchrony (something that young players find hard to master) while doing completely different things. The cello is just hard enough, and for me, this gives cellos the right degree of difficulty. And it makes playing cello the perfect companion to thinking. Like walking, playing the cello engages just enough of my mind to suppress internal chatter, leaving me free to imagine.

A similar balance of not too hard/not too easy applies to intonation on the cello, where playing in tune is easier than on the violin (its greater size, quite simply, leaves you more room to find the right note) but still subject to the subtlest inflections. The physicality of the cello is itself slightly irregular, with strings of different thicknesses that vibrate with different degrees of effort, a bridge and fingerboard sloping unevenly under the four strings, and decreased spacing between notes as one goes higher on each string. This means that each

note feels different to play. The piano is designed for potential perfection that seems to challenge players to achieve machine-like accuracy. The imprecisions of the Japanese *shakuhachi* are designed so that the player is never certain of exactly how the instrument will respond. The cello stands between these two, pleurably controllable, yet with pure perfection always slightly out of reach. Very early I realized that lifetimes had been dedicated to exploring and mastering the cello and that one lifetime could never suffice.

In my own case, under my mother's tutelage, I began with the classics and stayed with them—that is, until the appearance of *Sgt. Pepper* when I was thirteen. That album marked my first musical struggle with my mother, who refused to understand how I could like the Beatles. I moved closer to my father, a pioneer in the field of computer graphics and more comfortable with popular culture. I tried to turn my cello into an instrument for composing and performing rock music: I threw away the bow, turned the instrument sideways and propped it on my lap like a (very big, fat) guitar, clamped headphones around its belly, plugged it into a guitar amp and jammed. I tried the same thing with an electric bass guitar, but it lacked the sonic richness, thick-stringed resistance, wide range, and lightning action of my cello. Soon I was improvising and composing, experimenting with tape recorders, multi-track layering, all with this electrified cello.

I managed to cultivate my classical and rock experiences with the cello separately, safely avoiding their collision. That changed when I was sixteen and began to study with a new cello teacher, Richard (Richie) Bock, who played classical, jazz, and rock. Richie destroyed my complacency about music making, beginning with my assumptions about technique. Instead of focusing on the left hand that played notes and mastered intonation, vibrato, and glissandi, Richie put the right hand and the bow in the foreground. The most important, he

said, was “the part nobody thinks about, the part that comes easy. The bow is where expression comes from, like breathing for a singer.” And furthermore, he said *my* bowing was lousy, so bad in fact that I had to start from scratch.

For months, Richie had me play long-drawn bows over open strings, with no notes played by the left hand at all. I learned to see nuance in cello playing: the constant adjustment of pressure, speed, and angle depending on thickness of string and section of bow; the sweet spot of resonance when the instrument is allowed to vibrate freely; the great beauty that can be found in a simple, constant sound played fully, evenly, purely. By going back to basics, I discovered how to listen carefully and critically, to sense the slightest movement or tension in finger, hand, arm, and back. I learned to meditate in sound. I learned how to practice for real.

By the time I was ready to begin conservatory at Juilliard, I knew I was more interested in composition than performance. Free from thinking of the cello as a profession, I felt I could explore repertoire and my own musical ideas without outside approval. My new teacher, Mosa Havivi, made me rethink what it means to project a musical experience outside of oneself, to hear and feel one's playing as others do. Mosa taught me that I could—and had to—make my own decisions about interpretation and meaning.

As a child musician, the physical intensity of cello playing (a whole body experience, not just a finger activity) had led me to a dissociation of analysis and expression. I performed by ear and feel. Theory was pure abstraction. Now I began to make the conscious connection between thought and touch that had eluded me.

Indeed, there is much in musical education that encourages the dissociation of thought and touch. At Juilliard, Beethoven, a deaf composer, was held up as the ideal composer. Beethoven, the mythology went, was so great that he imagined all his music in his inner ear,

not only being unable to hear it in the external world but also shunning the mundane reality of physical vibrations that would dilute the Platonic ideal of his imagined sounds. What this meant at Juilliard was that no composer would be caught dead in a practice room, or plinking out his or her music on a piano, lest he or she be accused of inadequate ear training, of a sterile musical imagination.

But for me this was impossible: my feeling for composition called upon my intimate relationship with the cello. My musical training has separated sound and touch, thought and feeling, concrete and abstract. My relationship with the cello helped me to bring these things together. While at Juilliard I not only sought ways to hear and touch my music as I was composing it but also I began to imagine instruments that could be adapted to the musical requirements of each new project. So I started working with digital computers, learning Fortran (not a popular thing to do at that time, in that environment) in an attempt to model the sounds I was hearing in my head. I also took a four-month trip to India with my cello, traveling extensively, meeting and listening to some remarkable Indian musicians and playing solo Bach suites for them. I began to appreciate the relativity of the cello and of Western classical music; Bach sounded strange to many people I met, and by the time I came home, the cello sounded monochromatic in pitch and timbre to me. I used my new knowledge of computers to produce sounds and textures that went beyond the cello. And I translated my experience with computers and electronics into new playing techniques and compositional experiments for the cello.

After Juilliard, I went to Paris to work at Pierre Boulez's new Institut de Recherche et Coordination Acoustique/Musique (IRCAM). I arrived at a moment when some of the world's first digital synthesizers were being developed. Here, I found my calling—the design of performance and composition systems that could marry

the precision of programming with the spontaneity of human gesture. When I came to the MIT Media Lab in 1985, I worked with colleagues to invent instruments (I called them Hyperinstruments) that could enhance virtuoso performance as well as new systems (such as *The Brain Opera*) that could introduce music making to the general public. I designed toys to introduce children to music and thought of my mother and our explorations of sound in our home. In the mix of new instruments and musical forms—rhythmic Beatbugs, squeezey Music Shapers, and the sinuous Melody Easel—my inspiration has always remained the cello.

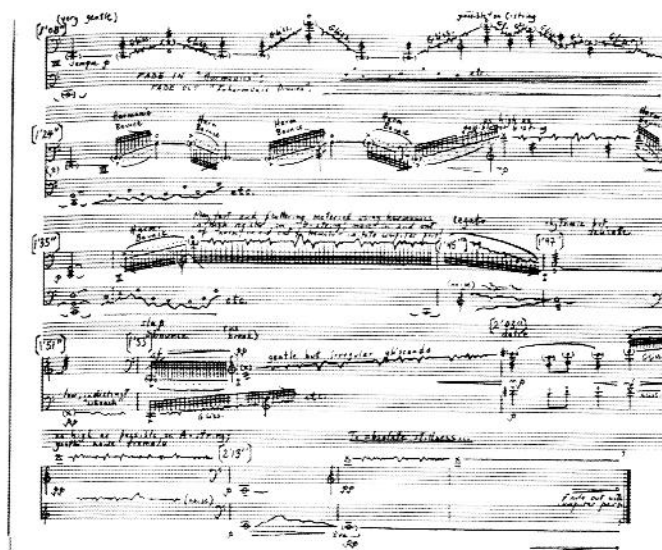
Coming full circle to music and childhood brings me to my own two daughters—Hana, now 12, and Noa, now 8. They are studying music—and although they do like playing Beatbugs and composing with Hyperscore, musical technologies of my invention, Hana is learning violin and Noa piano. I practice with each of them every day, trying to keep what was good about my Mom's coaching. The violin is just different enough from the cello that it keeps me on my toes. How do I teach a slide, a note perfectly in tune, a bow beautifully changed, a phrase delicately shaped, a musical story deeply felt and meaningfully conveyed? How do I share my love of music with my daughters when there is so much tough technique to learn, so much frustration to overcome? How do I reconcile the desire to build computational music toys that convey immediately the excitement and joy of music making with the need for practice and discipline and experience that can only mature over a lifetime?

My daughters' fits and starts with music have helped me to return to the cello with a fresh perspective. These days I do not perform on it often, but I do use the cello to try out new ideas. When a period of musical work is ending and I feel a new one beginning, I like to let my ideas percolate in my imagination, but I also like to touch them, and the cello is my tool for that. I try out new sounds that stimulate my physical memory: when

I hear melodies or intervals, I can feel what my left hand fingers would do to create them. When I am imagining—in the quiet of my study—a full orchestral sonority, my muscles reproduce the gesture as if I were playing it on the cello.

And still, perhaps above all, I play the cello to concentrate, to meditate, to relax. It remains for me the perfect gauge of complexity, of how much an individual human being can shape or master, follow or comprehend. Playing the cello remains the activity that I do best and that I do only for myself. It is the object that is closest to me that I don't share with others, the intermediary I use to reconnect to the forces and feelings that drew me to music in the first place.

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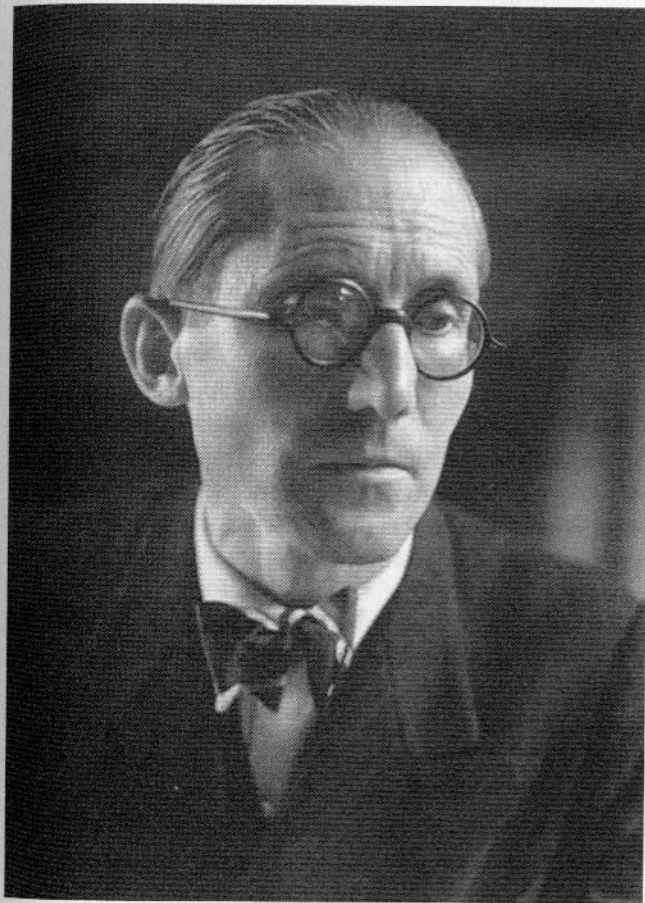


[Electronic communication] . . . is on the way to transforming the entire public and private space of humanity, and first of all the limit between the private, the secret (private or public), and the public or the phenomenal. It is not only a technique, in the ordinary and limited sense of the term: at an unprecedented rhythm, in a quasi-instantaneous fashion, this instrumental possibility of production, of printing, of conservation, and of destruction of the archive must inevitably be accompanied by juridical and thus political transformations. . . . [Because of] these radical and interminable turbulences, we must take stock today of the [archived] classical works. . . . [C]lassical and extraordinary works move away from us at great speed, in a continually accelerated fashion. They burrow into the past at a distance more and more comparable to that which separates us from archaeological digs.

—Jacques Derrida, *Archive Fever*

THE ARCHIVE

Susan Yee



La Fondation Le Corbusier in Paris archives the work of the world-renowned architect, Le Corbusier. His work is studied by every student of architecture, and in the mid-1990s my task was to closely examine his sketches, drawings, notebooks, models, anything I could find that might help to construct a virtual model of one of his famed unbuilt projects, the Palace of the Soviets. The archives were located in Le Corbusier-designed buildings, Villa La Roche and Villa Jeanneret; the idea of sifting through the master architect's original drawings in a space that was conceived by the master himself thrilled me. The materials were rich: fluid sketches, detailed drawings, study models, and notes. I read his letters. I browsed through his datebook and imagined his days full of meetings. I examined his hand-scrawled calculations in the margins of sketches and did the math along with him. There were newspaper clippings. I remember finding one where his design was critiqued. Right on the clipping he had written "Idiote" in a vigorous and powerful hand. I could trace the precision and force of the incision into the newsprint. I felt his frustration, his spirit.

One day, I asked to see the overall plan drawing for his unbuilt design. I was escorted to a special room where Le Corbusier's largest drawings were viewed and waited for the curator to bring up the large rolled drawing. I waited in silence as the curator opened the scroll. It was so large that it spilled over the edge of the table. I had to walk around the drawing in order to see it. I expected to be given gloves, but I was not. I felt awkward. I stood there more than timid, almost paralyzed. I didn't know if I could or should touch it. And then the curator touched it, so I went ahead and touched it too with my

bare hands. All I could think about was that this was Le Corbusier's original drawing. It was meticulously hand-drawn, but the drawing was dirty. There were marks on it, smudges, fingerprints, the marks of other hands, and now I added mine. I felt close to Le Corbusier as I walked around and around the drawing, looking at the parts that I wanted to replicate to bring home with me, touching the drawing as I walked. The paper was very thin.

The next day I came back to the archive and that same scroll was rolled out again. The ritual began again. I spent all day walking, touching, looking, thinking. On other days the ritual would be different. I looked at Le Corbusier's personal, handwritten letters. And one day, and this was the most miraculous of all, I found a little parchment bag full of paper squares of different colors and different sizes. I was there with a team of other MIT architects, and we all gravitated toward these playful cut-outs. Delighted with the discovery, we all immediately came to the same idea at once: that these were the elements Le Corbusier used when he was designing the Palace of the Soviets. These were the little squares he used to program the large project. He figured out the arrangement with little colored papers. One color was for meeting rooms, another was for public areas. Each function of the project had a designated color. And I imagined how he fiddled with these little bits of paper until he found a programmatic configuration that pleased him; I fiddled with them too.

On my last day at the archives, the curator approached me with pride, "Oh, you'll love what we're doing now. You won't ever have to come here! You won't ever have to look at these drawings anymore! We're putting

them all in a digital database!" She brought me to an adjacent room and showed me the exact drawing I had been looking at, the drawing around which I had been circling for days. It appeared on her computer as a small icon. If you clicked on it, it became larger. If I had accessed this drawing from home, I would never have grasped its dimensions, I would never have known that it was stored separately, carefully rolled, that it was dirty with smudges and fingerprints. The scans for the Web site gave me nothing to touch. I felt no awe about the scale of the drawings. Looking at the curator's scans made me think respectfully about mass consumption, about allowing everybody to have access, about the technical problems of how to use a cursor to move around the drawing on the screen, and about how differently I understood the digital image and the designer behind it.

Looking at the scans in the computer room made me miss the quiet of the physical archive, the ritual of bringing out the precious original drawings, the long minutes of unwinding. Sitting at the curator's computer in Paris, I followed her instructions and linked once again to the drawing. A moment later, some bit of business crossed my mind and I linked to MIT. Feeling like a saddened citizen of the information world, I felt transported to MIT through the link. I had a moment of shame.

That day with the curator was the first time I began to think about the transition from physical to digital. The evocative object, the Le Corbusier drawing in both its physical and digital form, made me wonder how automatic it had been for the curator to put the emotion of the archive out of mind, how easy it was to trade the value of touch and physicality for the powers of digitization.

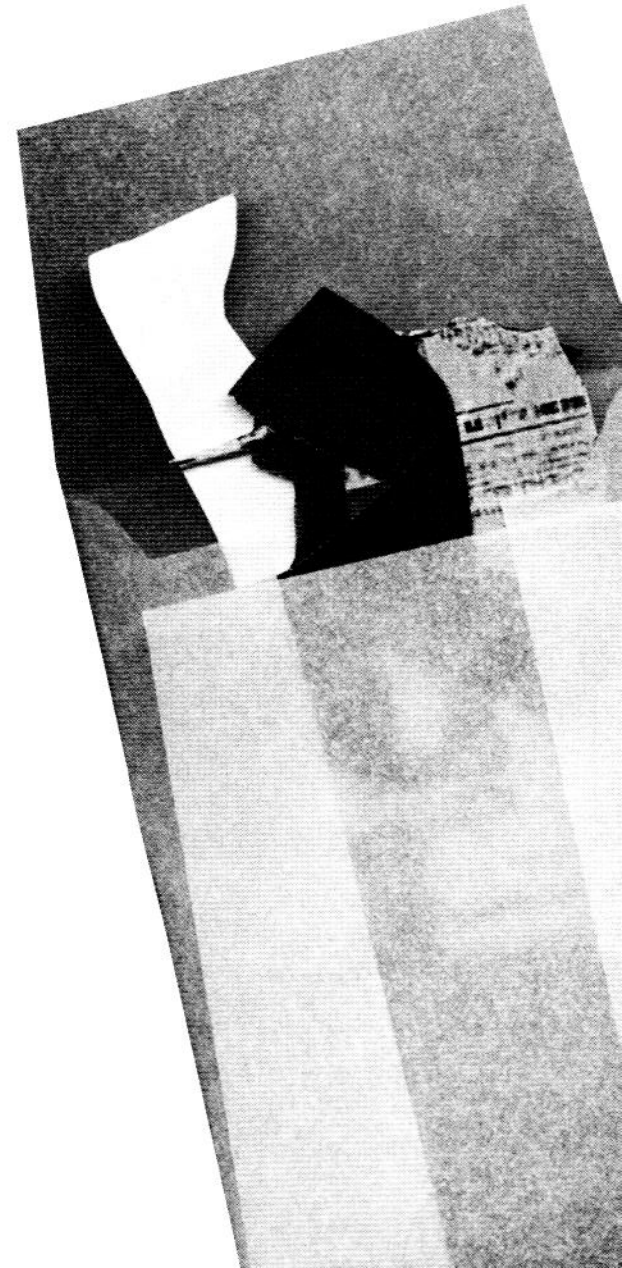
I think of Turkle's distinction between instrumental and subjective technology, between what technology does for us and what it does to us as people.¹ The new Le Corbusier digital database did things for me. It allowed me to do things that I could not do before. I could search

it, manipulate it, copy it, save it, share it. But what did it do to me? It made the drawings feel anonymous and it made me feel anonymous. I felt no connection to the digital drawings on the screen, no sense of the architect who drew it.

As I came to terms with my anonymity, my lack of connection, and the loss of my former rituals in the physical archive, I felt fortunate to be in a generation of designers that straddles both physical and digital worlds, a generation that creates, values, and understands handmade drawings and models as well as digital ones.

In my work designing technology-enhanced studios at MIT, I often think about Le Corbusier's drawings and the drawings that designers make today. Today's drawings and models are constructed on the computer. They have never been physical. They are born digital. They will never be touched. I think about how a new generation will be trained to favor computational techniques and algorithmic methods of design. Instrumentally, these technologies offer opportunities for innovation in design development and construction. Subjectively, however, what will these technologies do to us? How will they affect the way we feel, see ourselves, and see design? How will future students of architecture come to experience the designs of a master from the pre-digital era? And what of the "old masters" of our first digital era? Will future students be satisfied to simply understand the algorithms that generated their designs? Will we still crave some pilgrimage such as the one I took to Paris? But there will be no place to go; it will all be on a collection of servers. What will this do to our emotional understanding of the human process of design? What rituals might we invent to recover the body's intimate involvement with these new traces of human imagination? Will we be able to feel the human connection through digital archives? Will we care?

Susan Yee earned a PhD in architecture from MIT and studies the implications of integrating new technologies into design learning environments.



To express the same idea in still another way, I think that human knowledge is essentially active. To know is to assimilate reality into systems of transformations. To know is to transform reality in order to understand how a certain state is brought about. By virtue of this point of view, I find myself opposed to the view of knowledge as a copy, a passive copy of reality. In point of fact, this notion is based on a vicious circle: in order to make a copy we have to know the model that we are copying, but according to this theory of knowledge the only way to know the model is by copying it, until we are caught in a circle, unable ever to know whether our copy of the model is like the model or not. To my way of thinking, knowing an object does not mean copying it—it means acting upon it. It means constructing systems of transformation that can be carried out on or with this object. Knowing reality means constructing systems of transformations that correspond, more or less adequately, to reality. . . . Knowledge, then, is a system of transformations that become progressively adequate. . . . But let us ask what logical and mathematical knowledge is abstracted from. There are two possibilities. The first is that, when we act upon an object, our knowledge is derived from the object itself. . . . But there is a second possibility: when we are acting upon an object, we can also take into account the action itself, or operation if you will, since the transformation can be carried out mentally. In this hypothesis the abstraction is drawn not from the object that is acted upon, but from the action itself.

—Jean Piaget. *Genetic Epistemology*

STARS

Mitchel Resnick



When I was growing up in a suburb of Philadelphia, there was a small field on the side of our house.¹ On summer evenings, I would go to the “side lot” (as we called it), lie on my back, and stare into the sky. My eyes would dance from star to star. But it wasn’t so much the stars that held my attention. Rather, it was the space between, around, and beyond them. At an early age (maybe seven or eight), I had started to wonder about all that space. Does it go on forever? If not, where does it end? How does it end?

Every answer that I could think of seemed equally absurd. I could not imagine the universe going on forever. But how could it end? If there is a wall at the end of the universe, what is on the other side? These questions frustrated and fascinated me. Of course, I came across many other questions that I couldn’t answer. But for most questions, even if I didn’t know the answer, I could at least imagine that there *was* an answer. Questions about the “end of the universe” took on a special status for me. These were questions where I couldn’t even imagine any answer. No answer seemed possible.

As I grew older, I became interested in puzzles and paradoxes. I spent many hours trying to sort out the sentence: *This sentence is false*. If the sentence is true, then it must be false. But if it is false, it must be true. Again, a puzzle for which I couldn’t even imagine any answers.

In school, I was attracted to math and physics, two fields filled with paradoxes and counterintuitive ideas. I became fascinated by an object that my high-school physics teacher showed us. The object was remarkably simple: two wheels and an axle, with a pin hanging down from the middle of the axle (not quite hitting the ground),

and a string at the end of the pin. The teacher asked: What happens when you pull on the string? Since the string is attached to the end of the pin, it seems that the pin should come toward you. At the same time, it seems that the wheels should come toward you. Both can’t be true: if the pin comes toward you, the wheels move away; if the wheels come toward you, the pin moves away. Another paradox! But this object was different from the stars of my childhood: you could hold it in your hands and test it out. Indeed, I went home, took apart an old toy truck, and made my own version of the puzzle, testing pins of different lengths. Even after I “knew” the answer, I loved tugging on the string and thinking about the paradox.

In college, majoring in physics, I was determined to develop a better understanding of what I now thought of as my Ultimate Paradox—the paradox of a universe that can’t go on forever but can never end. In physics courses, I learned how to derive and manipulate the equations of general relativity, the field most directly related to my paradox. It wasn’t the equations that really interested me, they were just a foundation, a jumping-off point, for thinking about the paradox itself. I tried to approach it through new thinking strategies, through new intuitions and metaphors: I learned that the universe might curve back on itself, just as the land on Earth curves back on itself as you travel all the way around the globe. But what does that mean? How can three-dimensional space “curve back on itself”? How could I envision that? How could I “feel” that?

During college, I had planned to attend graduate school in physics. But at the end of senior year, I decided to work as a journalist instead. I worried that physics

graduate school would be filled with too many equations and too few qualitative insights. I was still fascinated with the mysteries and paradoxes of science. I hoped that as a journalist, specializing in science and technology, I would be able to share my fascination with others. For five years, I covered universities and high technology companies around Boston and then Silicon Valley. I enjoyed my work, but something was missing. I didn't feel the same level of intellectual excitement that I had felt in college. I had lost contact with my obsession. I began to recognize the importance of having obsessions.

Then, in 1982, I wrote a cover story for *Business Week* magazine about research in the field of artificial intelligence. I talked with many leading researchers in the field. I became increasingly interested in questions about the mind. How can a mind emerge from a collection of mindless parts? It seems clear that no one part is "in charge" of the mind (or else it too would be a mind). But how can a mind function so effectively and creatively without anyone (or anything) in charge?

At last, I had a new Ultimate Paradox, a new obsession. I wasn't so much interested in the details of neuroscience, or even in traditional research in artificial intelligence. Rather, I wanted to develop qualitative ways to think about the idea of emergence. I became interested not only in minds but also in other systems in which complex patterns emerge from simple interactions among simple parts. I became particularly interested in natural selection and evolution, hoping to gain a better understanding of how today's sophisticated life forms evolved from a few simple chemicals. For me, there was something intriguing and beautiful about this self-organized emergence of order from disorder, of complexity from simplicity. I developed an emotional investment in this idea. Few things got me more upset than listening to creationists attacking the idea of evolution, attacking the idea that complexity can arise from simple pieces.

Around this time, I came to MIT for a year as a Knight Science Journalism Fellow. During the year, I studied with Sherry Turkle, who studied the emotional power of things we think with, and Seymour Papert, who described how a particular object, gears, had changed his way of thinking in childhood. Papert had fallen in love with gears and, in the process, with mathematics.² Most important during that year was the way I came to see the computer in a new light. For me, the key insight was not that the computer itself is an evocative object (although surely it is for many people), but rather that the computer can be used to *create* evocative objects. And those new evocative objects could be used to help people learn new things in new ways. In designing the Logo turtle, for example, Papert had explicitly attempted to make an evocative object to help students become engaged with mathematical ideas and mathematical thinking. Just as the young Papert had fallen in love with mathematics through gears, children could now fall in love with mathematics through the turtle.

The idea of creating evocative objects for educational purposes is not a new idea. When Friedrich Froebel started the world's first kindergarten in 1837, he carefully designed a set of physical objects—blocks, balls, beads—that became known as Froebel's gifts.³ As children playfully experimented with Froebel's gifts, they learned important ideas about number, shape, size, color. This approach has stood the test of time, and it continues as the basis for kindergartens around the world today.

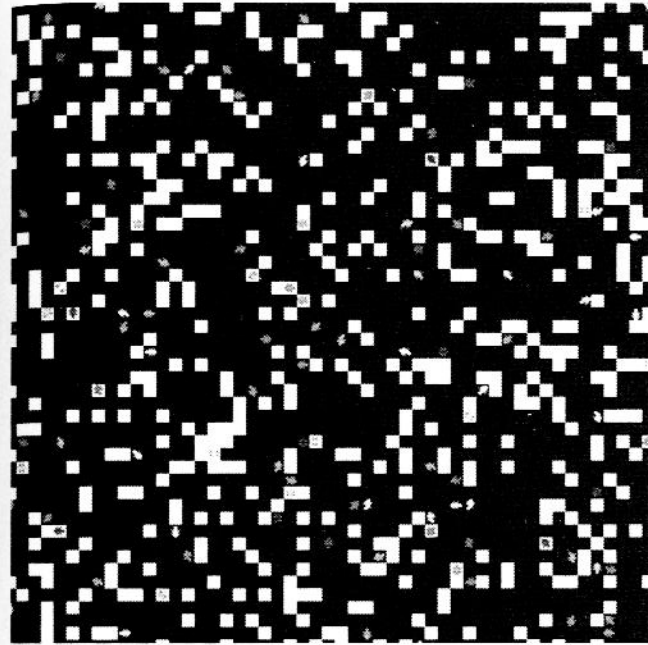
The computer provides an opportunity to expand Froebel's approach, making possible a wider and more diverse range of evocative objects for education. I felt a new sense of mission: I could use the computer to create evocative objects for exploring my new Ultimate Paradox, the paradox of a complex whole arising from simple parts. I wanted to create objects that would enable me to explore the paradox, but also to help others

explore it as well. I decided to use Papert's turtle as the basic building block. But instead of a single turtle, I created thousands of turtles. And I developed a new language, called StarLogo, that enabled students to program each of the individual turtles, then observe the patterns that emerge from all of the interactions.

Students have used StarLogo to explore a diverse range of phenomena. They have turned turtles into birds to explore how flocking patterns arise; into cars to explore how traffic jams form; into ants to explore how foraging patterns emerge; and into buyers and sellers in a marketplace to explore how economic patterns form. It has given me great satisfaction to see students become engaged with my Ultimate Paradox. For some, it has become an obsession, as it was for me.

Over the past twenty years, my research has continued to revolve around the creation of evocative objects for education. Working with the LEGO Company, I've embedded electronics inside LEGO bricks, so that children can make their LEGO constructions come alive—sensing, reacting, and even dancing with one another. I aspire for these “programmable bricks” to serve as a Froebel gift for the twenty-first century. Just as the stars of the night sky inspired, intrigued, and provoked me as a child, my hope is to create new objects that help others find their own obsessions.

Mitchel Resnick is LEGO Papert Professor of Learning Research and Director of the Lifelong Kindergarten research group at the MIT Media Lab.

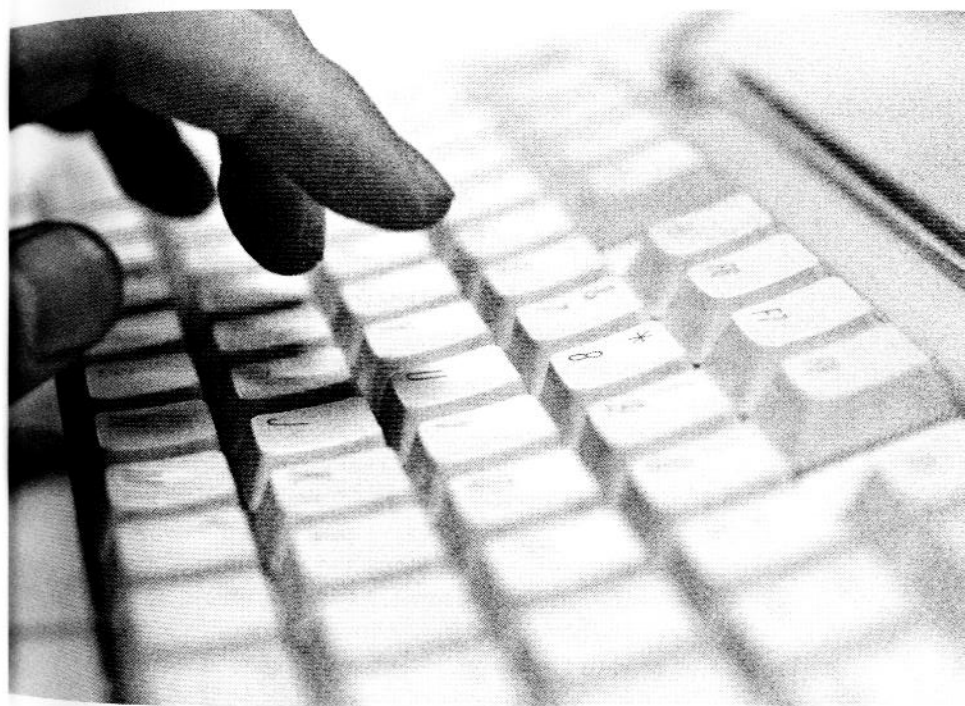


When the stick (hobbyhorse) becomes the pivot for detaching the meaning of "horse" from a real horse, the child makes one object influence another semantically. He cannot detach meaning from an object, or a word from an object, except by finding a pivot in something else. Transfer of meanings is facilitated by the fact that the child accepts a word as the property of a thing: he sees not the word but the thing it designates. For a child the word "horse" applied to the stick means "there is a horse" because mentally he sees the object standing behind the word. A vital transitional stage toward operating with meaning occurs when a child first acts with meanings as with objects (as when he acts with the stick as though it were a horse). Later he carries out these acts consciously. . . . In play a child spontaneously makes use of his ability to separate meaning from an object without knowing he is doing it, just as he does not know he is speaking in prose but talks without paying attention to the words. Then through play the child achieves a functional definition of concepts or objects, and words become parts of a thing.

—Lev Vygotsky, *Mind in Society*

KEYBOARDS

Howard Gardner



On July 11, 2003, I turned sixty. In front of the twenty or so friends and family that were gathered, my four children gave presentations—a poem, a newly composed piece performed on the piano, and a set of written reflections. I was touched, grateful, and struck by the fact that all four of my children spoke about keyboards. Two described the importance of music and the piano in their (and my) life; two evoked the experience of listening to me type manuscripts at night as they were nodding off to sleep.

I am not sentimental about objects. I admire beautiful things and like to be around them, but I make no effort to purchase or keep them. I am happy wearing clothes of forty years ago; truth to tell, I am happier wearing such old clothing. I save my feelings for other human beings and the family dog, Nero. What I do value are the sounds of music and the ideas in books. If I could no longer hear music (or play it), I would be devastated. If I could no longer read for study or pleasure (or write for others or myself), I would not enjoy life. My preferred access to linguistic and musical objects is via fingers on keyboards.

I began both piano lessons and the typing of manuscripts when I turned seven. I took piano lessons for almost six years, then began to teach piano sporadically, and later sat in on lessons and practiced with two of my children. In all, I have played piano off and on for fifty-three years. While I never learned to touch type, I have seen myself as a writer since second or third grade, and typewriters have been with me ever since. I began with manual typewriters for home and office; over time, I moved in turn to electric typewriters, office PCs, and a succession of laptop computers, on one of which I am typing at this moment.

There are scarcely any days on which I do not move my fingers across some kind of keyboard, and often I am at a keyboard, working on music or writing, for as many hours as I eat or sleep. I am able to write with a pen or pencil, and sometimes do so, but I much prefer to type.

Some people are students of keyboards; they sample hundreds of pianos and prefer only a certain model, one Steinway above all the rest. Others love the keyboard on their computer because of its touch—they feel that their hands glide over it with no wasted motion. But for me, this is not the case. I pay essentially no attention to the quality of my keyboards. All of my attention is focused on the message, musical or literary. When I play the piano, I try to use an appropriate touch, but I am really studying the music, trying to understand it, hoping to capture that meaning through my meager technique. When I am typing, my mind is entirely on the contents that I am trying to convey. Above all else, I am trying to be clear; secondarily, I am trying to write in a way that is pleasing to read.

And yet, even with my focus so intently on the message, the experience of my fingers on keyboards feels like more than simply a means to a desired end. In the creation of both music and text, if I could bypass the keyboard and directly transmit mental signals to an instrument or to the computer, I would not want to do so.

When I learned to play the piano, my mother sat next to me nearly every day. When two of my sons began to play, I naturally sat next to them as well. I feel an association between the piano keyboard and family love. In the case of writing, the sensations of fingers on keys are soothing in a way that goes beyond my pleasure in what I write: when I want to imagine myself happy, I think of myself in my study or in a comfortable hotel room on the

road, or even cramped, as I am now, in the economy class of American Airlines Flight 1367, from Boston to Miami, fingers on a keyboard, letting my thoughts proceed at their pace into a typescript.

Stepping back from my personal experience, I don for a moment the perspective of the social scientist. As a scholar, my task is to master the knowledge of the past and to identify ways in which I can add to it. As a sometime pianist, my task is to understand the explicit and implicit instructions of the composer and, ultimately, to introduce my personal interpretation of his or her composition.

In principle, both of these assignments can be tackled simply by thinking about the challenge at hand and arriving at the best possible solution. Indeed, Mozart is said to have created entire compositions in his head and simply to have written them down in the manner of an amanuensis; and various writers have claimed that the job of writing is simply the transposition to paper of words and ideas that have come to them in a flash.

I am skeptical of these accounts. Research on creativity reveals that, even though new ideas appear to come to one as a flash, there has invariably been tremendous preparation beforehand—and this preparation can be documented in the written record. Moreover, thought does not take place in a vacuum—it takes place in various media of expression. By the time one has become an expert some of these media appear to be largely cerebral. But especially during early development, as the social psychologist Lev Vygotsky has taught us, these media are invariably tools that have been created by the wider society—tools ranging from words to pencils, computers, and musical instruments.

Perhaps as an expert writer and a long time journeyman pianist, I could achieve some of my goals without a keyboard. However, I think that I would be handicapped by the absence of an instrument on which to

work. And I know that affectively I need, enjoy, even love the opportunity to type or play away, for much of the day.

Howard Gardner is the John H. and Elisabeth A. Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education.



THE YELLOW RAINCOAT

Matthew Belmonte

Strange indeed is the encounter with the other. . . . Confronting the foreigner whom I reject and with whom at the same time I identify . . . I lose my composure. I feel "lost," "indistinct," "hazy." . . . [Yet] the foreigner is within us. And when we flee from or struggle against the foreigner, we are fighting our unconscious. . . . Delicately, analytically, . . . [we must be taught] how to detect foreignness in ourselves. . . .

By recognizing our uncanny strangeness we shall neither suffer from it nor enjoy it from the outside. The foreigner is within me, hence we are all foreigners. If I am a foreigner, there are no foreigners.

—Julia Kristeva, *Strangers to Ourselves*



Even in primary school I was preoccupied with the idea of protection from an unpredictable world. Protection often came in the form of a glaringly bright, yellow raincoat that kept me dry on rainy days on my way to school. A thoroughly synthetic creation made of rubberized polyester, it would have been difficult to imagine anything less natural. It would be difficult to imagine an artifact that more embodies the tension between myself and my environment. More than its function of keeping rain out, however, it represented my fear of letting anything in—people most of all.

People were the most unpredictable elements of my world; unlike other objects they were more than the sum of the forces acting on them. The human factor was a constant irritant for a budding Laplacian like me. Where a person was involved, one could never be assured of predicting the output, even if all the inputs were known. My wish back then was that I could be the human analog of the neutrino I had read about in science articles: a particle that moved effortlessly through the world, almost never interacting. On the playground, while the other three-year-olds competed for the swings and the slide, I paced along the fence, studying the ground and identifying minerals in the rocks that I found. Rocks, unlike people, were safe.

Wrapped around and covering me, the raincoat represented my mother's triumph over my own will, and persistently reminded me of my dependence on her. In a fundamental way that I didn't consciously acknowledge, the coat came to represent my mother, and I loved and resented it as I loved and resented her. A fear of death, of being smothered and negated, drives us to separate ourselves from our parents. And a fear of life, of being responsible for ourselves in an indifferent world,

brings us back to seek their protection. These conflicting denials of death and of life were attached to the coat: it made me impermeable to the assaults of the outside world, yet it defined me in a way that prevented me from being myself.

In solitude I slipped between the horns of this dilemma. When I was alone, there was neither the threat of attention from other people, nor the demand to submit to the decisions of my parents. The defeat of my will that was signaled by the yellow coat could be replayed as a victory, if I were the one who chose it. Walking alone through a downpour, I was immersed in the outside world's flood yet insulated from it. It was thrilling to feel the pressure of the rain and to see it roll off me and leave me dry. It was as if I were marveling at some alien world and knew that a spacesuit was all that separated me from its deadly atmosphere. Alone in the rain, I was master of my own actions and of my surroundings.

I believe that my childhood sensitivity to the boundary between self and external world led me in my adult life to study people with autism, whose central, daily challenge is the work of imposing internal narrative flow on a deluge of external sensory inputs. Ironically, when I was in primary school I never felt much empathy for my autistic older brother. Now as I look back I see both science and autism are compulsions to order, which differ only in their degrees of abstraction. I now feel that the same set of genetic biases that gave my brother autism gave me just enough of a desperation for order to make me a scientist, and indeed, a student of autism—enough to be driven by the same sense of impending chaos that drives my brother, yet I'm not as overwhelmed by it. I often consider how similar he and I are, and how I so easily could have been him, or he me.

So it was this shared desperation for order that drove me into science, and later into the craft of fiction. Like my old raincoat, science and art enable me to immerse myself in nature's order while they insulate me from nature's chaos. As scientists we invent perfect models in which phenomena are supposed to be mathematically tractable; the human construction of science is full of ideal gases, incompressible fluids, frictionless surfaces, and blackbody radiators. Similarly, as artists we filter the complexities of real life into representative texts in which distinct characters are involved in coherent plots evincing meaningful themes. Treating life as theater and inventing purpose and order, I keep chaos, meaninglessness, and death at bay. My theoretical and narrative constructions in science and art are the same sort of protective gear as the impermeable coat that I once wore to primary school; they hold nature at arm's length, close enough so that I can make some sense of it, but far enough so that I won't be overwhelmed.

My work has taught me that this notion of protection goes a long way toward explaining how people construct theories to gain a sense of control over their surroundings. Then they behave in ways to reinforce these theories. People with autism share the "normal" desire to control their surroundings. What differs for them is the intensity with which these surroundings impinge. Abnormal neural connections within autistic brains may lead to abnormal perception, increasing the salience of individual events but undermining the ability to connect these pieces of life into more integrated and abstract representations.

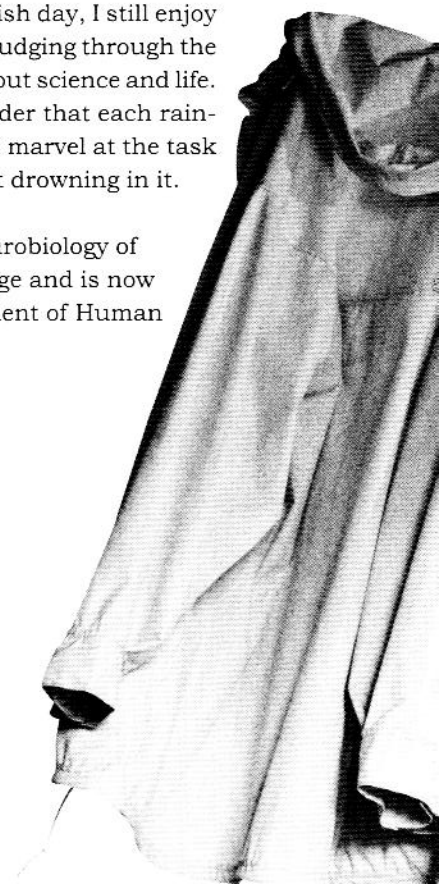
I made understanding the experience of such a fragmented perceptual world the center of my work. To proceed, I imagine life as a film being screened by an incompetent projectionist. Perhaps the volume is so high that none of the dialogue can be heard above the hiss of noise, or perhaps the aperture setting causes one bright corner of the picture to drown out all the rest. However,

if I can rewind the film and play it again and again, I can gather a bit more information each time I watch it. My aspiration is to understand all of it.

The rigid and repetitive behaviors of people with autism begin to make sense when we consider them as the normal reaction of a human mind to a very abnormal sensory environment, rather than as direct symptoms of an illness. Autistic symptoms are what a person does in order to force a chaotic world to follow a predictable script. We are all trying to impose a narrative order on what may seem a fundamentally chaotic world. The difference in autism is that there is more chaos to be controlled. In this regard, the study of autism can tell us a great deal about humanity in general and how psychological distress can be explained as a rational, if extreme, reaction to a world gone awry.

On a stereotypically rainy English day, I still enjoy a ramble through the countryside. Trudging through the rain helps me collect my thoughts about science and life. As I squelch along footpaths, I consider that each raindrop is an observation in itself, and I marvel at the task of comprehending the storm without drowning in it.

Matthew Belmonte studied the neurobiology of autism at the University of Cambridge and is now at Cornell University in the Department of Human Development.

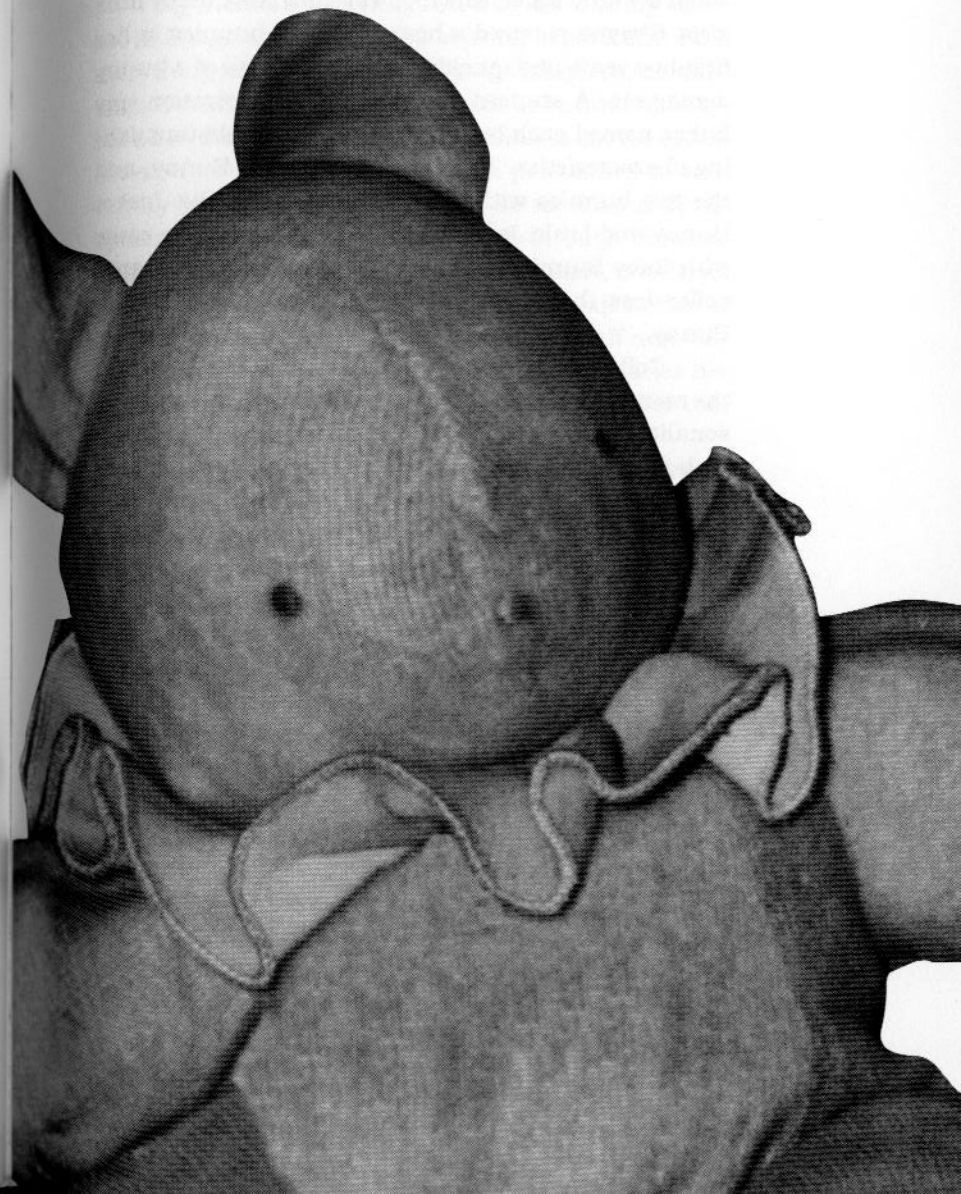


To get to the idea of playing it is helpful to think of the *preoccupation* that characterizes the playing of a young child. The content does not matter. What matters is the near-withdrawal state, akin to the concentration of older children and adults. The playing child inhabits an area that cannot be easily left, nor can it easily admit intrusions. This area of playing is not inner psychic reality. It is outside the individual but it is not the external world. Into this play area that child gathers objects or phenomena from external reality and uses these in the service of some sample derived from inner or personal reality. . . . [Thus] in playing, the child manipulates external phenomena in the service of the dream and invests chosen external phenomena with dream meaning and feeling. [And] there is a direct development from transitional phenomena to playing, and from playing to shared playing, and from this to cultural experiences.

—D. W. Winnicott, *Playing and Reality*

MURRAY: THE STUFFED BUNNY

Tracy Gleason



I had just begun my graduate research on imaginary companions, including children's animated stuffed toys, when my little sister, Shayna, was born. Like many little girls, Shayna received a host of stuffed bunnies in her first two years and quickly became mistress of a bunny menagerie. A student of scientific categorization, my father named each bunny according to its distinguishing characteristics. The smallest was Mini Bunny, and the two bunnies with clothes were named Big Jacket Bunny and Little Jacket Bunny. A Mama Bunny came with Baby Bunnies #1 to 4. A bunny with a soft cotton collar less than half-an-inch wide was named Collar Bunny.

Collar Bunny was for many months simply one of the menagerie. He was long on comfort and short on personality, just a stuffed bunny about 10 inches high, with floppy arms and legs, a big white head, and smallish ears that stuck straight up. His fur, sewn in stripes the shades of lightly decorated Easter eggs, did not distinguish him from the rest of the pastel objects of Shayna's world. He had a small plastic rattle inside his body, and when he sat, the stuffing in his arms made them stick out to the sides. He came to be valued for this ability to rest stably in a sitting position, a characteristic that made him a welcome guest at tea parties.

When Shayna was two, she saw a children's video for which her aunt and uncle had written the lyrics and music. A little girl in the video carried a large stuffed bunny named Murray with her everywhere. Shayna routinely acted out portions of the story, singing the songs and faithfully reproducing the blocking of each of the scenes. In the course of these activities, she chose Collar Bunny to play the part of Murray. Eventually, her in-

terest in the video waned, but the idea that a little girl could love a bunny never did.

My friends and colleagues, who know of my interest in imaginary, personified objects, believe that I did everything in my power to encourage Shayna's relationship with Murray. Although I did not do so intentionally, I confess that Murray has been an endless source of fascination for me. He is my research personified in soft, velvety fabric. For me, Murray is better than a developmental psychology textbook. I see through him into Shayna's imagination. His ability to comfort, entertain, and amaze my sister delights me as a manifestation of our tendency to embody character inside fluff and fabric. When Shayna is upset, I watch as Murray dries her tears, and I am somewhat taken aback to discover that I, too, am comforted by his presence.

As a budding preschooler, Shayna grew in personality and power. And so did Murray. He became as important at playtime as he was at bedtime. Shayna would throw him up in the air and lift him in long leaps down the hallway, proud that Murray could push the envelope of bunny behavior to include ceiling-high jumps. In Murray I could see Shayna's pride in all of *her* new skills, like dressing herself and hopping on one foot and telling a silly joke. Soon Shayna could control and distinguish the words and actions of her real self, the role she took in play with Murray, Murray's "real" self, and the role she gave Murray in play with her.

When Shayna went off to nursery school, preschool policy dictated that Murray could not follow. Consequently, Shayna pretended that Murray was attending a different preschool, and she identified the church in which it was housed. Stressed by their separation, Shayna gave Murray a host of special powers. He

developed Boing-De-Boing Eyes that allowed him to see through barriers of all kinds, around corners and across miles. He could see what Shayna was doing no matter where she was, and he always knew when she was coming for him. His Boing-De-Boing ears allowed him to hear Shayna speaking no matter how far apart they were. He could fly, magically transporting himself through space and time to be by her side—in spirit, if not in body.

When Shayna began kindergarten Murray developed new competencies. He and Shayna began communicating in the Bunny language, thus elevating their discussions beyond the comprehension of our parents. In order to keep them informed, Shayna gave Bunny language lessons, complete with tape recordings of vocabulary and worksheets for grammar. At school Shayna was a student; at home she was the teacher. As she learned to read, write, and spell English words, Shayna taught her mother these same skills in Bunny language.

As Shayna mastered literacy, the lessons in Bunny waned. The Bunny language still exists, but now it is the official language of Bunnyland where Murray attends elementary school. Bunnyland is a utopia of peace and prosperity, with festivals every Sunday and on alternate Wednesdays. It has provinces and capitals and a complicated topography, and we depend on Shayna to keep us apprised of Bunnyland's current events.

References to Murray's life both here and in Bunnyland provide Shayna with an entrée into adult conversation, and Shayna is happy to tell his tales. Murray's exploits give Shayna transitional, albeit imaginary, topics for the dinner table. Shayna uses Murray's experiences to forge a new kind of relationship with adults, one that is no longer solely based on her need for their nurturance, but rather is founded on common interests. When I visit I always ask about Murray's latest adventures, because I know they will reflect Shayna's current hopes, interests, and fears.

Murray shows signs of love and age; his jumpsuit is starting to tear a little over his bum, and his rattle is visible through worn patches and no longer makes any sound. A turn in the washing machine with something red made him decidedly more pink than white. At times when he is tossed aside—in favor of Barbie, say—at these moments, as he lies on the floor with his arms and legs akimbo, the simplicity of his being becomes apparent. Yet, when I find him on the floor, I feel compelled to pick him up and sit him in a more comfortable position, perhaps placing a book nearby in case he gets bored. I know his brain is polyester fill and his feelings are not his but my own, and yet his Boing-De-Boing eyes see through me and call me on my hypocrisy. I could no more walk past Murray as he lies in an uncomfortable position than I could ignore my sister's pleas to play with her or the cat's meows for food. Here, Murray has nothing to do with intellect and everything to do with love.

The adults in Shayna's life see Murray according to their own desires. My father thinks of Murray as a Puck-ish sage: a bunny with a great sense of humor, who is wise beyond his years. To him, Murray is the kind of guy who would have fun watching football but also has an opinion on Kant. Shayna's mother sees Murray as love personified, a being who would accept and forgive in the face of any transgression. For my husband, Murray is a kindred spirit. Each year he finds in Murray an oasis of calm in the chaos of Christmas morning (they are both Jewish).

For me, Murray has many faces. As a sister, I am grateful to him for bringing me closer to Shayna. I speak for him (always a high, squeaky voice appropriate for a small bunny) and can make my sister laugh. I hug him and treat him as a person, and my sister beams with pleasure. As a researcher, he has given me a ringside seat at the performance of Shayna's imagination, even as I remind myself that in fact it was she, as his creator, who bought me the ticket to that seat.

Finally, Murray teaches me about myself. When I think about him I can sense how willingly I blur the edges of fantasy and reality, and how we all choose imagination as a forum for practicing our social skills or safely experiencing powerful emotions. I animate Murray into giving me what I need, even as I know that he is an assembly of cotton and stitches.

I have two photos on my desk. One is of my husband, and the other is of Murray. In his photo, Murray's body almost fills the frame. He is seated next to Mini Bunny, and he has his arm around her. His head is cocked to one side, and he is holding a daisy in his lap. I know that my sister arranged the picture, but in my heart I feel it captures his personality to a T.

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