Evocative Objects

Things We Think With

edited by Sherry Turkle
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KNOTS

Carol Strohecker

The "bricoleur"['s]. . . universe of instruments is closed and the rules of his game are always to make do with "whatever is at hand." . . . Further, the "bricoleur" also, and indeed principally, derives his poetry from the fact that he does not confine himself to accomplishment and execution: he "speaks" not only *with* things, as we have already seen, but also through the medium of things: giving an account of his personality and life by the choices he makes between the limited possibilities. The "bricoleur" may not ever complete his purpose but he always puts something of himself into it.

—Claude Lévi-Strauss, *The Savage Mind*

I remember the day I taught my younger brother how to tie his shoes. I was nine years old and he was three, and since I often looked after him, I also frequently found myself tying his shoes. That day, we sat together on our staircase, our legs bent toward us. Looking down at our shoes, I remembered how a little mantra had helped me learn to write a figure 5: the pencil went "down, around, hat" and in three strokes reliably produced the numeral. So I made up a mantra about shoelaces having something to do with left, right, loops, and around, which I recited while moving the pieces of string accordingly—first on my foot and then on his.

My brother's excitement grew as he observed me and then tried the technique for himself, repeating it until it worked and resulted in a triumphantly tied pair of shoes. His excitement reflected my own as I marveled not only at his diligence, but at the power of the simple mantra. Watching him carefully looping his laces, I saw myself mirrored in a younger child.

My own knot work developed through my teens as I generated macramé designs for belts, bracelets, potted plant hangers, shawls, room decorations, and the like. I adorned my siblings and friends, my walls and keepsakes with knots—in chains, braids and spirals, and with all manner of string weights, textures, and colors. I calculated lengths and costs; mastered arm bends, wrist flicks, hand spans, and fingertip maneuvers; and learned to see things dimensionally, imagining repetitions, alternations, interspersals, and entwinements. I didn't know I was beginning to think like a mathematician. I was simply having fun. I enjoyed generating the creations and seeing how people received them.

"Knot Lady" was a name I first earned from the children I worked with at the MIT Media Lab. After entering graduate school at MIT, I created a Knot Laboratory where I taught children, most of them around ten years old, to tie knots and talk to me about their experiences. Over a year, we transformed a bleak, urban classroom into a lively laboratory space devoted to learning with knots.[1]

Each day at school, I was greeted with a large sign: "KNOT LAB." Constructed by three students who mixed string knot formations with pictures of a chemist's flask and party balloons for its design, the sign reminded me of the simultaneously playful and serious business that took place behind those doors.

Inside our "Knot Lab," children played with string, tacked knots onto display boards, and worked together on stories about knots. The products of their experiments—large, colorful displays of knots in various stages of formation were drawn on paper, tacked to walls, and dangled from the ceiling.

Dozens of knot forms found their home in the Knot Lab. They included simple knots like the Overhand, Figure 8, and Stopper; square knots like the Stevedore and Granny and Thief; and movable knots like the Running Bowline, True Lovers', and Trumpet. To construct them, the children considered unknots, tangles, mirror images, handedness, and knotty spatial relations—over, under, around, and between. They wrapped, rotated, flipped, twisted, and shifted scales as they tied. Their thinking spanned the deliberate and spontaneous, the rational and affective, the conscious and unconscious. And individual preferences were apparent: some children dealt with a knot as an integral entity produced by moving a single end of the string; others broke the process into steps, following and creating procedural instructions; and still others combined pieces—smaller knots as

modules—to build up more complicated knots. These approaches were each productive, but they were also very different. The knots demonstrate the diversity (rather than the standardization) of styles of learning. They are objects that enable us to explore the inner states of those who tie them.

One of the most avid knot-tyers was a girl named Jill. I remember that she tended to be serious in the lab, that she was neat and polite, and that she liked to sit close, touch, and talk at length about the knots she worked on. She liked being reassured about her work, which was careful and deliberate. What she didn't like was to leave something unfinished. She stayed with her projects until they were done and tried to convince others to do the same. She didn't like to skip steps; she wanted the sense of accuracy that only the careful progression from one detail to the next could provide.

I noticed early on that more than for any of the other lab participants, it was important to Jill to designate clear anchor points for the string as she tied new knots. On the way to producing a knot, she would often resort to stapling or taping down parts of the string. It was important to Jill to articulate and anchor intermediary configurations, in order both to understand a knot and create a record for later reference.

As the project progressed, Jill told me that her parents had recently divorced, and that she and her brother lived half of the week with their mother and half of the week with their father. She mentioned that there was tension in her parents' communication and that it troubled her. She told stories of situations in which any reasonable action on her part would have slighted one of her parents. She seemed to feel herself in a perpetual "double-bind," doomed to doing something wrong no matter what she chose, torn between decisions that her parents might see as representing the interests of one or the other of them.

Jill was absorbed with knots whose completed state involved motion. She once spent days creating an exhibit of such knots, where passers-by could pull the ends of a True Lovers' knot she had suspended from a pipe on the ceiling in order to play with the knot's back-and-forth movement. Jill made several iterations of the knot before the exhibit took its final form, modifying the string to facilitate pulling its ends. To hang her construction, she anchored a long string to a ceiling pipe with a Square knot. A Bowline at the end of this string held one of the two strings composing the True Lovers' knot, which supported the second string wrapped around it. Excited about her construction, she made a "museum label" highlighting the placement of the three knots:

> At the very top [on the black pipe] notice the "Square knot" to hold it in place. The knot holding on to the Lovers' Knot [True Lovers' knot] is the "Bowline." Notice the way the strings are two colors. It is that way so it is easier for you to pull it.
>
> To pull take the two strings with the black Lego pieces. Pull hard until the two pretzel knots meet. Then pull hard the two strings without anything on them. Repeat if you wish.
>
> Please pull me.

To me, Jill's final phrase signaled her identification with the knot. And it seemed to echo another voice in her mind that wanted to say: Notice how I am suspended by two knots, one that anchors me and one that holds me. Notice how I am two knots, waiting to be pulled this way and that. I understand being pulled; it is something that I know. Allowing others to pull me is a purpose that I serve.

Through the course of the project, Jill expressed her emotions in knots and tried to initiate some emotional repairs as well: frustrated with being pulled by others led her to devise a step-by-step approach to knot

tying. Others might leave; Jill committed herself in advance to a plan.

Six years after the Knot Lab had closed, I was able to find Jill and another member of the original project. They were curious about reconnecting with each other and with me. Jill remembered me as the "Knot Lady" but claimed not to remember much about knots. I thought that in this she was expressing her anxiety about mathematics. Although Jill had been one of the most avid participants in the Knot Lab when she was younger, in the intervening years she had come to think of herself as a person who was "not good at math," a self-image all too common among young women. Jill was open to discussing her lab experience and to participating in new projects involving colorful polyhedra but hesitated when our explorations involved some numeric quantification of an idea. The gap between what she could do and what she thought she could do was poignant.

It may be that I am the one for whom the Knot Lab had the most impact. Knot making showed me how commonplace objects can help people think purposefully about continuity and separation, combination and deviation. Through knots I learned that engaging objects can help people to build intuitions about mathematics. And witnessing one of the female participants succumb to stereotypical math phobia after such a strong start as a fifth grader spurred my determination to encourage the representation of different learning styles in all pedagogy.

For many, however, I will always be simply the Knot Lady. My growing collection of knot-oriented gifts serves as constant reminder of this: a ceramic vase with a Square knot decoration and braided handles, a clock with knots in places of numbers, two seared glass spindles entwined to form an elegant bracelet. And new objects and e-mails continue to come my way from people whenever they encounter news about knots—whether it's an article about the usefulness of knot theory in DNA research, a publication from *The Shipping News,* or endearing knot jokes. In truth, I wouldn't want it any other way. Much as painters relish a blank canvas, writers a fresh page, or moviemakers a darkened screen, I suppose I will always have a penchant for bits of string and the potentials they suggest.

Recently, I asked my brother if he had any memories of learning to tie his shoes. He told me he recalled a moment when he had just completed tying his shoes and left the house to join his friends. I like to imagine that this moment occurred after he mastered the strings and mantra on the stairs, only steps from the front door of our house.

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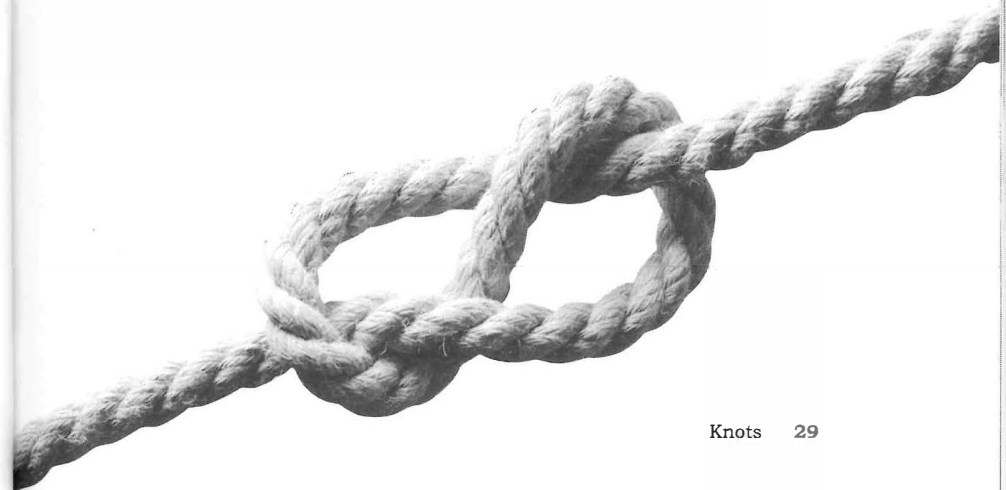
THE RADIO

Julian Beinart

Functional perfection exercises a cold seduction, the functional satisfaction of a demonstration and an algebra. It has nothing to do with pleasure, with beauty (or horror), whose nature is conversely to rescue us from the demands of rationality and to plunge us once more into an absolute childhood (not into an ideal transparency, but into the illegible ambivalence of desire). . . .

All possible valences of an object, all its ambivalence, which cannot be reduced to any model, are reduced by design to two rational components, two general models—utility and the aesthetic—which design isolates and artificially opposes to one another. . . . But this artificial separation then permits evoking their reunification as an ideal scheme. Utility is separated from the aesthetic, they are *named* separately (for neither has any reality other than *being named separately*), then they are ideally reunited and all contradictions are resolved by this magical operation. Now, the two equally arbitrary agencies exist only to mislead.

—Jean Baudrillard, "Design and Environment or How Political Economy Escalates into Cyberblitz"
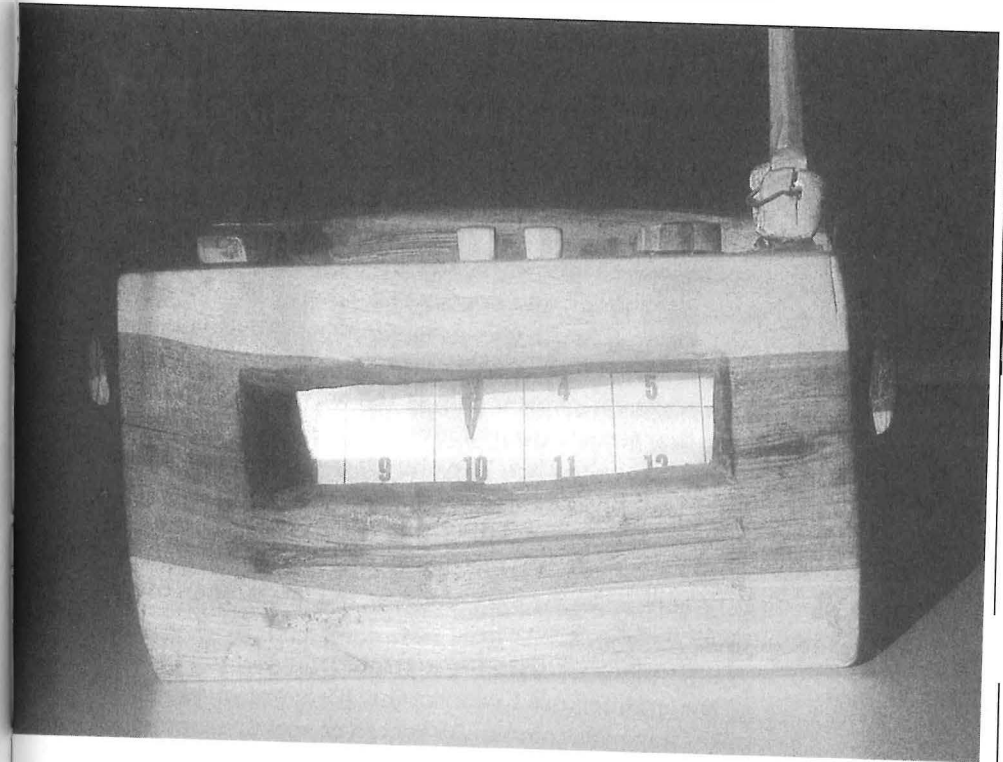
The waterless coastline stretches thousands of miles, from just north of Cape Town all the way to Angola. I grew up in a small town at the southern tip of this desert and was a child when German submarines torpedoed Allied convoys and left survivors to waste away on this Skeleton Coast. My town was a hot and dull center for wheat farmers. The tallest building was the Dutch Reformed Church, an Afrikaner Gothic steeple, to which white dressed-up farmers' kids would march on Sunday mornings. My family belonged to the synagogue across the mud of a river, in an out-of-the-way place where its low, quasi-Ottoman façade faced no one. Colored people cleaned our house, drove my father's trucks, got drunk on Saturday mornings, and lived somewhere I did not know.

Later, when I was a sophomore in architecture school, I tried to do a measured drawing of the church for a class assignment. It was the only building in the town that seemed to merit my work. But I never was able to finish the drawing. The church was too big to measure, and somehow it stood outside me. It was a totally isolated and commanding thing, never to be messed with, never to be modified, never to change, and never to be entered by the likes of me, or, as I later understood, by all those colored Christians.

In many ways the Church fitted much of the dogma of the architecture I was taught. We never questioned client power or community access or social meaning in buildings. Our designed objects were to be seen on their own in space and to remain unaltered over time. We had the benighted obligation to innovate culture, a culture produced by Western heroes working for people like themselves. Our ideal was to have Palladio's clients, princes with whom we could act out our professional narcissism.

Years later I was in South Africa again, now with graduate degrees from American universities and a sense of obligation to spread their wisdom. But to whom? The universities were segregated; increasingly uneasy, I taught basic design to freshmen, based on what I had learned at MIT from Gyorgy Kepes, who in turn had brought his version of the famous Bauhaus Vorkurs from Europe. The exercises of this fundamental course were meant to reduce students' reliance on past visual knowledge and to force them to deal with a formal language of vision completely new to them. The new language was abstract and universal, implying that it could be as international, yet as removed from local culture as Esperanto. In what Baudrillard refers to as this universal semantization of the environment, visibility was controlled.[1]

Soon after, in the early 1960s, I remember how shocked I was when I saw something I had not noticed before. Walking down a street in the middle of Durban, South Africa's most racially mixed city, I passed a boy carrying a wooden transistor radio. It was about six inches long and two inches wide, with a wooden handle and a hinged wooden dowel antenna about two feet long tapered to a small knob at its end. On the top of its body, one of three square wooden buttons was pressed down. A slit of broken glass covered a rectangular dial behind which was a piece of an old paper calendar numbered one to twelve. A red pointer was stuck on three; it could never move. Although it looked like a Braun transistor radio, this object never produced sound. I asked the boy about it and he said: "It can't play music, but I sing when I carry it. One day I'll have a real one."

From that time, quite suddenly, I began to see objects that had been invisible to me before. There were all kinds of wire bicycles, some of twisted soft metal, others shaped out of thin steel with yellow frames, red beaded tires, blue handles, and pedals. A friend sent me a three-by-two-foot black bicycle from Zambia, which had a movable front wheel. It had, so he said, been made by a boy to get himself a job in a bicycle repair shop.

Everywhere there were objects of emulation and imagination. Often they were copies of sophisticated machines now made by hand out of recycled, thrown away material: Honda motorcycles made from panels of sheet tin taken from Castle beer cans; a dark green Isuzu Trooper 4×4 made out of a single piece of wood; wire Volkswagen Beetles with engine covers that lifted up; a snout-pointed fighter plane with a South African flag on its rudder; a large helicopter made of wire with a working AM radio in its belly. In the mute transistor radio family, there were silent wooden Sony cell phones useful only for dreamed conversations.

Cheaply available, highly visible, and linguistically subtle, material from products carrying popular brand names and out-of-context messages (Coca-Cola, Sprite, and Fanta, among others) adorned tin lunch pails, cloth jockey caps, miniature delivery trucks, and almost everything else. Recently I bought a three-foot-long pantechnicon in New York. Made in Abidjan of Nestle coffee can metal, it repeatedly says:

> *Nescafé est un pur café soluble, fabriqué avec des grains de Robusta de Cote d'Ivoire, soigneusement selectionnés puis traité pour votre plus grand plaisir.*

And on an elegant racing bicycle from Cameroon there are small-type messages about "milk for baby's growth" and "just add water."

I have puzzled over these objects for a long time. In South Africa, I decided they were design responses to a technology that could not be purchased by poor people, whereas what I was teaching in the university derived from a German design pedagogy that eagerly embraced available modern technology. So I made a new version of my academic program and over a period of about six years taught it to local people at seven short-term summer schools in five African countries. We used anything that was available, often thrown-away rubbish. Passers-by dropped in off the streets and became students. Almost everyone responded to the exercises quickly and directly, often humorously. They seemed able to deal with issues of form with the same intensity and forthrightness of the boy in Durban.

Late one night I took some jazz musicians home to their black township on the southwestern side of Johannesburg. I had never been to Western Native Township before; whites did not go to such places. But I returned many times after to study the people and their houses, particularly the way they had plastered and painted the small boxes, which they had been renting from the municipality since the influenza epidemic of 1917. Over a few years a team of students and I documented the fronts of all 2,000 houses. The facades were patterns of rectangles, circles, and half-moons, a restricted palette of shapes from which a communal language had been assembled. So, instead of painting a hammer-and-sickle on his wall, the first local chairmen of the African National Congress chose an open circle with a serrated edge from the community's menu of forms, which he then read as an industrial rotor hub, a symbol of Russian progress. A woman who ran an illegal Fah-Fee (a popular Chinese-based betting game) saloon painted her lucky symbol, a horse, on her wall but made the horse of common triangles and half-moons. From these bare houses with seven people per room came an astounding decorated urbanism.

No designer on his or her own could have invented the decorative language of the Western Native Township community, nor could any designer have chosen the personal example each house displayed on its facade. Designers have tried their hand at animating dull housing and produced only abstract stereotypes. But many designers have learned the difference between professional and popular knowledge. They no longer see buildings as disassociated from their context; they try hard to revel in environments of complexity and difference; they design permanent monuments badly and ephemeral events much better; they treasure the every-day in open societies; and they know when to invite others unlike themselves in and when to stand aside.

We will never know whether we have lost the naive genius of the little boy in Durban. We work in the hope that such ability will be available not only to those who are poor, excluded, and have to dream about the possessions of those a class above them. Some believe that new technologies may help us nourish the full universe of our abilities. We have yet to see this in action, especially for people for whom our technology remains chimerical. But, above all, we need a social environment in which we see the value of others and do not consign them and their objects to invisibility. And if this happens, we may not have to choose between Afrikaner steeples and Zulu radios.

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Question 3: What does your design make you think of?

I think of dignity.—M. Myaluza

It makes me think of a butterfly. I am fond of them.—P. Butelezi

I think of my brother-in-law who did it to signify his success in his divorce case.—Phillip Letatola

It makes me appreciate the beauty of art.—Rhoda Nkile

It reminds me of two things: cypress trees and the insignia of a diamond card.—Phoofolo

I think of the Queen's crown. —Joyce Swartbooi

I think of the freedom of movement I had in WNT.—Johannes Maseke

It reminds me of the money I had spent on it.—Ruth

I think of wealth in the form of a diamond.—A. Mkhize

I think of nothing.—Joel Ngubane

I think of Chinese and Japanese flags.—S. Ramaphosa

It makes me think of tombstones and graveyards. It is a memorial now because WNT is dead.—Phiri

I think of a horse. I am a fah-fee woman; a horse is my lucky number. —Martha Sidzatana

I think of a razor which together with the black colour signifies "danger." —Ishmail Setlodi

It makes me think of my late mother. —M. Malunga

It reminds me of my brother I have not seen for three years now.—Mashaba

THE MELBOURNE TRAIN

William J. Mitchell
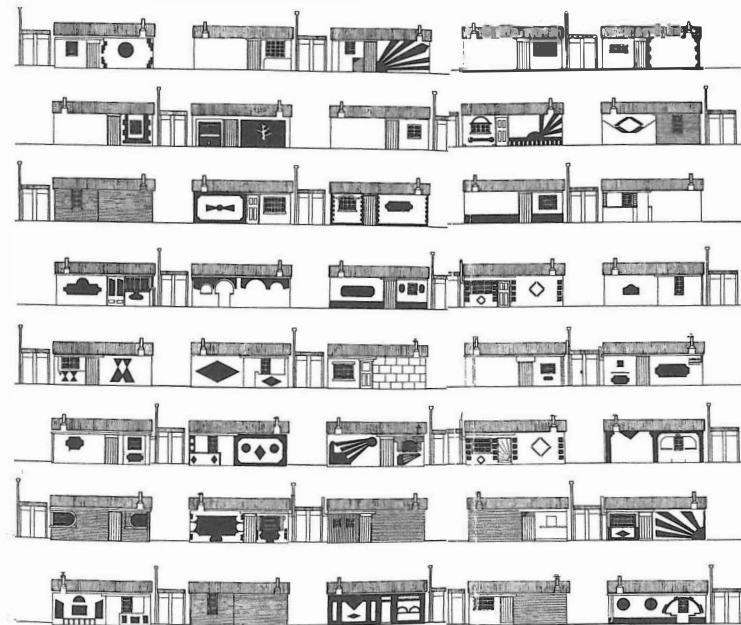
Dreaming makes *everything in me which is not strange, foreign,* speak: the dream is an uncivil anecdote made up of very civilized sentiments. . . .
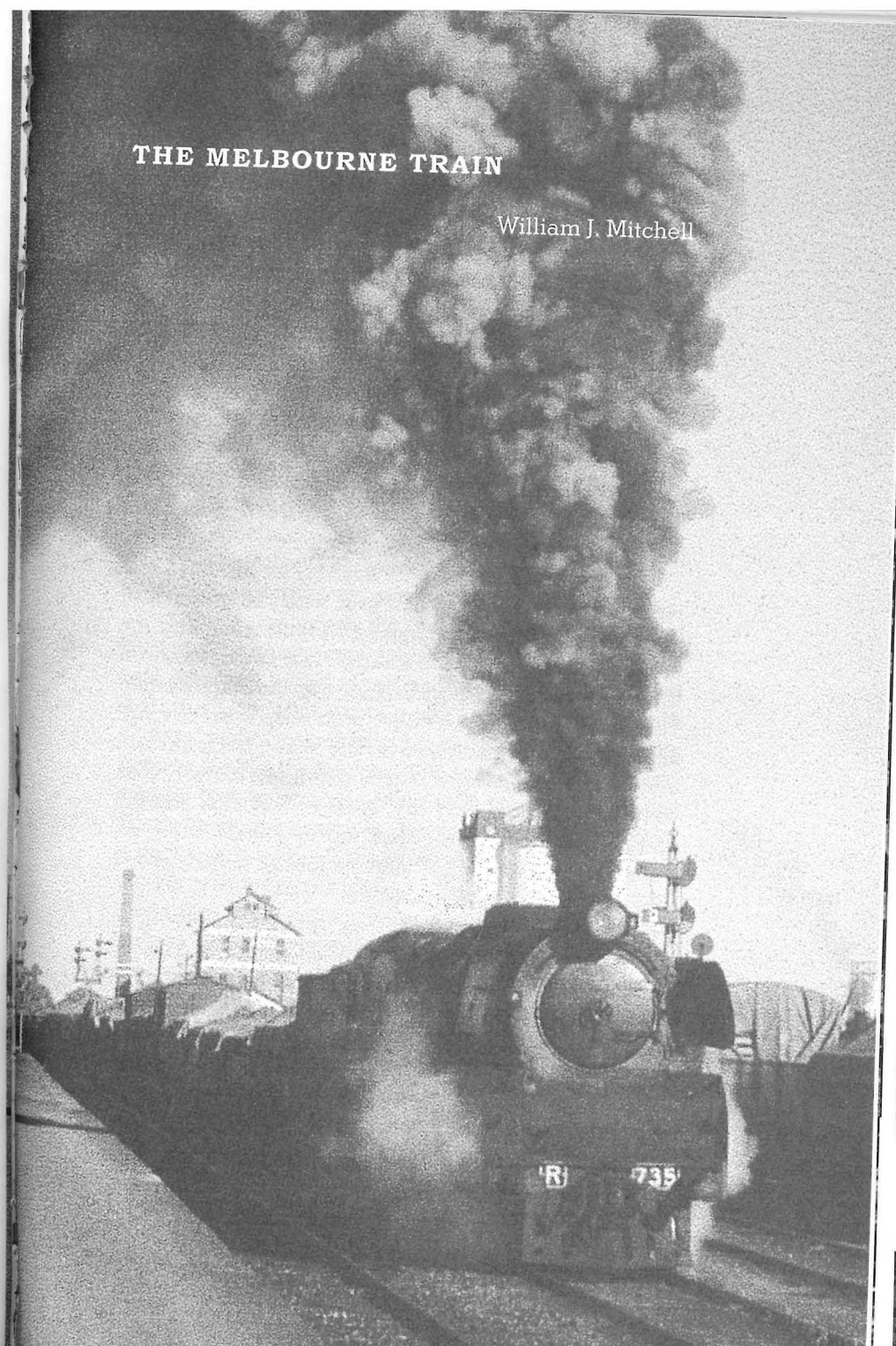
What is significance? It is meaning, *insofar as it is sensually produced.* . . . Then perhaps the subject returns, not as illusion but as *fiction.* A certain pleasure is derived from a way of imagining oneself as *individual,* of inventing a final, rarest fiction: the fictive identity. . . . I write myself as a subject at present out of place, arriving too soon or too late. . . .

If it were possible to imagine an aesthetic of textual pleasure, it would have to include *writing aloud. Writing aloud* is carried . . . by the *grain of the voice,* which is an erotic mixture of timbre and language and can therefore also be, along with diction, the substance of an art. . . . Its aim is not the clarity of messages. . . . What it searches for are the pulsional incidents, the language lined with flesh, a text where we can hear the grain of the throat, the patina of consonants, the voluptuousness of vowels, a whole carnal stereophony.

—Roland Barthes, *The Pleasure of the Text*

I was born in a lonely flyspeck on the absurdly empty map of the Australian interior. When I eventually took an interest in such things, I discovered that Mark Twain had once passed through there, and had written in *Following the Equator:* "Horsham sits in a plain which is as level as the floor—one of those famous dead levels which Australian books describe so often; gray, bare, somber, melancholy, baked, cracked, in the tedious long droughts, but a horizonless ocean of vivid green grass the day after a rain. A country town, peaceful, reposeful, inviting, full of snug houses, with garden plots, and plenty of shrubbery and flowers."[1]

We moved away when I was very small, but I still remember the river—arched over with red gums, and loud with the sound of magpies, kookaburras, and the occasional screech of a cockatoo. You could stand on the bridge and drop stones to plonk into the muddy water. There was a broad main street, with shop verandas and angle parking for the few cars. The baker, the milkman, and the iceman delivered from horse-drawn carts. Across the Natimuk Road were dry, grassy paddocks, and my dad always carried a big stick for the snakes when we walked there. Old Baldy Anderson (though nobody called him that to his face) ran the pub.

Every evening, the express train from Melbourne came thundering into town—passing through, and barely pausing, on its way to Adelaide. You could hear the whistle blowing—with urgently increasing intensity, then a mournful, gorgeous Doppler shift—from miles away across the starlit plains. The locomotive was a magnificent smoking, hissing, clacking monster sporting a glowing firebox, a tender heaped with filthy coal, and huge, shiny wheels. It was my earliest intimation of the technological sublime.

Throughout my bush childhood, the trains served as mobile metonyms for a wider world. In the slang of the day, the sprawling coastal cities were "the big smoke," and the steam engines were the fleeting local bearers of that emblematic attribute. They puffed great clouds of it up into the otherwise perfect hemisphere of clear blue sky, and left long plumes trailing across the flat horizon—matched, occasionally, by the dust plumes from cars speeding along dirt roads. When you entered a tunnel on the train, you had to leap up to close all the windows; otherwise, your compartment filled instantly with choking soot.

Each warmly lit carriage interior was a synecdoche of urbanity—an encapsulated, displaced fragment of the mysterious life that was lived at the end of the line. The passengers dressed differently from the locals, and they talked of unfamiliar things. They carried with them the Melbourne newspapers—the sober and serious broadsheet the *Age,* the racy *Sun* and *Argus,* the evening *Herald,* the *Sporting Globe* (printed, for some reason, on pink paper), and the utterly scandalous tabloid *Truth.* News was scarce in the bush, in the days before portable radios and casual long-distance calls, so fresh papers were eagerly awaited; passengers would sometimes toss them out to the railway workers who stood leaning on their shovels as a train groaned slowly by, much as they might offer a smoke to a stranger, or slip some flour and tea to a swagman at the door.

The passenger compartments were beautifully crafted in polished wood, overstuffed leather, screwed brass and chrome fittings, frosted glass with railway insignia, heavy sliding doors that closed with a satisfying thump, and little enamel notices enumerating prohibitions—spitting, smoking in the wrong places, frivolously

pulling the emergency brake chain, and flushing the toilet while the train was stopped at a station. They were meticulously equipped with hooks for the broad-brimmed hats that all the men wore, ashtrays for the heaped remnants of cigarettes (some old-timers, I observed with amazement, could casually roll their next smokes with one hand while stubbing out the last with the other), overhead racks for suitcases, and chemical foot warmers that you would take out from under the seats and shake to activate. And there were wondrous cabinets of curiosities, with friezes of large, sepia photographs over the seats—each one depicting a ferny gully, a gravel track lined by huge eucalyptus trees, a mountain lookout, a wild patch of coast, or some other picturesque scene from the extensive territory served by the Victorian Railways. When I was a little older, and my family had picked up and moved to the shores of the Southern Ocean, the Jubilee Train came to town—a celebration of the fiftieth anniversary of the federation of the former colonies and formation of the Australian nation. The Jubilee train overflowed with the vast, varied, and unruly world distilled into a collection of mementos and souvenirs. I saw famous gold nuggets, the bullet-dented armor of the outlaw Ned Kelly, creepy remnants of the cruel convict era, stuffed birds and animals, diving helmets, feathery coral, miscellaneous minerals, and giant clams from faraway Queensland.

It was on a train, long before I was reluctantly dragged off to school, that I first realized I could read. With my nose up against the window, I began to decipher the signs advertising Bushell's Tea, the mileage markers that crept by, and the names of the stations where we creaked to successive stops—words in memorable sequence, the beginnings of narrative. I quickly found that the made-up narratives of books vanquished the boring hours as we crept across the plains. It wasn't long before I ran through the meager supply of kids' books, and moved on to the volumes of Henry Lawson that I had discovered at home. Lawson, to my gratified astonishment, wrote not of the Old Country and the Empire, nor of exotic American adventure, but of the people and places I *knew*. He was the bard of the bush. I loved the deadpan desolation of his great stories "The Drover's Wife" and "The Union Buries Its Dead." I could readily have believed that his famous character Mitchell the bushman, arriving with battered swag and old cattle-dog at Sydney's Redfern railway station, was a long-lost uncle. I was stirred by his angry anthem of the underdog, "Faces in the Street." And sometimes it seemed that he was sitting beside me, gazing out into the shimmering distance:

> By homestead, hut, and shearing-shed,
> By railroad, coach, and track—
> By lonely graves of our brave dead,
> Up-Country, and Out-Back:
> To where 'neath glorious clustered stars
> The dreamy plains expand—
> My home lies wide, a thousand miles
> In the Never-Never Land.[2]

It didn't matter that he had some patch of Western Queensland in mind when he wrote those lines. It didn't matter that he had died, drunk and penniless on the streets of Sydney, decades ago. I knew exactly what he meant. The power of his words, magically locking on to the landscape before me, made him vividly present.

When I was learning to write schoolboy essays of my own, perched at a wooden desk with porcelain inkwell and steel-nibbed pen, I often thought of sentences as trains. You could shunt the words around, like rolling stock on a siding, until you got them in exactly the right order. Like empty boxcars, they could carry the freight of simile and metaphor. And verbs, surely, were locomotives. Put them up front for snappy imperatives. Multiply, mass, and combine them for extra power. Keep it

short. On the other hand, if the mood took you, and you wanted to construct a long, slow, freight-train of a sentence, with reflective asides in the manner of writers like Joseph Furphy, you could just let a few scattered verbs help it along from somewhere in the middle. Or, for a different effect, they might follow, pushing. When I memorized and recited poetry from the *School Reader*—mostly jingling ballads, like "The Wreck of the Hesperus" and "The Man from Snowy River"—the rhythms of the rails were always on my mind. Eventually, I got to read Pope on poetry, and realized he was right: the sound must seem an echo to the sense.[3]

As the years went by, and I made myself into an architect and urbanist, I began to understand that objects, narratives, memories, and space are woven into a complex, expanding web—each fragment of which gives meaning to all the others. For me, it was a web that grew from a quiet, isolated place on the banks of the Wimmera River.

It is more than half a century, now, since I left that little town. A decade after leaving, when I had the chance to attend Melbourne University, I fled the bush forever and have since lived my life among the world's great cities. But the sight of an express train still evokes the other end of the line. Now it recovers the memory of a spreading, aromatic peppercorn tree, a corrugated iron roof that was too hot to touch when you climbed up to retrieve a ball, the sudden smell of raindrops in the dust, and a small, curious child—walking with his impossibly young and beautiful parents along a silent, sunburned street.

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equipped them with an extraordinary repertoire of ways of adapting to such variability. The world challenges them anew each and every day and in ways that could not possibly be met with a single tool, or even a few, or perhaps not even with a finite number of tools. Slime mold, in its capacity for self-organization, illustrates one strategy for survival, and it is undoubtedly a versatile and fertile object-to-think with. But ultimately more complex living beings find the need of a far larger repertoire of strategies than this little organism can possibly be expected to display.

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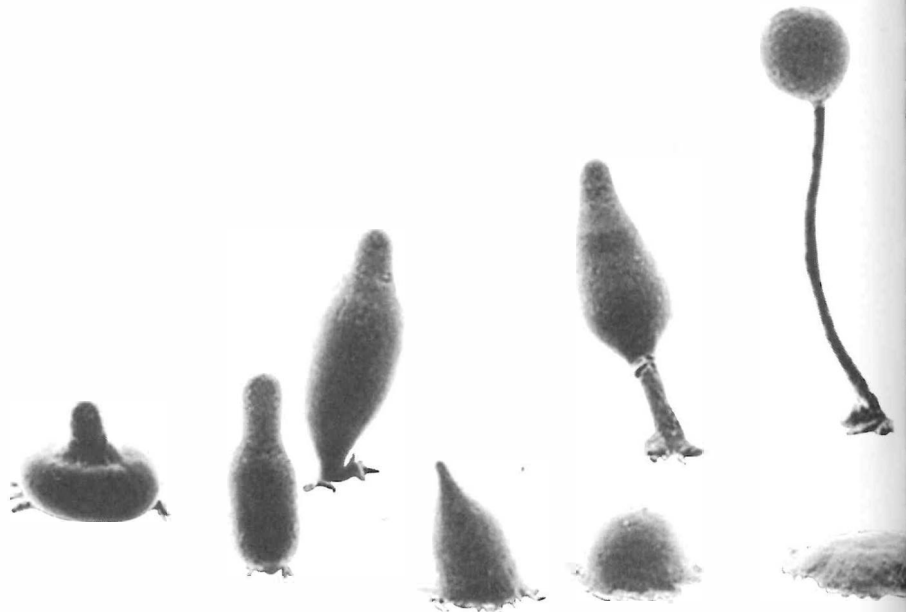
WHAT MAKES AN OBJECT EVOCATIVE?

Sherry Turkle

What makes an object evocative?[1] As I write, *Bodies,* an exhibition of preserved humans from China, is on tour internationally. Its objects, poised between death and new animation, raise questions about the sanctity of what has lived, the nature of art, and the human beings who once were the objects on display. Thinking about the uncanny, about thresholds and boundaries helps us understand these objects with their universal powers of evocation.

And yet, the meaning of even such objects shifts with time, place, and differences among individuals.[2] Some find the preserved bodies the fearsome creatures of night terrors. For others, they seem almost reassuring, an opportunity to contemplate that although death leaves matter inert, a soul may be eternal.

To the question "What makes an object evocative?" this collection offers pointers to theory (presented as epigraphs) and the testimony of its object narratives, voices that speak in most cases about familiar objects—an apple, an instant camera, a rolling pin. One role of theory here is to defamiliarize them. Theory enables us, for example, to explore how everyday objects become part of our inner life: how we use them to extend the reach of our sympathies by bringing the world within.

As theory defamiliarizes objects, objects familiarize theory. The abstract becomes concrete, closer to lived experience. In this essay I highlight the theoretical themes of each of the six parts of this collection (with special emphasis on objects and the inner life) in the hope that theory itself will become an evocative object. That is, I encourage readers to create their own associations,

to combine and recombine objects and theories—most generally, to use objects to bring philosophy down to earth.

It was made of 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.
—Mitchel Resnick, "Stars"
Objects of Design and Play

Objects help us make our minds, reaching out to us to form active partnerships. Mitchel Resnick's pull-toy, a wooden car on a string, embodied a paradox: "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." Resnick had been shown the pull-toy in his high school physics class; he brought the idea of the toy car home with him, but more than this, he brought home the notion of paradox itself. He took apart his own, familiar toys for parts that enabled him to rebuild the pull-toy in his fashion, and even when he had come to understand its mysteries, he continued tinkering: "Even after I 'knew' the answer, I loved tugging on the string and thinking about the paradox." The object took on a life of its own. "No ideas but in things," said the poet William Carlos Williams.[3] And the thing carries the idea.

The anthropologist Claude Lévi-Strauss would say that as Resnick made and remade the pull-toy he was becoming a scientist, more specifically, a *bricoleur,* a practitioner of the science of the concrete. Bricolage is a style of working in which one manipulates a closed set of materials to develop new thoughts.[4] Lévi-Strauss characterizes the primitive scientist as a bricoleur, but modern engineers, too, use this style.[5]

From our earliest years, says the psychologist Jean Piaget, objects help us think about such things as number, space, time, causality, and life.[6] Piaget reminds us that our learning is situated, concrete, and personal. We invent and reinvent it for ourselves. As Resnick plays with pull-toys, he is learning to see himself as capable of inventing an idea, and he is changing in other ways as well. He is learning to be more at home with uncertainty and with his own object attachments.

Object play—for adults as well as children—engages the heart as well as the mind; it is a source of inner vitality. Resnick reminds us of how his mentor, the mathematician and educator Seymour Papert, considered the lessons of his childhood object: gears. An intimate connection with gears brought Papert in touch with ideas from mathematics. As Papert put it: "I fell in love with the gears."[7] Far from being silent companions, objects infuse learning with libido.

Another of Papert's students, Carol Strohecker, proposes knot-tying as a microworld that similarly combines ideas and emotions. Here, I pair her essay with the writing of Lévi-Strauss, a connection that puts the focus on the cognitive. But reading Strohecker's narrative from a psychoanalytic perspective shifts the emphasis to emotion and the particular needs of individuals.[8] In *Playing and Reality,* Winnicott describes how one of his patients, a seven-year-old boy, becomes obsessed with string in response to the anxiety of being separated from his hospitalized mother. At each hospitalization, the boy turns to string play as solace, as a way of coping with her absence.[9]

Similarly in Strohecker's "Knot Lab," ten-year-old Jill, a child of a difficult divorce, is preoccupied with tying down the ends of string as she works, using tape, nails, and tacks to keep her knots in place. For Jill, knots are a way to think through her personal situation. Herself at loose ends, Jill is comforted by securing knots in transition. When she builds a knot exhibit that enables passersby to play with the back-and-forth movement of a True Lovers' Knot, her label for the knot concludes with the phrase "please pull me." Strohecker hears Jill speaking through the knots: "Notice how I am suspended by two

knots, one that anchors me and one that holds me. Notice how I am two knots, waiting to be pulled this way and that. I understand being pulled; it is something that I know. Allowing others to pull me is a purpose that I serve."

My datebook and its events had their own esoteric language. Familiar venues, organizations, and individuals were noted in tiny writing and abbreviations that only I could decipher.
—Michelle Hlubinka, "The Datebook"
Objects of Discipline and Desire

Michelle Hlubinka writes about her datebook and her first timepiece—a Mickey Mouse watch that she received on a family vacation when she was four: "Having the watch, I entered a society not just of time-keepers, but time-managers. And I became good at it, perhaps too good at it."

You think you have an organizer, but in time your organizer has you. The organizer is one of many day-to-day technologies that concretize our modern notion of time. The historian of technology Lewis Mumford examines how the invention of the clock by monks in the Middle Ages transformed social life and subjectivity.[10] Clocks produced time as discrete units, making possible a new way of thinking. Before clocks, there was day and night, morning, mid-day, and evening. Soldiers showed up for battle at dawn. After clocks, there were minutes and seconds. Industrialization needed a clock-produced world of measurable sequences and synchronized action. Capitalism depends on regimenting human time and human bodies.

Our clocks and datebooks do more than keep us on time. Objects function to bring society within the self.

The historian Michel Foucault provides a framework for thinking about how objects such as Hlubinka's watch and datebook serve as foundations of "disciplin-

ary society."[11] In modern times, social control does not require overt repression. Rather, state power can be "object-ified."[12] Every time we fill out a medical questionnaire or take a pill, we are subjects of social discipline. And every time we enter appointments in our datebook, we become the kind of subjects that disciplinary society needs us to be.[13]

When literary theorist Roland Barthes writes that the objects of disciplinary society come to seem natural, what is most important is that what seems natural comes to seem right. We forget that objects have a history. They shape us in particular ways. We forget why or how they came to be. Yet "naturalized" objects are historically specific. Contemporary regimes of power have become capillary, in the sense that power is embodied in widely distributed institutions and objects.

From this perspective, Gail Wight's object—the antidepressant medication she calls "Blue Cheer"—produces a patient, just as Hlubinka's datebook produces a time-keeper and time-manager. At the start of Wight's narrative about her pills, she has a sense of herself as an unhappy artist. Soon, psychiatry recasts her identity: she is a broken biological mechanism, but one that medicine can fix. Over time, Wight does not need the presence of a physician to reinforce her medical identity. Over time, the pills alone can do the job.[14]

Eden Medina, like Wight, has her body disciplined. In Medina's case, the social demands are embodied in her shoes. The ballet slippers that haunt Medina communicate the shape of the body to which they want to belong: the ideal dancer's body, conforming to the socially constructed conventions of ballet. Toe shoes put Medina in touch with body practices that teach how the flesh disappoints and how it needs to be disciplined and denied.[15]

Although it looked like a Braun transistor radio, this object never produced sound. I asked the boy about it and

he said: "It can't play music, but I sing when I carry it. One day I'll have a real one."
—Julian Beinart, "The Radio"
Objects of History and Exchange

Julian Beinart saw a new object, a mute radio made of wood, and then he could not stop seeing it. His hometown of Durban, South Africa, revealed itself to be rich in technological objects fashioned from the raw materials of an impoverished culture. There were bicycles made from beer cans, cars from bent wire, radios from wood—all technologies of everyday life copied as pure form.

As Beinart found these objects, he saw people and social relationships of which he had been previously unaware. The mute radio and its cousins changed the people who made them and Beinart who discovered them. The mute radio, with no instrumental purpose, was free to serve as commentary on possession and lack, on power and impoverishment.

In a famous passage on commodities, Karl Marx describes how when wood is transformed into a table, it remains an ordinary, sensuous thing. But when the table becomes a commodity in a market system, the object comes alive: it "stands on its head and evolves out of its wooden brain grotesque ideas far more wonderful than if it were to begin dancing of its own free will."[16] Like Marx's commodities, Beinart's wooden radio comes alive as it embodies relationships to power. Yet the wooden radio subverts itself as a commodity and reveals the social relations that commodities are designed to hide.

The social theorist Marcel Mauss, too, describes the animation of objects: gifts retain something of their givers.[17] As people exchange objects, they assert and confirm their roles in a social system, with all its historical inequalities and contradictions. A gift carries an economic and relational web; the object is animated by the network within it.

From the perspective of the philosopher Jean Baudrillard, the mute radio reveals something profound about the social role of all the radios that can speak. He describes how commodities cultivate desires that support the production and consumption capitalism requires.[18] This process keeps the dominant ideology alive. It becomes invisible and alienates from the real. In such a system, normal radios are taken for granted. But when radios are remade in wood or throw-away tin, the invisible is made visible. In wood, a radio is subversive, a potent actor.

David Mitten finds a Native American axe head that also speaks to him in a subversive way. It subverts his sense of distance between himself and those who came before him, a theme of the writings of Bruno Latour, with whom his essay is paired. For Latour, objects speak in a way that destroys any simple stories we might tell about our relations to nature, history, and the inanimate; they destroy any simple sense we might have about progress and our passage through time.[19] Mitten says that when he picked up the axe head, the landscape of his ancestry exploded around him, demanding that it be placed in history, in nature, and in the social lives of the people who had and used it. More than this, Mitten knows that he will part with the axe head only in death, when his daughter will inscribe his life into stories about it.

A bunny with a soft cotton collar less than half-an-inch wide was named Collar Bunny. . . . 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.
—Tracy Gleason, "Murray: The Stuffed Bunny"
Objects of Transition and Passage

D. W. Winnicott called "transitional" the objects of childhood that the child experiences as both part of the

self and of external reality. Collar Bunny (later renamed "Murray") is such an object.

He belongs to Tracy Gleason's younger sister, Shayna. Whatever Shayna imagines herself doing or thinking ("like dressing herself and hopping on one foot and telling a silly joke") can first be "tried on" as bunny thoughts and actions.

Winnicott writes that the transitional object mediates between the child's sense of connection to the body of the mother and a growing recognition that he or she is a separate being. When Shayna starts preschool and its rules insist that Murray cannot accompany her, she is challenged to invent ways of bringing him along. Her solution is to invest Murray with new powers. He develops the ability to read Shayna's mind and intuit her every emotion. In doing so, Murray makes it possible for separation to be not-quite separation. Transitional objects let us take things in stages.

The transitional objects of the nursery—the stuffed animal, the bit of silk from the baby blanket, the favorite pillow—all of these are destined to be abandoned. Yet they leave traces that will mark the rest of life. Specifically, they influence how easily an individual develops a capacity for joy, aesthetic experience, and creative playfulness. Transitional objects, with their joint allegiance to self and other, demonstrate to the child that objects in the external world can be loved. Winnicott believes that during all stages of life we continue to search for objects we can experience as both within and outside of the self.

It is in these terms, as an object in the space between self and surround, that Judith Donath speaks of her much-beloved 1964 Ford Falcon. She inhabits the car like a "skin"; it connects her to her mother, its first owner, and to her children, for whose safety she abandons it. It brings her the joy of an object that traffics, in her words, "between the outside world and the inner self."

Donath's essay is paired with the writing of the anthropologist Igor Kopytoff, who explores objects in terms of their life spans, a perspective that encourages us to look at the biography of an object alongside that of a person. Through Donath's sensitivity to the Falcon's cultural biography, she was better able to understand her own. When Donath rides the Falcon as a child in the 1970s, it is a bourgeois suburban object. When it reappears in New York's East Village in the 1980s, the Falcon has been transformed into the neighborhood "cool car." By the 1990s in Cambridge, Massachusetts, the car is exotic and glamorous, congruent with Donath's desire to stand out as a graduate student. "No matter how dully mundane I felt, in the Falcon I was the Driver of that Cool Car."

Winnicott situated his transitional objects in play, which he saw as an intermediate space, a privileged zone in which outer and inner realities can meet.[20] For William J. Mitchell, born in the outback of Australia, the train to Melbourne provided such a space.

The train is the backdrop for a rite of passage, a time of transition that the anthropologist Victor Turner has characterized (for individuals and cultures) as "liminal" or threshold time.[21] For Turner, these times of transition are characterized by the crystallization of new thought and the production of new symbols.

On the Melbourne train, Mitchell is taken from one physical space (his small village in the Australian bush) to another (the cosmopolitan Melbourne), and he is also taken toward a new identity. He writes: "Each warmly lit carriage interior was a synecdoche of urbanity—an encapsulated, displaced fragment of the mysterious life that was lived at the end of the line." Within the liminal space, the self is porous. In train space, Mitchell is open to new associations, sights, and sounds: "And there were wondrous cabinets of curiosities, with friezes of large, sepia photographs over the seats."

In liminal space, Mitchell brings books, words, and objects within his expanding sense of self. It is on the train that he first realized that he can read.

> "It was on a train, long before I was reluctantly dragged off to school, that I first realized I could read . . . words in memorable sequence, the beginnings of narrative. . . . As the years went by, and I made myself into an architect and urbanist, I began to understand that objects, narratives, memories, and space are woven into a complex, expanding web—each fragment of which gives meaning to all the others."

Mitchell's essay, rich in its discussion of language, is paired with an excerpt from the literary theorist Roland Barthes, whose reflections on objects, language, and identity (he writes of "language lined with flesh") also resonate with those of David Mann, writing about the transitions facilitated by the *World Book Encyclopedia* he received as a child.[22]

Far more than a vehicle for the transfer of information, Mann describes the encyclopedia as a means of access to language:

> Its pictures came to life in my mind, parsed into nouns and danced through grammar to the music of verbs. By the time I was four it had taught me to read. Not through my family but through these volumes language became a part of me, the book of the world opened to me and I myself opened to the world as I might otherwise never have done.

Mann and Mitchell make language itself a liminal object, standing outside and within the self, a vehicle for bringing what is outside within.

Mann's description of a self constituted by language is paired with a text by the psychoanalyst Jacques Lacan. Lacan believes that to talk of "social influences" on the individual neutralizes ole of Freud's most important contributions: the recognition that society doesn't "influence" autonomous individuals, but comes to dwell within them with the acquisition of language.[23]

Lacan's theory allows for no real boundary between self and society. People become social with the appropriation of language. You and language become as one. There is no natural man. Lacan's narrative of how language comes to "inhabit" people during the Oedipal phase opens out to larger questions about how we build our psyche by bringing things within. Nowhere is this more in evidence than when we consider what we bring within at a time of loss.

The logo boasts "Globe Trotter," echoing my grandmother's love of travel. With her newfound liberty after her husband and children had gone, she began to discover the world. . . . But this suitcase is new; she had been saving it for one final trip.
—Olivia Dasté, "The Suitcase"
Objects of Mourning and Memory

After her grandmother's death Olivia Dasté packs the old woman's suitcase one last time. A sweater, a handkerchief, a teacup are lovingly arranged in the suitcase. Dasté is afraid to open the suitcase too soon: "[I]t feels dangerous to open it. Memories evolve with you, through you. Objects don't have this fluidity; I fear that the contents of the suitcase might betray my grandmother." But after two years, mourning has done its work. Dasté holds a fragrant red sweater to her face and knows she doesn't have to. Dasté has internalized her grandmother's spirit. "I smile. I am with her in Bordeaux and we have all the time in the world."

In *The Year of Magical Thinking*, Joan Didion describes how material objects may look during the

mourning process.[24] After her husband's death, Didion cannot bring herself to throw away his shoes because she is convinced that he may need them. This is the magical thinking that is associated both with religious devotion and the "illness" of mourning. With time, Freud believed, the true object, the lost husband, comes to have a full internal representation.[25] This completes the formal process of mourning; it is only at this point that the shoes can be relinquished. They have served a transitional role.

Susan Pollak, too, begins her narrative of loss with an echo of the tactile—brought back by the way a rolling pin evokes her grandmother's kitchen, the safe place of Pollak's childhood.[26] Pollak's thoughts then go to baking and to the evocative object of Marcel Proust, perhaps the most famous evocative object in all literature. Proust's object is the small cookie called a madeleine. When dipped in tea, the taste of the madeleine brings Proust's character back to his youth, to a country home in Combray, and to his aunt Albertine. Finally, the madeleine opens him to "the vast structure of recollection."[27]

"Never underestimate the power of an evocative object," says Pollak. As a practicing psychotherapist, she is interested in objects for more than evocation. She argues, following Winnicott, that transitional objects can heal. Pollak tells the story of a patient, Mr. B., who was not able to mourn his father until he found the "half-moon" cookies his father had bought for the family when Mr. B. was a child. At that time, money had been tight and his father had only been able to buy day-old cookies. When Pollak's patient went back to his old neighborhood and found the bakery from his childhood, he bought a dozen fresh half-moon cookies. They were unfamiliar, almost displeasing. He had to wait until they were a day old in order to savor them. Only the taste and texture of his childhood could reestablish his lost connection. After finding the cookies he was able to talk to his children about their grandfather. He was able to recall his father's acts of generos-

ity and to think sympathetically about why his father had needed alcohol to endure. The cookie facilitated mourning. Mr. B., a novelist, long blocked in his writing, was able to begin a new novel. For him, as for Proust, memory passed through the body.[28]

Pollak reminds us that Proust himself makes a connection that Winnicott would wholeheartedly endorse. Toward the end of *Remembrance of Things Past,* he says: "Ideas come to us as the successors to griefs, and griefs, at the moment when they change into ideas, lose some part of their power to injure our heart."[29]

My rocks are un-rock-like. They are plain limestone contradicting itself. The most earthy and banal material transcends itself to become exotic.
—Nancy Rosenblum, "Scholars' Rocks"
Objects of Meditation and New Vision

In a narrative in which ideas are successors to grief, Nancy Rosenblum, the widow of a sculptor who collected Chinese scholars' rocks, asks, "How can a rock be a man?"

Scholars' rocks are found in nature, then mounted on meticulously worked bases. The bases transform the rocks into things that are made as well as found, objects that invite reflection on the boundary between nature and culture. Says Rosenblum: "They have the power to provide an effortless, aesthetic experience of mystery. Of infinity in a finite space. Of transformation. Just by looking. Without philosophy."[30]

The rocks displace scale, time, and authorial intent. They are classically liminal objects in Turner's sense: betwixt-and-between categories, the rocks challenge the categories themselves. As Rosenblum puts it, "Gaze at a stone and it disorients."

In traditional rites of passage, participants are separated from all that is familiar. We saw that this makes

them vulnerable, open to the objects and experiences of their time of transition. The contemplation of liminal objects can make us similarly vulnerable. In their disorienting qualities, in the way they remind us of the mundane yet take us away from it, scholars' rocks share something of what Freud called the uncanny, those things "known of old" yet strangely unfamiliar.[31]

In his writing on the uncanny, Freud analyzes the etymology of the German words *heimlich* and *unheimlich,* roughly the homelike and familiar and the eerie and strange. The two words seem to be the opposite of each other, suggesting that the eerie is that which is most unfamiliar. But among the meanings of *heimlich* (familiar) is a definition close to its opposite: it can mean concealed or kept out of sight. Heimlich has a "double." By extension, Freud argues, our most eerie experiences come not from the exotic, but from what is close to home. Uncanny objects take emotional disorientation and turn it into philosophical grist for the mill.

In this collection, Jeffrey Mifflin, the curator at Boston's Massachusetts General Hospital, uses a 2,600 year-old mummy to ponder ultimate questions: "He had been flesh and blood and bone, and the flesh and bone were still there. His senses had once worked as mine now did. His mind was gone, but neither would I live forever."

Mifflin's mummy frightens him even as it grows in his affections. The man who became the mummy was Padihershef, a stonecutter who lived near Thebes during the Saite Period (XXVI Dynasty) and died in his late forties. His specialty was cutting stone to make tombs. Mifflin begins to identify with Padihershef. When Mifflin opens the mummy's exhibit case and smells the embalming spice and chemicals, he is not overtaken by their pungency, but by the thought that Padihershef's own friends would have smelled something quite similar as they closed his coffin.

Mifflin calculates the generations between himself and the mummy, in his estimate about 130, and he wonders if his "distant progenitors in Britain were mining tin or slicing blocks of peat at the same time that Padihershef was chiseling out tombs in Egypt?" Mifflin thinks about his own uncertainties about religion and the afterlife in relation to Padihershef's probable certainties. Mifflin measures their lives against each other, each seeking to find a place in history and in his generation.

As a curator, Mifflin compares the untidy, chaotic spaces in museum back rooms and the meticulous presentations in the front rooms where all is tidy and ordered. The contrast reveals something too often hidden: we tend to present "front room" knowledge as "true." But its certainties are constructed. We make up a clean story to mask our anxieties about the chaotic state of the little that we know. Chaos compels its opposite: "the orderly presentation of supposed facts" to which Mifflin feels disconnected. He fears that he will always be blocked in his ability to experience certainties by his access to their opposite—his experience in the dirty back rooms. Yet it is the contrast between the front and back rooms that leads Mifflin to a new appreciation of the complexity of knowledge.

In *Purity and Danger,* the anthropologist Mary Douglas examines the evocative power of such contrasts, focusing on how the tension between order and disorder is expressed through our relationship to dirt and pollution.[32] Order is defined in terms of dirt, or that which is not polluting. And dirt is defined in terms of order. Societies create the classification "dirt" to designate objects that don't fit neatly into their ways of ordering of the world.

This collection ends with Evelyn Fox Keller's reflections on her life in science, a narrative about the power of order-disrupting ("dirty") objects to provoke meditation and new vision. Keller takes slime mold as her object, an object full of paradoxes: "In times of plenty, it lives as an individual single-celled organism

but, when food supplies are exhausted, it regroups. . . . [It] traffics back and forth both between the one and the many and between sameness and difference."

Turner and Douglas help us see things on the boundary, such as slime mold, as both disruptive and as sources of new ideas. Indeed, for Keller, the "betwixt-and-between" slime mold not only becomes an object-to-think-with for thinking about processes within cells, it becomes a way to think about the politics of science.

In the late 1960s, most biologists argued that slime mold goes from being a unicellular to a multicellular organism, following a signal given by "founder cells." In a 1968 paper, Keller and biologist Lee Segel disagreed. They suggested that changes in the slime mold's state followed from the dynamics of the cell population as a whole. There was no command and control center that took charge of the process. Biologists resisted this suggestion. Keller says: "[D]espite the absence of evidence, [biologists] continued to adhere to the belief that founder cells (or pacemakers) were responsible for aggregation."

Two decades later, while working on a biography of the geneticist Barbara McClintock, Keller again faced the resistance of biologists—this time to a style of doing science. Canonical scientific methods insisted on the researcher's distance from the object of study, but McClintock wanted to be close to her objects, among the corn cells of her research. She imagined herself like a modern-day Alice, brought to their scale in order to feel more a part. Her colleagues in biology were not impressed. Keller began to identify with McClintock. Like her subject, when Keller had looked at cells, she had seen social and decentralized processes. Keller comes to see her career and McClintock's as illustrative of how biology rejects theories that challenge the dogma of single and centralized causal factors.

As Keller wonders why people find causal accounts so compelling, she considers explanations that draw on the Freudian tradition. There, our earliest, profoundly bonded, connections to the world are interrupted by a sudden experience of separation. Keller hypothesizes that "we tend to project onto nature our first and earliest social experiences, ones in which we feel passive and acted upon." Whether or not this particular hypothesis is true, she says, a more general point certainly is: scientists were not open to the "discrepancies between our own predispositions and the range of possibilities inherent in natural phenomena. In short, we risk imposing on nature the very stories we like to hear."[33]

What are the stories we like to hear? Keller suggests that they are often the ones that confirm us in comfortable ways of thinking. But theory can help us to see things anew.

Until now, I have discussed physical objects that engender intimacy. What becomes of this intimacy when people work with digital objects?

Any response needs to be complex, as is apparent in the contrast between two essays in this collection. Mitchel Resnick describes his StarLogo program that brings its users to an encounter with ideas about emergent phenomena, much as the concrete objects of Piaget's day put children in touch with ideas about counting and simple categorization. His goal is to have the computer enable a new kind of learning. Yet Susan Yee's testimony about work in a digital archive suggests aspects to life on the screen that may be inherently alienating.

Yee, an architect, begins her relationship with Le Corbusier through the physicality of his drawings. As she works in the Le Corbusier archives in Paris, his original blueprints, sketches, notes, and plans are brought to her in long metal boxes. Le Corbusier's handwritten

notes in the margins of his sketches, the traces of his fingerprints, the smudges, the dirt, all of these encourage Yee's identification with the designer. To Yee, the most "miraculous" moment in the physical archive is finding the little colored paper squares that Le Corbusier used to think through his design for the Palace of the Soviets. Yee says that she could imagine Le Corbusier "fiddling" with the design elements, moving them around, considering different shapes and volumes as he worked. The little bits of colored paper connect Yee to his process. Delighted, Yee "fiddles" with them too. The bricolage of the master is re-experienced in the bricolage of the student. As it happened, Yee was visiting the Le Corbusier archive at a dramatic moment, the day it was converted from physical to virtual space. The philosopher Jacques Derrida sees such transitions as "transforming the entire public and private space of humanity."[34] For one thing, while any archive is a selection of material that erases what has been excluded—the digitized archive goes a step further. Its virtuality insures another level of abstraction between its users and what has been selected. It brings to mind Derrida's writing about the word processor where "erasure" is central to his concerns: "Previously, erasures and added words left a sort of scar on the paper or a visible image in the memory. There was a temporal resistance, a thickness in the duration of the erasure. But now everything negative is drowned, deleted; it evaporates immediately, sometimes from one instant to the next."[35]

Derrida's meditation on erasure brings us back to what troubled Yee in the archive. She is aware that, digitized, the Le Corbusier archives will be available to scholars all over the world and be protected from wear and tear. Yet, when the archive is digitized, Yee experiences the loss of her connection to Le Corbusier: "It made the drawings feel anonymous," she says. More important, the digitized archives make Yee feel anonymous. She is grateful for her own position in a genera-

tion of architects that knows drawing by hand as well as by computer; her narrative captures an anxiety that digital objects will take us away from the body and its ways of understanding.

Through Yee's essay on the archive, this collection engages the problem of virtuality and its discontents. Yet her cautionary essay must be read in relation to other narratives about computational objects—represented by the promise and enthusiasm of Resnick's writing, as well as that of Howard Gardner, Trevor Pinch, and Annalee Newitz—that suggest how digital objects engage us in new and compelling ways.

Indeed, in Newitz's description of her laptop computer, the flickering screen does not appear cold and abstract, but is integrated into her sense of herself. Her experience of the laptop is reminiscent of how Joseph Cevetello, a diabetic, talks about his glucometer, a device for measuring blood sugar. Cevetello notes how over time his glucometer becomes more than companion: the glucometer "has become me." Moment to moment, its output determines his actions. He lances his finger, readies an insulin injection, and waits "for my meter to tell me what to do." The laptop, like the glucometer, is experienced as co-extensive with the self. Newitz feels so close to her laptop that she cannot tell where it leaves off and she begins. Her self-understanding depends on analyzing the flows and rhythms that pass between herself and the machine. In bed, Newitz remembers not to let the blankets cover the computer's vents so it does not overheat. She is at one with her virtual persona: "I was just a command line full of glowing green letters."

Cevetello and Newitz have achieved couplings so intimate between themselves and their objects that we might characterize them as cyborg.[36] In the cyborg world we move beyond objects as tools or prosthetics. We are one with our artifacts. And in the cyborg world, the natural and the artificial no longer find themselves in opposition. Says the historian of science Donna Haraway:

"Any objects or persons can be reasonably thought of in terms of disassembly and reassembly."[37] No object, space, or body is sacred in itself: "Any component can be interfaced with any other if the proper standard, the proper code, can be constructed for processing signals in a common language."[38] Newitz still has to carry her laptop around, but the day is not far off when computation will become part of our bodies, beginning with chips to improve our sight and hearing. Cevetello anticipates the day when his glucometer will be available as an implant; it will provide a digital readout directly sensed by his body.

Once we see life through the cyborg prism, becoming one with a machine is reduced to a technical problem of finding the right operating system to make it (that is, *us*) run smoothly. When we live with implanted chips, we will be on a different footing in our relationships with computers. When we share other people's tissue and genetic material, we will be on a different footing with the bodies of others. Our theories tell us stories about the objects of our lives. As we begin to live with objects that challenge the boundaries between the born and created and between humans and everything else, we will need to tell ourselves different stories.