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THE ROBO-TOILET REVOLUTION

THE ACTRESS AND THE GORILLA

The flush toilet is a curious object. It is the default method of excreta disposal in most of the industrialized, technologically advanced world. It was invented either five hundred or two thousand years ago, depending on opinion. Yet in its essential workings, this everyday banal object hasn't changed much since Sir John Harington, godson of Queen Elizabeth I, thought his godmother might like something that flushed away her excreta, and devised the Ajax, a play on the Elizabethan word jakes, meaning privy.

The greatest improvements to date were made in England in the later years of the eighteenth century and the early years of the next by the trio of Alexander Cumming (who invented a valve mechanism), Joseph Bramah (a Yorkshireman who improved on Cumming's valve and made the best lavatories to be had for the next century), and Thomas Crapper (another Yorkshireman who did not invent the toilet but improved its parts). In engineering terms, the best invention was the siphonic flush, which pulls the water out of the bowl and into the pipe. For the user, the S-bend was the godsend, because the water that rested in the bend created a seal that prevented odor from emerging from the pipe. At the height of Victorian invention, when toilets were their most ornate and decorated with the prettiest pottery, patents for siphonic flushes, for example, were being requested at the rate of two dozen or so a year.

Nonetheless, the modern toilet would still be recognizable to Joseph Bramah. He could probably fix it. Other contemporary inventions like the telephone have gone through profound changes (it's difficult to think of Alexander Graham Bell coming to grips with an iPhone). They have been improved through generations of innovation. The toilet, by contrast, remains adequate and nothing more, though readers of Focus magazine once voted it the best invention in history (over fire and the wheel). Compared to other items that are considered necessities—car, telephone, television—the toilet is rarely upgraded voluntarily. Marketers call it a "distress purchase" because it is only replaced when necessary.

One country treats the toilet differently. Here it is modified, improved upon, innovated. It is a design object, a must-have, a desirable product. Enormous sums are spent on improving its smallest parts. Only here is the toilet given the respect accorded other great inventions.

Three scenes:

On my first morning in Tokyo, I go to get my hair cut. I am the first customer in the shop and talk to the receptionist while I wait. I tell him I'm writing a book about toilets.

"Why?"

I say Japan's toilets are like no other.

"Are they?"
[He thinks]
"Westerners don't like them."
[He makes a gesture of spray going upward]
"They don't understand."

In a tiny bar in Tokyo's Golden Gai district, across the alley from Quentin Tarantino's favorite bar, I'm having a conversation with the owner, a hefty, cheery girl from Hiroshima. She has asked what I'm doing here, and I have answered. "Oh! That's so interesting!" Within five minutes, the entire bar—it holds seven bar stools and discretion is pointless—is discussing with great vigor the merits of Japan's two leading toilet brands. TOTO washes better. Yes, but Inax dries better. It's all a question of positioning. My companion, a genteel young woman who runs an art gallery, is amused. They are taking it totally seriously, she says. They are genuinely trying to help you. It's nice. It is very cold in Kyoto. I have come to Japan in December, in between trips to Bangkok and India, where December is hot. I have not brought enough winter clothing and I am feeling the cold. In Kyoto I walk the streets for a while, nipping into shops for warmth. Eventually it gets to be too much. There's only one option left. Though I have boycotted McDonald's for years, this is where I go because I know they have heated toilet seats. I know they have TOTO.

Japan makes the most advanced, remarkable toilets in the world. Japanese toilets can, variously, check your blood pressure, play music, wash and dry your anus and "front parts" by means of an in-toilet nozzle that sprays water and warm air, suck smelly ions from the air, switch on a light for you as you stumble into the bathroom at night, put the seat lid down for you (a function known as the "marriage-saver"), and flush away your excreta without requiring anything as old-fashioned as a tank. These devices are known as high-function toilets, but even the lowliest high-function toilet will have as standard an in-built bidet system, a heated seat, and some form of nifty control panel.

Consequently, first-time travelers to Japan have for years told a similar tale. Between being befuddled by used underwear-vending machines and unidentifiable sushi, they will have an encounter that proceeds like this: foreigner goes to bathroom and finds a receptacle with a high-tech control panel containing many buttons with peculiar symbols on them, and a strange nozzle in the bowl. Foreigner doesn't speak Japanese and doesn't understand the symbols, or the English translations that are sometimes provided. Does that button release a mechanical tampon grab or a flush? What, please, is a "front bottom"? Foreigner finishes business, looks in vain for a conventional flush handle, and then—also in vain—for which button controls the flush. Foreigner presses a button, gets sprayed with water by the nozzle instead and is soaked.

This is the Washlet experience. The Washlet, originally a brand name for a toilet seat with bidet function, has become for the Japanese a generic word for a high-function toilet (though usually translated as Washeretto). In modern Japan, the Washlet is as unremarkable and loved and taken for granted as the Band-Aid. Since 1980, TOTO, Japan's biggest and oldest toilet manufacturer, has sold 20 million Washlets to a nation of 160 million people. According to census figures, more Japanese households now have a Washlet than a computer. They are so standard, some Japanese schoolchildren refuse to use anything else.

It is easy for anyone who has not used a Washlet to dismiss it as yet another product of Japanese eccentricity. Robo-toilets. Gadgetry and gimmickry, bells and whistles. Such sniping ignores the fact that the Japanese make toilets that are beautifully engineered, and that the stunning success of the high-function toilet holds lessons for anyone—from public health officials to marketing experts—whose work involves understanding and changing human behavior and decision making. It is instructive because only sixty years ago Japan was a nation of pit latrines. People defecated by squatting. They did not use water to cleanse themselves, but paper or stone or sticks. They did not know what a bidet was, nor did they care. Today, only 3 percent of toilets produced in Japan are squat types. The Japanese sit, use water, and expect a heated seat as a matter of course. In less than a century, the Japanese toilet industry has achieved the equivalent of persuading a country that drove on the left in horse-drawn carriages to move to the right and, by the way, to drive a Ferrari instead. Two things interest me about the Japanese toilet revolution: that it happened, and that it has strikingly failed to spread.

TOTO—the name comes from a contraction of the Japanese words for "Asian porcelain"—ranks among the world's top three biggest plumbing manufacturers. In 2006, its net sales were $4.2 billion. It has 20,000 employees, two-thirds of Japan's bathroom market, seven factories in Japan, and a presence in sixteen countries. With the Washlet, TOTO has given the Japanese language a new word, and the Japanese people a new way of going to the toilet. It is a phenomenon.

I arrange to visit the TOTO Technical Center in Tokyo. It is a low, sleek building, oddly located in a residential street in an ordinary eastern suburb which has a mom-and-pop hardware shop on the main street, no neon, and no visible foreigners. The Technical Center is described as a place "where architects come to get ideas about designs." It is a show-and-copy emporium, big, spotless, and empty of people or architects. Sample bathroom sets gleam in the distance; a row of toilets automatically lift their lids as I walk past, in a ceramic greeting ceremony. Photographs are forbidden, leading me to wonder what an architect who's no good at sketching is supposed to do. But the toilet industry in Japan is a highly competitive business, and the top three—TOTO, Inax, and Matsushita—keep their secrets close. My requests to visit TOTO's product development laboratories were politely refused.

My guide is a young woman called Asuka. She works in TOTO's investor relations department and has probably been instructed to deal with me because she went to school in the United States for a few years and speaks near-perfect Valley Girl. Perhaps I've met too many engineers, but she doesn't seem like someone who would work in this industry. When she sees a World Toilet Organization sticker on my glasses case, she says "on Gucci!" with genuine distaste. She later confesses that, actually, she'd rather be marketing cosmetics. She says TOTO is a good employer, though I'm disappointed to discover that rumors of certain employee perks are unfounded. They do not get free toilets.

It's Asuka's first time presenting a PowerPoint introduction to TOTO, and despite the occasional sorority phrasing—"the Washlet is, like, a must-have"—she conveys the facts and figures well enough. The world's biggest toilet manufacturer was founded in 1917, when a man called Kazuchika Okura, then working for a ceramics company, thought it might be a good idea to manufacture toilet bowls. It was not the most obvious business plan. As Asuka puts it, "back then, the sanitation environment was terrible here in Japan. We only had wooden toilet bowls."

In truth, they didn't have toilet bowls at all, because squatting toilets didn't have any. Nonetheless, according to the official TOTO history—as told in a comic strip that Asuka gives me, this being *manga*-mad Japan—Mr. Okura expressed his desire, in somewhat stilted English, to "research how to mass-produce sanitary-ware, which are large ceramic items."

Progress in selling large ceramic items was slow at first. Then came the Second World War, which left Japan with a damaged infrastructure and planners determined to build superior housing connected to sewers. This wasn't a new concept: the Osaka Sewerage Science Museum shows a diorama featuring Lord Hideoshi, a shogun who installed a sewer at Osaka Castle four hundred years ago. With little thought for chronology, Lord Hideoshi is joined in the diorama by a bowler-hatted Scotsman called William Barton—voiced by an American who learned Scottish from Star Trek—who worked in Tokyo University's engineering department and introduced Japan to waterborne sewerage. Still, by the end of the Second World War, only a tiny proportion of the country was sewered.

American forces stationed in Japan, accustomed to flush toilets at home, pushed for the same to be installed in the nation they were occupying. TOTO's toilet bowls sold increasingly over the next forty years, and by 1977, more Japanese were sitting than squatting. This cultural change was not without difficulties. The writer Yoko Mure, in a contribution to Toilet Ho!, a collection of essays about Japanese toilet culture (whose title in Japanese apparently expresses the extreme relief of someone who has been desperate for a restroom and finally finds one), wonders "how the people could use a Western-style toilet. The Western style is the same as sitting on a chair. I had a terror that if I got used to it, I might excrete whenever I was sitting on a chair anywhere, even at a lesson or at mealtimes."

The new ceramic sitting toilet had other disadvantages. Visiting an outhouse during Japan's freezing winters can never have been pleasant, but at least with a squat pan there was no contact between skin and cold material. The new style changed that. Now, flesh had to sit on icy ceramic for several months of the year, a situation worsened by a national resistance to central heating that persists today. A homegrown solution was devised by sliding socks onto the seat, but this technique only worked on old horseshoe-shaped seats, which were becoming less common.

TOTO spotted a flawed design that could use some innovation. In 1964, the Wash Air Seat arrived in Japan. Produced by the American Bidet Company, this detachable seat featured a nozzle that sprayed warm water and also blew hot air for drying purposes. In the United States, the Wash Air Seat had been aimed at patients who had difficulty using toilet paper or reaching around to wipe themselves. It was a niche item that TOTO thought had mass appeal. But their version failed. It was too expensive. The bidet function was too foreign. History and habit were both against it.

First, there was the bidet issue. In toilet customs, the world divides, roughly speaking, into wet (flush) or dry (no flush). In anal-cleansing terms, it's paper or water, and, as with driving habits, cultures rarely switch. India and Pakistan have a water culture, so that no visit to the bathroom is possible without a lota (small jug or cup) of water to cleanse with after defecation. Alexander Kira writes that nineteenth-century Hindus refused to believe Europeans cleaned themselves with paper "and thought the story a vicious libel."

In their toilet habits, the Japanese were a paper and stick culture. Wipers, not washers. But they were also a cleansing culture with strict bathing rituals and firm ideas about hygiene and propriety. Keeping clean and unpolluted is one of the four affirmations of Shintoism. Stepping unwashed into a bath, as Westerners do, is unthinkable to the Japanese, where a tradition of bathing communally in cedar-wood baths functions on the assumption that everyone in the bath is already clean.

These hygiene rules stopped at the outhouse door. The Japanese were as content as the rest of the paper world to walk around with uncleaned backsides. Using paper to cleanse the anus makes as much sense, hygienically, as rubbing your body with dry tissue and imagining it removes dirt. Islamic scholars have known for centuries that paper won't achieve the scrupulous hygiene required of Muslims. In a World Health Organization publication that attempts to teach health education through religious example, Professor Abdul Fattah Al-Husseini Al-Sheikh quotes the Prophet's wife, Aisha. She had "never seen the Prophet . . . coming out after evacuating his bowels without having cleaned himself with water."

Paper cultures are in fact using the least efficient cleansing medium to clean the dirtiest part of their body. This point was memorably demonstrated by the valiant efforts of a Dr. J. A. Cameron, who in 1964 surveyed the underpants of 940 men of Oxfordshire, England, and found fecal contamination in nearly all of them that ranged from "wasp-colored" stains to "frank massive feces." Dr. Cameron, though a medical man, could not contain his dismay that "a high proportion of the population are prepared to cry aloud about footling matters of uncleanliness such as a tomato sauce stain on a restaurant tablecloth, whilst they luxuriate on a plush seat in their fecally stained pants."

Also, the Japanese didn't know they wanted better toilets. The writer Jun'ichiro Tanizaki reminisced about visiting a privy perched over a river, so that "the solids discharged from my rectum went tumbling through several tens of feet of void, grazing the wings of butterflies and the heads of passers-by." But the reality of the Japanese privy had little to do with butterflies. Instead, the average Japanese toilet—especially the public variety—was known as the four K's. It was *kiken* (dangerous), *kitanai* (dirty), *kurai* (dark), and *kasai* (stinky). Consequently, it was neither talked about nor acknowledged. This desire for concealing anything to do with defecatory practice surfaces in the common proverb Kusaimono ni futa wo suru (Keep a lid on stinky things); in the existence of Etiquette, a pill that claims to reduce odorous compounds present in excreta and is marketed to "people minding excrement smell"; and in the even greater success of a TOTO product called Otohimei, or Flush Princess, a box that plays fake flushing sounds to disguise the noise of bodily functions, and is now found in most women's public restrooms.

Japan has always had a strong tradition of scatological humor, but it operated beneath polite society levels. These days, times have changed enough for a golden feces-shaped object called Kin no Unko (Golden Poo), thought to bring good luck, to have sold 2.5 million units. But in the late 1970s, when TOTO turned to relaunching the Washlet, the toilet—bidet or otherwise—had no place in conversation. It was something detached, unmentionable, out of sight and smell. It could not be advertised. All these factors ensured that the Washlet languished in obscurity for years.

At TOTO, Asuka is joined by Ryosuke Hayashi. His full title is Chief Senior Engineer and Manager of the Restroom Product Development Department, but he prefers to be called Rick,

and he is Rick-looking, with slicked hair and almost good English. Rick is an important man. Of the 1,500 patents that TOTO has filed in Japan (and 600 internationally), the Restroom Department is responsible for half. Rick finds my interest in the Washlet quaint. It's been around since 1980, after all, when TOTO revamped the Wash Air Seat and launched the Washlet G series (the G stands for "gorgeous"). I say that for any non-Japanese person used to a cold, ceramic toilet that does nothing but flush, the Washlet is extraordinary. He's unconvinced. I'm asking him about the cathode ray when he wants to discuss microrobotics.

He'd rather talk about the Neorest, TOTO's top-of-the-line toilet and, in his engineering eyes, an infinitely superior combination of plumbing and computing. Certainly, the Neorest looks gorgeous. It should, when it retails in Japan for $1,700, and in the United States for $5,000. Rick thinks that's value for money, considering that "it has a brain." The Neorest takes two days to learn its owner's habits, and adjusts its heating and water use accordingly. It knows when to switch the heat off and which temperature is preferable. It has sensors to assess when the lid needs to be put down, or when the customer has finished and the nozzle can be retracted. It can probably sense that I'm writing about it.

The Neorest's bells and whistles, even if they are nanotechnological bells and warp-speed whistles, are vital, because competition in Japan's toilet industry is unrelenting. In 2005, TOTO teamed with the construction company Daiwa House to build the Intelligent Toilet, which can measure blood sugar in urine, and by means of pressure pads, weight. It has developed the top-secret CeFiONtect, short for Ceramic Fine Ionizing Technology, which uses a super hydrophilic photocatalyst to repel dirt. This complicated procedure is helpfully translated for me as "like a duck." Asuka demonstrates the duck glaze properties on a display Neorest in the showroom, marking with a blue pencil both a glazed and unglazed part of the toilet bowl. She looks profoundly unimpressed when the pencil mark is indeed eradicated on the treated area, either because she's done it before or because it's not mascara.

All this technology has come from years of research, billions of yen, many great minds (TOTO has 1,500 engineers), and a visit to a strip club.

I persist in asking about the genesis of the Washlet and how it changed Japan, and Rick finally humors me. To sell the Washlet to an unwelcoming public, it had to work properly. The Wash Air Seat and the early Washlet operated mechanically. It took several minutes for the spray to spray and for the water to heat. TOTO solved this by making the workings electronically operated, the spray instant, and the angle perfect. The Washlet nozzle extends and retracts at exactly 43 degrees, a position precisely calibrated to prevent any cleansing water from falling back on the nozzle after doing its job (this is known as "backwash"). Determining the angle was a long, careful process, says Rick. I ask him how the research was done. He says, "Well, we have 20,000 employees," and stops. I wait for enlightenment.

Asuka hands me another comic book by way of an answer. It is a 48-page TOTO history published by Weekly Sankei magazine in 1985, five years after the company had relaunched the Washlet. Its heroes are Mr. Kawakami, a TOTO engineer, and his portly, cheery colleague, Mr. Ito. Kawakami and Ito are entrusted with improving the Washlet. The nozzle has to be accurate, and to make it so they need to know the average location of the human anus. Facts like this are not easy to find, so they turn to the only source material available, which is anybody on the

company payroll. Their workmates aren't impressed. "Though we are colleagues," one says with politeness, "I don't want you to know my anus position."

Kawakami and Ito prevail by performing the *dogeza*. This is an exceedingly respectful bow that requires someone to be almost prostrate. It is the kind of bow, a translator later tells me, "that a peasant would do to a passing samurai if he wanted the samurai not to kill him." She says it is an extremely shocking thing to do in the context of toilets. Yet it worked. Three hundred colleagues are persuaded to sit on a toilet—in private—and to mark the position of their anus by fixing a small piece of paper to a wire strung across the seat. The average is calculated (for males, it comes to between 27 and 28 centimeters—about 10½ inches—from the front of the toilet seat), but that's only the first hurdle. Mr. Kawakami is now tasked with improving the Washlet's ability to wash "the female place." He needs to know how many centimeters separate a female's two places, and is initially at a loss. Obviously the best place to research female places is in a place with females, preferably naked ones. That's where the strip club comes in, though most strip club clientele are unlikely to react as Mr. Kawakami does, shouting, "Three centimeters!"

I had fun having the comic strip translated out loud in a quiet restaurant in England one lunchtime when ears wagged and heads tried not to turn. But the strip club and the wire only go so far in explaining TOTO's extraordinary success. I wanted a second opinion.

Inax is TOTO's archrival. The two companies sell similar products, and in fact Inax launched a Washlet-type toilet before TOTO. But they currently have only 30 percent of the market. The Inax factory is near Nagoya, home of Toyota. I had been given instructions by email to take a slow train from Nagoya to Enokido, where I would be met. The train gets emptier and emptier, and the views more rural and less concrete—pretty curved roofs, barns, gardens—until finally I'm the only person left in the carriage. We have arrived at Enokido, which is deserted. I don't have directions from the station to the headquarters, so I don't know what to do, until I turn around and see that the station is in Inax's car park. Of course it is. I bet Toyota doesn't have a station in its car park, or its name spelled out in 109 tiny toilets (I counted) on the factory lawn.

I wanted to come to Inax because I'd read about their Shower Toilet. Even in the realm of wonders that is Japanese toilet technology, a toilet in a shower sounded intriguing. A young PR man named Tomohiko Satou has persuaded four senior staff to meet me, and when I tell them this, they laugh. "Oh, we have that problem," Tomohiko tells me. "The Shower Toilet is called that because it uses a shower—meaning spray—to clean. In the United States, we had to call it Advanced Toilet."

The Shower Toilet is the Inax Washlet, but with a difference. Twenty-seven degrees of difference. Inax has spent a lot of money deciding that a nozzle aimed at a 70-degree angle has greater firing power and accuracy. They think it cleans better. "TOTO doesn't want backwash," says Mr. Tanaka, the senior toilet engineer. "That is why they have 43 degrees. We don't worry about that because the nozzle is cleaned after every use." The 1967 version of the Shower Toilet is displayed in the factory showroom. It has a red pedal which had to be pumped to bring up hot water and a blue pedal for cold water. It didn't sell because it cost the price of a new car and with all that water, things got rusty. It was hard to manufacture, with a 30 to 50 percent ceramic defect rate. Today the defect rate is 5 percent.

Mr. Tanaka invites me to lunch before a quick factory visit. The cafeteria reception features a perplexing display of a Satis—Inax's luxury toilet and Neorest rival—encased in a Plexiglass bubble in a fishing net, surrounded by shells, sand, and blue glass and accompanied by the slogan "Our gift to the future." Tomohiko doesn't know what it means either.

The factory is hot. Inax's ceramic-firing furnace is 328 feet long and burns at 1,200 degrees Fahrenheit. The temperature must remain constant, and the factory works almost year-round, because it takes too long and costs too much to fire up the furnace again. The Inax men show me robots that glue and glide beautifully, which can be trained to do other gliding tasks in only two months—at a punishing cost that cannot be divulged. My hosts ask if I have any questions about the production process, but I can't think of any. I'm more interested in the means of consumption than production, and specifically, how TOTO managed to vault over Inax in sales of the high-function toilet—and to convince the Japanese to use it in the first place—when Inax's product was earlier and by some accounts better.

Oh, they say. That's easy. The answer to both questions is the same. It was the gorilla and the actress.

TOTO won over the Japanese public in several ways. On the one hand, there was the gradual approach. Washlets were installed in hotels, department stores, anywhere the public could try them, like them, and never not want to have their bottom washed and dried again. This ensured a slow but steadily growing popularity.

Then came the advertising. In 1982, Japanese television audiences were treated to the sight of an attractive young woman, her hair and clothes slightly wacky—traditional Japanese wooden shoes, a flouncy dress, hair in bunches—standing next to a toilet and telling viewers that "even though it's a bottom, it wants to be washed, too." The actress was a singer called Jun Togawa, described to me as a Japanese Cyndi Lauper, and she made her mark. Any Japanese who was sentient in 1982 can probably still recite her catchphrases, which were certainly unlike any others. In another ad, she is shown standing on a fake buttock reading a letter supposedly from her bottom, which writes that "even bottoms have feelings."

The Inax men sigh. "TOTO had such good ads. Everyone remembers them." The Inax ads, by contrast, featured a man dressed up in a comedy costume. "It was a gorilla sitting on a toilet bowl. It was supposed to be a true experience." Until now, my hosts have mostly exuded a quiet gravity. Toilets in Japan are a serious business. But the gorilla cracks their composure. They laugh, partly from bewilderment, as they attempt to explain why using a gorilla to sell a toilet could ever have been a good idea. "We don't know why we had the gorilla," says Inax's senior communications executive. He has been nodding politely for most of the meeting, but the gorilla story unearths a lovely giggle from inside his earnest demeanor. "We can't even remember the slogan. But I do remember that he was wearing dungarees."

Helped by Japan's economic growth spurt in the 1980s, and by Inax's inept advertising, sales of high-function toilets began a slow, steady climb, but with TOTO in the lead. By 1995, 23 percent of Japanese houses had some kind of Washlet, according to a Cabinet Office survey, and by the end of the next decade, the figure had doubled. Inax has yet to catch up.

The gorilla also failed because the actress hit the right weak spot. TOTO's genius was to address the *wabi sabi* soul of the Japanese consumer. *Wabi sabi* is a cultural and aesthetic

philosophy that resists translation, but is usually rendered by the words “simple” or “unfinished.” The Japanese tea ceremony is *wabi sabi*, as are those clean bathing habits. The Washlet wasn’t unfinished, nor was it transient, but it purified both the body and the toilet room. The toilet was now inside the house—and sometimes inside the bathroom—but its nozzles and hot air kept the user safely distant from his or her bodily excreta. All that complicated engineering simplified the unpleasant business of going to the toilet. Rick Hayashi of TOTO has a toilet-related definition for wabi sabi: “clean, simple, no smell.” The bidet-function toilet removed the need to touch the body with toilet paper. In an increasingly overcrowded urban environment, it provided the means for keeping a distance from bodily functions that before had been achieved by siting the privy far from the house. Also, it had heated seats. It had music. It turned the four K’s stinky, dark toilet room into a sliver of pleasant private space, a highly desirable thing to have in the notoriously tiny apartments of Japan’s cities.

After five hours of my questions, Mr. Tanaka shyly offers two of his own. “Why don’t English people want a high-function toilet? Why is Japan so unique?”

I don’t know how to reply. I say something vague about how in the UK and United States, it’s generally presumed that plumbing technology has evolved as far as it needs to. It works, it flushes, and that’s all that is required. I say I think that’s mistaken, but that’s the way it is. Mr. Tanaka nods with politeness, but neither of us find my answer satisfying. I decide to go to the promised land for enlightenment. TOTO and Inax both covet the enormous Chinese market, but what they really want are Americans. U.S. consumers have more wealth and higher levels of technology. In the eyes of the high-function toilet industry, the United States is frontier country, yet to be conquered, persuaded, and bottom-cleansed. I can’t yet answer Mr. Tanaka’s question, but the land of promise might.

TOTO opened its first U.S. office in 1989. Its current premises in New York City are in downtown SoHo, in an expensive-looking building in an expensive location, with an expensive toilet—the latest Neorest—in the window. Somehow, the Neorest is glossy and streamlined enough—it recalls the sleekness of a luxury yacht—to fit in well on this street of designer shops and lofts. The location makes sense because of TOTO USA’s business strategy, which is to sell luxury. That’s why I’m in SoHo and not Wisconsin (home to Kohler, America’s toilet market leader) or New Jersey (home to American Standard, the runner-up).

TOTO USA’s PR chief is Lenora Campos. Her manner is assured and her background educated: she holds a Ph.D. in “the representation of clothing theft in early modern Britain” and describes herself as “a failed academic.” Somewhere along the way from academia to the Neorest, she has developed a nice line in euphemism: she describes her job as “working in high-end plumbing” and excrement as “matter.” But she’s as sharp as her euphemisms are soft. I have come to her with prejudices. The U.S. market is stagnant. American toilets are ugly. They are the “complex and ridiculous thrones” described by the philosopher Alan Watts, who knew Japan and found Western toilets wanting. Americans aren’t interested in innovation, and they don’t want Washlets or change.

Campos doesn’t bite. TOTO USA isn’t only about Washlets. Their regular, non-bidet toilets sell well, though nowhere near Kohler’s sales. Campos describes her chosen industry as “very dynamic. It addresses sustainability, the environment, technology, design.” She disagrees with my interpretation of the industry as dull and conservative. There has been innovation, even if it

was only in the plumbing. Actually, in recent history, this has been the industry's only innovation, and one that was forced upon it.

For decades, the average American toilet used a guzzling 3.5 gallons (13 liters) of water in every flush. Some used nearly 5 gallons. By the early 1990s, when several states were reporting water shortages and the concept of water conservation began to take root, it was calculated that the American toilet was using nearly half a household's water supply. In 1992, the Energy Policy Act (EPAct) was passed, requiring all new toilets within two years to flush with no more than six liters, or 1.5 gallons. It was a shock. This was barely enough time to change production lines, let alone reconfigure a toilet design that depended on a set volume of water to function. The resulting modified toilets were rushed and flawed. The six-liter flush had existed in Europe for years, which probably explains its inclusion in the EPAct. If the Europeans can do it, so can Americans. After all, Americans believe that their plumbing is the best in the world (and that Europe's is dreadful); that their sanitary appliances, in the words of the anthropologist Francesca Bray, who taught a class about toilets at the University of San Diego, "are at the top of the evolutionary and civilizational scale."

But American toilets are nothing like Europe's, and not because they are superior. The American toilet is siphonic, or wash-out. The technology involves complicated principles of air and water flow, but in essence, the U.S. toilet pulls the water out, and the European one pushes it. Manufacturers attempted to make a siphonic flush work with less water by narrowing the pipes, so the siphon effect was increased. It didn't work. Users were having to flush two or three times. There were difficulties with smell. "In retrospect," a toilet designer tells me, "it was pretty asinine to think they would just adapt."

In plumbing, the post-EPAct era is still known as the time of clogging. Black markets sprang up in old-style toilets. News crews crossed into Canada to interview Americans smuggling back Canadian 13-liter toilets. These toilet pirates were outraged that not only were they being told how much to flush, but that they were being asked to do it with bad equipment. It offended their plumbing and their pride. One cross-border black marketeer interviewed by CNN fumed that "I never thought in Vietnam, you know, when I had to go out in the woods at night, I never thought I'd have a problem here in my own country. . . . We have the best life in the world and we can't even get a decent toilet now." And anyway, if the new toilets had to be flushed several times, where was the water conservation?

In 2001, enough Americans were angry enough to persuade Representative Joe Knollenberg of Michigan to introduce H.R. 1479, the Plumbing Standards Improvement Act. The bill would rescind the low-flow requirements of the EPAct and "get the federal government out of the bathroom." It was defeated by one vote in committee.

The clogging reputation was hard to shift. Even today, most American toilets will have a plunger nearby, no matter how much American toilet manufacturers protest that they're outdated. When American Standard launched their high-end Champion range of toilets in 2003, its selling point was its powerful flush. Posters in faux Soviet revolutionary style featured plumbers in overalls brandishing wrenches, and the slogan "Working Towards a Clog-Free Nation."

American manufacturers' loss was initially TOTO's gain. TOTO's success in Japan had come through clever advertising and marketing, but it was also due to a brown, gloopy material called

gi ji obutse, which translates as “fake body waste.” It is, TOTO staff in Japan tell me, “a key part of TOTO,” and so key, the recipe is top secret, though they will reveal that it involves soybean paste.

Soybean paste (miso) is a lethal weapon in the battle for toilet market victory, because toilet makers need to test flushes, and they need test media to do it with. A flush is a chaotic event. Various media bounce around trying to get through one small opening. The more realistic the test media, the closer its properties—buoyancy, density—to human feces, the better the flush. Toilet engineers have always known this: when George Jennings’s Pedestal Vase won a gold medal at a Health Exhibition in 1884, it successfully flushed ten apples, one flat sponge, three “air vessels” (crumpled paper), as well as cleaning the “plumber’s smudge” smeared on the toilet bowl surface.

By the time EPAct came into force, American manufacturers had barely progressed from the apples. They worked with golf balls, sponges, or wiggly bits of plastic. TOTO, though, had been working with a realistic test media for over eighty years. When the National Association of Home Builders (NAHB) published a survey in 2002 testing toilets for flush performance, TOTO models were ranked first, second, and third. This helped TOTO’s reputation and sales: since 2003, annual U.S. sales have doubled (from 14.4 billion yen to 30.1 billion or $257 million). TOTO won’t release sales figures—beyond saying unhelpfully that the company is “the recognized leader in the toilet category,” which would puzzle Kohler—but at least temporarily, gi ji obutse helped to give them the flushing edge in a clogged nation.

Suddenly, America’s plumbing industry found it had to catch up. Money was put into innovation. In 2002, American Standard had no Ph.D.’s in its R&D department, and now it has five, including an expert in nanotechnology (used to develop antimicrobial coating). But American toilet manufacturers still needed better test media. They couldn’t risk clogging when their reputation was already battered in the eyes of a plunger-weary public, and they could hardly offer their toilets for test drives. Luckily, one day, a Canadian named Bill Gauley became suspicious.

Gauley is a water engineer by training and curious by nature. By the 1990s, six-liter toilet models had gone on sale after Canadian states brought in water-efficiency rules, but Gauley was skeptical. He did some tests and found that many of the six-liter models were actually using several liters more. When the NAHB report was published in 2002, he read it carefully. The report was supposed to help municipalities choose which toilet models were efficient enough to deserve rebates from the government. Dozens of toilets had been tested using sponges and paper balls as test media, and then rated with scores.

Gauley emailed the NAHB and told them politely that their survey was useless. He said they should have used realistic test media—since when did humans excrete sponges?—and that their scoring system was flawed. “To their credit,” he tells me, “they said, ‘You sound like you know what you’re talking about, so raise the funding and you can test the toilets yourself.’ Then I had to put my money where my mouth was.” His first challenge was to find something superior to sponges. He tried potatoes, mashed bananas, flour and water. Nothing floated or flushed the same way that human excrement did. He read that TOTO used soybean paste and asked them for the recipe. When the company refused to reveal it, he asked his colleagues for help. Anyone who went shopping was instructed to “look for anything that might work.” They brought back rice

paste and peanut butter, but still Gauley wasn't satisfied. Finally someone brought in a brand of miso that he thought looked and floated right. "Not that we go around feeling human feces, but some of us have kids and it seemed right, for density and moisture content."

All that remained was to set up a drop guide to guarantee the test media always fell in the same spot. (Gauley did this electronically, rather than enlisting the help of his colleagues' anuses.) Also, he had to calculate the weight of an average deposit. This wasn't easy, as most research focused on unusual diets, but a 1978 study in the gastroenterological journal Gut eventually yielded the fact that an average bowel movement weighed 250 grams (roughly half a pound). Then Gauley started testing. Of forty toilets that supposedly conformed to the 6-liter requirement, only half passed. The results were published as the *Maximum Performance (MaP) Testing of Popular Toilet Models*, and shortly afterward, the phone calls began. Some manufacturers were furious. Lawyers were consulted. Gauley was not intimidated. "We'd videotaped every test. So when they came threatening to sue, we'd show them a good performing toilet and they would usually say, 'You're right. We have to improve our toilets.'" And Gauley had to improve his test media. The soybean paste was the right density and weight, but it was messy, and it wasn't reusable. Then a technician said, "Why don't you just put sand in a condom?" The physical properties of sand are nothing like feces, but the comment gave Gauley an idea. He bought a packet of Lifestyles non-lubricated and returned to the lab. His colleagues were doubtful. "They said, are you sure it's going to be strong enough?" He filled one with miso and threw it against the wall. It was strong enough.

After TOTO's secretiveness, I didn't expect Gauley to reveal the recipe of his gi ji obutse, and in fact he's contractually forbidden from doing so. When he found the right brand, he asked to buy 250 kilograms from the importer. "His eyes lit up and he said, 'How many restaurants do you own?' I said none and that actually he'd think it was funny but I wanted to use it to test toilets. He didn't think it was funny and suddenly he didn't want to sell it to me anymore." Gauley changed the importer's mind by promising never to reveal the name of the company. But he plans to publish the recipe online once they've analyzed it. "I'm always thinking, how can we help the marketplace? I don't want the recipe to be proprietary. I'm not trying to sell artificial poo."

Thanks to Gauley's artificial poo, Veritec's MaP is now the best-known independent survey of American toilets available. It is fair to say he's helped make America's toilets better, though Pete DeMarco, a senior toilet man at American Standard, keeps his praise on a low heat. He calls MaP "one test among many." In fact, DeMarco says, a strange macho one-upmanship has taken over the male arena of toilets and testing. To pass the MaP test, toilets have to flush five of the 250-gram condoms and four toilet-paper balls compiled of six sheets of toilet paper each, but some manufacturers go further, bigger, stronger. American Standard's toilets are made to flush 1,000 grams. This bigger-better mentality has reached the consumer. "People want 1,000-gram toilets," says Gauley, wonderingly. "But even 500 grams is a waste of performance." An interior designer friend says clients still ask her for 13-liter "traditional" toilets, not understanding that a successful flush uses the force and flow of water, not just volume.

Gauley says the marketplace has changed "incredibly" since he started playing around with soybean paste. I ask him whether the place of the toilet has changed in American culture, whether it has risen above its basic function. He says no one has ever asked him that before but now that I mention it, no. "Americans want one that works and then they want to forget about it. And that's it."

Ironically, the flush transformation brought about by better test media was bad for TOTO. Gauley's tests helped other manufacturers reach TOTO's flushing standards. The company had to find another way to conquer the American market. So it would go back to bottoms. In Japan, TOTO successfully sold its toilets on the concept that they could keep the consumer clean, rather than the other way around. It would do the same in America. In 2007, the expensive "Clean is Happy" campaign was introduced to the American public. There were smiley-face badges handed out on the street, viral Internet ads, and a lavish Web site featuring disturbingly cheery people telling you what Washlets could do in language Americans could understand. The deodorizer, one cheery person explained, "is kind of like the catalytic converter in your car." The Washlet provides a "hands-free clean," said another. It uses water, and what's so scary about that, when "we wash our faces and hair with water! Humans love water!" I was doubtful. American humans may love water, but not to clean their backsides with.

On the Web site of the American Bidet Company, company founder Arnold Cohen, who prefers to be called "Mr. Bidet," expresses his conviction that the bidet "is the most significant innovation for personal hygiene and sanitation since the introduction of indoor plumbing." But the bidet has known limited spread beyond its French origins, and even in France it is disappearing. Ninety percent of French homes used to have a bidet; now it's 10 percent. Yet if logic governed human cleansing habits, the bidet would be as common as the toilet. Instead, it has generally been viewed with suspicion or bewilderment. (One American schoolteacher visiting Paris in 1929 wrote in her diary, "Oh what a mistake we made about the little bathroom for the feet or whatnot.")

As Alexander Kira writes, the bidet entails "somewhat special circumstances surrounding the cleansing of the perineal region [that are] in some instances, highly charged emotionally." New York University sociologist Harvey Molotch, who has written about toilets as consumer items, thinks the bidet has never risen above being seen as unavoidably French, and therefore louche. For centuries, Paris was the place to go for sex and women. Anal washing meant dirty naughtiness, something that may have inspired one American manufacturer to name its bidet model "Carmen." The abyss between paper and water was highlighted at a 2005 art show held in New York called *Lota Stories*, in which Americans recorded their experiences of using a lota cup of water in their toilet habits. The results revealed years of frustration. One contributor, mindful of the frustration of trying to use water in the toilet-paper world of America, left useful advice for subterfuge. Filling a plastic cup (preferably khaki, black, or "some other nondescript color") at the sink will draw less attention. In an apartment-sharing situation, always keep a plant in the bathroom to explain away the watering can. Above all, use discretion: "Ignore the impulse to explain what you are doing, even to friends. Unless people have been using a lota all their lives, the benefits completely escape them, and they will view you as a freak with a freakish bathroom custom."

There was another problem. To sell its cleansing products, TOTO had to tell Americans they were dirty. Its first attempt didn't start well. A huge billboard ad featuring bare bottoms, supposed to hang near Times Square, had to be modified when a church in the building under the billboard successfully applied for an injunction. Bare butts, said Pastor Neil Rhodes, would impede churchgoers' concentration. "You have naked bodies before your eyes," he told the *New*

York Post. "How are you going to close your eyes and seek God?" The ad was an odd move to make in a country where conservatism can border on the puritan. Lenora Campos of TOTO is sensitive to this. "Americans do have issues around the body and bodily functions. We are very uncomfortable discussing it." The billboard was changed because, she said, it was "off the mark. If the message is being lost and something is being generated that is unforeseen, then that message has to be changed."

Delicate sensibilities have always made selling toilets and toilet products difficult. It's hard to advertise your product when social mores don't allow you to say what the product is for. Toilet paper manufacturers have responded to this in mostly uncreative ways (except for the 1920s slogan "Ask for Hakle and then you don't have to mention toilet paper"). Since then, toilet paper advertising has been unrelentingly pastels and puppies. It's dull but it works. The global toilet paper industry is worth $15–20 billion, and according to the most recent statistics available, the average American uses 57 sheets a day.

In 2002, the toilet tissue brand Velvet departed from the norm by launching a campaign that featured "a series of lovingly photographed bare bottoms," with the tagline "Love your bum." It became the second most complained about ad in the UK that year (the first, an image for an antipoverty charity, featured a cockroach emerging from a baby's mouth). The world of toilet paper, said a creative director for Velvet's ad agency, "had a huge gap" compared to the creativity levels of advertisers dealing with other markets.

Toilet advertising in the United States was in equal difficulties. American Standard's Soviet-style campaign was successful because it was unusual. But most advertising still featured conservative shots of the classic American "throne" toilet, stiff in its lines and defiantly unstreamlined. At American Standard, the throne has been modernized by making it even higher, the better to take the strain off aging baby-boomers' legs. It's now an astonishing 16.5 inches from rim to floor, even more ergonomically nonsensical than usual (squatting frees up the colon and aids defecation; sitting squeezes it shut and impedes release, leading to claims that the sitting toilet has contributed to increased rates of colon cancer, hemorrhoids, and constipation). Even with all the flow dynamics and nanotechnology, the modern American toilet has actually only perfected the removal of waste from the toilet while impeding the removal of waste from the body. And the American public is happy with it.

TOTO hopes to sell its products for their health benefits. Colonic irrigation is increasingly fashionable; why not another form of healthy cleansing? But toilet paper manufacturer Kimberly-Clark also tried to appeal to health concerns when it launched Cottonelle Fresh Rollwipes, moist toilet paper on a roll. In surveys, two-thirds of Americans polled agreed that moist tissues cleaned better than dry paper. Kimberly-Clark consequently spent $100 million on the launch. Sales of Rollwipes were dismal, and the concept disappeared from shelves. It has yet to be resurrected. Americans apparently don't want water anywhere near their perineal region, at least not yet.

Consequently, TOTO is playing the celebrity card. When Madonna visited Tokyo in 2005, for the first time in twelve years, she proclaimed publicly that she'd missed the warm toilet seat. Celebrities who have admitted to owning Neorests include Jennifer Lopez, Will Smith, and Cameron Diaz. As it did in Japan, TOTO is trying to create toilet evangelists who will do the informal marketing work. When the $1.5 billion Venetian Resort in Las Vegas was being built,

TOTO products were placed in all its bathrooms, probably because its billionaire chairman Sheldon Adelson had been given Neorests to test in his home. If TOTO USA can't achieve the mass conversion it did in Japan, it will take the high road of exclusivity instead. You won't find TOTO in a Home Depot, even though that's where you'll find most toilet-buying Americans.

It took fifteen years for TOTO to be successful in Japan. That's the usual amount of time for new household products—air conditioners, washing machines—to be widely adopted. There are signs that Americans may yet succumb to the robo-toilet: in 2007, the American toilet market leader Kohler thought the market was robust enough to launch its own toilet with bidet attachment. Campos thinks the increasing visibility of the toilet in popular culture will help. She cites bathroom scenes in *Sex and the City*, in which the character of the uptight lawyer Miranda is disturbed by her boyfriend's habit of peeing with the bathroom door open, and in *Friends With Money*, Jennifer Aniston is shown cleaning a toilet (though she actually had a toilet-cleaning double). Campos says that the Neorest is starring in an upcoming film, even if its role is to perform the old foreigner-gets-wet story, which hardly seems good advertising. Celebrities such as Will Smith and Barry Sonnenfeld, director of *Men in Black*, have spoken out against the deficiencies of toilet paper. (Sonnenfeld compared using a moist wipe to "a romp through a field of daisies for your butt.")

Perhaps the robo-toilet revolution is simply taking its time. But Tomohiko Satou of Inax is noticeably lacking in TOTO-style optimism. He has a fair sense of American views about robo-toilets, having spent time posted in Inax's San Francisco office, where sales, he admits, were "not so much." "Japanese people," he tells me, "understand that our product is very sanitary and clean." But years of trying to explain that to Americans taught him a painful truth. "Americans just don't want to use it. They're not scared. They're just not interested."