

The RISE of the GADGET and HYPERLUDIC ME-DIA

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Abstract Though digital “gadgets” have become one of the most important sectors of consumer electronics, the concept itself has been largely overlooked. This article traces the history of the gadget from its nineteenth-century origins as a placeholder name to its use for a class of technical objects, through to its incorporation of electronics and its contemporary success. Building upon Jean Baudrillard’s analysis, the article explores how digital technology has changed the gadget’s nature and capacities. It argues that the digital gadget’s success lies in its hyperfunctionality, hyperludic experience, and relationship with me-dia. It analyzes the digital gadget’s role in the reorientation of the broadcast ecology around personalized media worlds and experiences, arguing that its mode of play represents an integration of the life, activities, bodies, and attention of the individual that extends beyond that achieved by broadcast media

Keywords gadget; Baudrillard; digital media; technology

The machine was the emblem of industrial society. The gadget is the emblem of post-industrial society.

—Jean Baudrillard, *The Consumer Society*

From the beginning the gadget has been surrounded by an air of uncertainty, a slipperiness in our understanding that has benefited it in its slow rise to prominence. Appropriately for an object whose boundaries and definition are vague and whose forms and functions are varied, even the origins of the word are unclear. The story that it was derived from Gaget,

Gauthier and Cie's name stamp on tourist copies of the Statue of Liberty, is now discredited, and sources suggest instead an etymological origin in the French *gâchette*, the "catch-piece of a mechanism" (a term applied, for example, to parts of a firing mechanism), or *gagée*, meaning a small tool or instrument. The *Oxford English Dictionary* claims anecdotal evidence for the term's use by the 1850s as a word for an object whose name one cannot remember, a use consistent with its first print appearance in Robert Brown's 1886 book *Spunyarn and Spindrift, a Sailor Boy's Log of a Voyage Out and Home in a China Tea-Clipper*, which reports: "Then the names of all the other things on board a ship! I don't know half of them yet; even the sailors forget at times, and if the exact name of anything they want happens to slip from their memory, they call it a chicken-fixing, or a gadget, or a gill-guy, or a timmey-noggy, or a wim-wom—just *pro-tem.*, you know" (quoted in Quinion 2007).

Unlike "chicken-fixing," "timmey-noggy," or "wim-wom," however, the "gadget" was destined for greater things. By the early twentieth century it had changed from the frustrated expression of aphasia at an object's recalcitrance to a category of objects in itself, and by the postwar period it had become a profitable element of technical and consumer culture, albeit one often overlooked and rarely taken seriously. Again, perhaps, this suited the gadget; associated with the domestic sphere and sold in novelty shops, department stores, and catalogs, gadgets quietly succeeded in colonizing everyday life, taking up residence in our kitchen cupboards and drawers and our sheds and garages. Their incorporation of electronics brought greater popularity, and toy boxes soon filled with beeping gizmos

while plastic objects with blinking LEDs spilled out of drawers.

For all its success, this proliferation of the gadget proved to be only the preliminary phase of the gadget's rise. Embracing its electronic potential it established a foothold in personal entertainment and communication, where with the convergence of mass media and computer processing at the end of the twentieth century it completed its passage from a functionally specialized, handy gimmick to become one of the most important categories of technical object and a major force in global consumer electronics. Breaking out of the drawers and toy boxes, this new, networked digital gadget—our tablets, netbooks, phones, music players, media players, e-readers, cameras, and portable gaming devices—became personal, mobile, and ubiquitous. Today the gadget has become the center of attention.

Despite its long history and contemporary success, few attempts have been made to trace its rise or theorize its form and effects. Indeed, something about the category itself eludes conceptualization and critique; ignored or dismissed for most of its life, at the moment of its greatest occupation of our lives it still avoids analysis and censure. One of the few discussions of the gadget appears in the work of Jean Baudrillard, who provides a prescient vision of its cybernetic future. In this article I want to extend this vision to explore the contemporary digital gadget. In particular, I want to argue that its success is related to its role in the development of what I call "me-dia" and to its personalized, hyperfunctional, and hyperludic nature that repeatedly calls us back and that constitutes a mode of physiological alienation and integration that is far greater than any achieved by the broadcast media. To understand this hyperludic gadget,

however, we first need to understand something of the peculiar and unwritten history of these timmey-noggies, wim-woms, and thingamajigs.

The “Anonymous History” of the Gadget, or How Humans Came to Dream of Magnetic Sleep

Although expressions of frustration at items whose name has momentarily escaped the user must always have occurred, there is nevertheless something significant about the origin of the word *gadget*. Its anecdotal use by the 1850s, its etymological origins, and Brown’s exhausted declaration about the number of things aboard a modern ship suggest that the key issue was the increasing quantity and complexity of objects: problems intimately connected to the industrial society. Already in 1829, Thomas Carlyle could be found lamenting “the mechanical age,” that “age of machinery” in which “nothing is now done directly, or by hand; all is by rule and calculated contrivance. For the simplest operation, some helps and accompaniments, some cunning abbreviating process is in readiness. Our old modes of exertion are all discredited and thrown aside.” His examples are near hysterical; even the brood hen is replaced by chickens hatched by steam, he claims, while mechanical devices mince our cabbages and cast us “into magnetic sleep” (Carlyle 2004 [1829]).

The Industrial Revolution saw a significant and cumulative development in technical objects (Headrick 2009). From the mid-eighteenth century on there was an increase in invention and its technical application, an increase in the quantity of technologies in use, a growing complexity of technologies, and an increasing penetration by them in the lives of ordinary people as technologies moved

from marginal curiosities to the partner or director of people’s labor. Most accounts of the period emphasize the *scale* of the technologies. Although the textile mules, mills, and gins, the systems of powered wheels, belts, and shafts, and the steam engines all depended on a complex system of parts (that, by the late eighteenth century, had to be precision-made in machine shops), it was the whole assemblage—the *machine*—that became recognized as the key social and productive force of the industrial age. When engineer Isambard Kingdom Brunel discussed the *Great Eastern*, the iron steamship that was the largest in the world on its launch in 1858, he referred to it repeatedly as “a machine”—as a single entity and whole (Harvie, Martin, and Scharf 1970: 48–51). Though early inventions had an air of novelty, it was large-scale “machinery” that came to dominate life, attention, and criticism.

By the early 1850s, machinery’s dominance was beginning to change. The effect of an advancing industrial and nascent consumer culture was a proliferation of technical objects—of commodities, things, tools, entertainments, and scientific and philosophical instruments—and it’s no coincidence that the word *gadget* emerges at this time. At exactly the moment when social critics were attacking the subsumption of the *human body* beneath the weight of industrial technology as “an appendage of the machine” and one of its parts (Marx and Engels 1987 [1848]: 87), nautical slang similarly arose to express the overwhelming of the *human mind* and its expressive faculty by the sheer multiplication of technical forms and functions. If industrial technology transformed the overwhelming of the body into an alienation of the mind, the proliferation of technical objects reversed the process, transforming the alienation of the mind—of

the mental image of the thing—into an alienation of the body, of the capacity even to frame one's own speech.

Perhaps the best evidence of this proliferation is found in that epochal celebration of the industrial object, “the Great Exhibition of the Works of Industry of All Nations.” Held in London in 1851, it contained over one hundred thousand objects from fourteen thousand exhibitors, forcing its organizing committee into a remarkable feat of classification. With the human census only a few decades old in the United Kingdom and with the 1841 census being the first to actually record the names of everyone in the household, the committee produced the first census of the industrial population—of those objects inhabiting the workshops, factories, studios, and shops of the nation—classifying the products of industry into a thirty-part taxonomy divided into four overall categories. It would take four large volumes of the official catalog to list them all, and contemporary visitors were bewildered by the number of things to see. One James Ward, for example, described his “state of mental helplessness” upon entering the exhibition (quoted in Auerbach 1999: 95); there was too much for the mind to cope with.

Under the glass of Joseph Paxton’s great greenhouse—inspired by the leaves of the *Victoria amazonica*—the object flowered for public display. As Thomas Richards suggests, at the beginning of the decade that would see Charles Darwin propose the interlinked evolutionary development of all life on earth the Great Exhibition’s “dense vegetation of things” (Richards 1990: 25) celebrated the flora and fauna of the world’s workshops within a “phylogeny of manufacture” that advanced “a prescient vision of the evolutionary development of commodities” (1990: 25, 27). While scientists

traveled the natural world, cataloging its complexity, the exhibition offered the revelation of another emerging, competing, and evolving ecology: the world of things. Critics and satirists alike recognized the power of these new *life-forms*. Karl Marx’s description of commodity fetishism makes clear the phantasmal, even demonic, life and power of the commodity and the ideas evolved in its little “wooden brain” (1983 [1867]: 76), while Samuel Butler’s 1863 article “Darwin among the Machines” (2009 [1863]) only half jokingly suggested that the evolutionary gains of contemporary machinery constituted the germs of a future intelligent life that would enslave humanity itself.

Although it was the giant displays of working machinery and the monumental fifteen-ton block of coal that proved most popular with the exhibition’s public, we can already find scuttling among its exhibits the early forms of the gadget. Though the term was only just being coined, its future forms were becoming identifiable. Richards even asserts that the exhibition “contained more gadgets than any other type of article” (1990: 33), and although his definition—“a mechanical device so specialized as to be practically useless” (1990: 33)—is a personal one, the claim has some merit. The catalog itself constitutes a textual, visual pornography of the functional, technical object and is full of descriptions of each item and illustrations of the most exciting offerings. Perhaps the most famous and spectacular of these in its form and hyperspecialized redundancy was the “sportsman’s knife” by Rodgers and Sons of Sheffield, pictured deliriously spouting its eighty-plus blades and instruments like a remarkable, lethal species of plant life (Royal Commission 1851: pl. 335). In plates and descriptions like these the publication prefigures those catalogs

of useless items pushed by salespersons through mail slots until recent times.

The Crystal Palace exhibited a world of commodities, but few at the time possessed its objects. Though “stuffed with everyday goods for the middle classes” (Auerbach 1999: 121), this world was still only the promise of a domestic consumer revolution to come. Alongside the technical issues of perfecting their form and their mass production remained the problem of distribution. The rise of department stores in the second half of the nineteenth century constituted an important solution, but so too did developments in catalog shopping. In America, Sears, Roebuck and Company offered its first mail-order catalog in 1888, earning it the nickname, by the early twentieth century, “the consumer’s bible.” By 1895 its 532 pages contained every conceivable household item, while its 1908 update included the ready-to-assemble house to put them in.

Gadget sales were helped by the late nineteenth-century transformation of advertising, with the inclusion of visual images, more eye-catching typography, and stronger manufacturer claims. The pages of late-Victorian newspapers present one with a remarkable series of unlikely novelties, with the well-off able to choose from remarkable objects such as a “baby care take and exerciser” (1876); “Wood’s automatic revolving heel rubber-pad” (1880); “patent revolving bed-tables” (1880); “a new food guard” (1882); “Dr. Scott’s electric hair brush” (1883); “self-pouring tea-pots” (1888); “Harness’s eye-battery” (1886) as well as his “electro-pathic belt” (1891) and “electric corset” (1892); through to “Vigor’s horse-action saddler” (1895); “the Leopold skirt grip” (1895); “Carr’s patent ladder tape” (1896); “Clarke’s patent pyramid food-warmer” (1897); and “Claxton’s ear-cap” (1898)

(see Vries 1968). By the late nineteenth century, therefore, the group of objects the “gadget” would encompass had already emerged, moving from the experimental greenhouse of the Great Exhibition to become a profitable and well-advertised, if distinctly *odd*, sector of consumer culture.

Domestic media entertainments also partook of the air of gadgetry. Within three months of David Brewster’s gift to Queen Victoria of his stereoscope at the Great Exhibition, a quarter million viewers had been sold in England and France. The pleasures of the stereograph’s 3-D transformation would thrill generations until the early twentieth century; the experience was perhaps never better described than by Oliver Wendell Holmes in 1861 as “a dream-like exaltation of the faculties, a kind of clairvoyance, in which we seem to leave the body behind us and sail away into one strange scene after another like disembodied spirits” (quoted in Merrin 2005: 163). By the century’s end the Victorian parlor and child’s bedroom were alive with the technical phantasmagorias of the kaleidoscope, zoetrope, thaumatrope, phenakistoscope, and praxinoscope and the fantastic projected scenes of the boxed children’s magic lanterns.

It took until World War I for the terminology to catch up with this world of devices. It was then that *gadget* began to lose its seafaring use to stand instead for a class of objects. Rudyard Kipling had briefly referred to “steam gadgets” in his 1904 book *Traffics and Discoveries* (2007 [1904]: 90), but it was in his December 1914 *Daily Telegraph* article “Canadians in Camp” that he most clearly identified the gadget, writing of the engineers: “They have installed decent cooking ranges and gas, and the men have already made themselves all sorts of handy little labour-saving gadgets” (2009 [1914]). These gadgets

were clearly associated with invention and novelty—as Vivian Drake, a British Royal Flying Corps pilot, reported in his 1918 memoir *Above the Battle*: “Our ennui was occasionally relieved by new gadgets—‘gadget’ is the Flying Corps slang for invention! Some gadgets were good, some comic and some extraordinary” (2009 [1918]: 191).

Here begins the classic era of the gadget. Now the proliferating objects of varied name and use were enclosed within its all-encompassing category. No longer a placeholder name, “the gadget” was elevated to a mode of technical being, a specific branch of mechanical object of hyperspecialized functionality. Its precise definition, however, remained slippery in its range of applications and crossover with other categories. At its best it was associated with labor-saving, invention, and innovation—suggesting a trouble-free life, realized through the creation of new devices to remove the problems and annoyances of daily life and labor. At its worst it was associated with inflated claims, unclear needs, dubious provenance or amateurish origin, suspect lasting value, and cheap gimmickry and novelty. Hence “the gadget” came to represent both the leading wave of technical invention (and the promised future of its perfected, everyday evolution) and something darker—sidetracks and dead ends off that evolutionary line. Like the “sportsman’s knife,” these were potentially pathological and excrement products, objects whose hyperdevotion to specialized functionality led to excessive forms caught in their own hyperrealization of solutions to invented problems and condemned to obsolescence from their own uselessness.

These tensions mark the dissemination of the gadget through everyday life over the following decades. This

dissemination was aided by the ongoing mechanization of the household (see Giedion 1975 [1948]: 512–627), the invention of new materials such as plastics, cheaper manufacturing methods, and the democratization of industrial consumer culture after World War I. Although domestic gadgetry was successful, there remained a deep-rooted suspicion of its novelty and second-class status compared with the more spectacular triumphs of consumer production. Kitchen gadgets suffered from their association with novelty, with the home, with the kitchen, and with the housewife. What grabbed the popular imagination in “the machine age” wasn’t the electric can opener but instead the public achievements of technological modernity: the factory system and assembly production; skyscrapers, power stations, and electric dams; and aircraft, ocean liners, and modern railroads. The automobile, not the electric lamp stove, became the aspirational symbol of mass consumption in the 1920s and 1930s.

But domestic developments had their own significance. Following Le Corbusier’s famous 1923 dictum, there was an increasing tendency to reconceptualize the house as a machine. Here the housewife was repositioned as the manager of the household, delegating tasks to her new labor-saving workers, kitchen gadgets. Though the famous eating machine in Charlie Chaplin’s 1936 film *Modern Times* satirized Taylorist ideas of worker efficiency, it pointed toward real developments in domestic automation and the gadgetry of food preparation. Ivor Jepson’s “Sunbeam Mixmaster,” first appearing on the shelves in 1930, for example, would become one of the most famous appliances of the century, helping establish the kitchen as the home of the modern gadget.

The US magazine *Popular Science Monthly* provides an insight into the gadget's domestic progress. It carried regular photo features on the "latest aids for the housewife" (April 1931), illustrated with happy women posing with their latest devices. The March 1922 edition, for example, included a feature on "household brighteners" such as a pistol gas lighter and foldable juice filter, while the October 1927 edition included a table-mounted string bean slicer, a handheld drapery and upholstery vacuum cleaner, a miniature electric range, a pea sheller, and a grapefruit core remover. The 1930s saw the greatest range of new gadgets, with the magazine showcasing an electric permanent wave machine and electric handheld food mixer (April 1931); an egg opener and separator and a hand-powered vegetable slicer (March 1933); a self-opening table, portable potato baker, and waterproof heating pad (April 1933); a portable gas-torch fire lighter, a magnet can opener, individual teapots, a mop cleaner, a milk-bottle pitcher attachment, combination serving trays, and a closed onion slicer (February 1934); disappearing electric cords, an electric air-compressor cream whip, an electric buffet warmer, a safety wringer, and an electric air cooler (July 1934) (see Modern Mechanix 2013).

The popular prejudice against such objects led Sigfried Giedion to attempt an "anonymous history" of everyday technology in his book *Mechanization Takes Command* (1975 [1948]: 2–4). It was this project that inspired Reyner Banham's discussion of overlooked objects of design, *The Architecture of a Well-Tempered Environment* (1969). Banham had provided one of the first attempts to grasp the gadget, or "gizmo," in his short article "The Great Gizmo" (1965), a discussion of an object that has, Banham says, "coloured

American thought and action more deeply . . . than is commonly understood" (1981: 112). Banham describes the gizmo as "a characteristic class of U.S. products—perhaps the most characteristic," offering a definition—"a small, self-contained unit of high performance in relation to its size and cost, whose function is to transform some undifferentiated set of circumstances to a condition nearer human desires" (1981: 110)—whose abstraction succeeds in highlighting again the problems of the category and its etymological and material history.

Apart from Banham's emphasis upon the gadget's role in the American pioneer and domestic experiences and his observation that the "social usefulness" of gadgets has changed as they have come to rely on a supporting technological infrastructure requiring expert knowledge (1981: 108, 112), his analysis is limited. Recognizing his own inability to solve its conundrum, Banham's most telling remark is that twenty years after Giedion "the subject still lacks a radical theorist who will range freely over departmental barriers and disciplinary interfaces and come back with a comprehensive historical account of the rise of portable gadgetry, and deduce from it some informed projections of the good or evil future it affords" (1981: 114). Almost half a century later we're still waiting for that account. Few since have even noticed the category, let alone theorized the category. Marshall McLuhan includes a chapter titled "The Gadget Lover" in *Understanding Media* (1994: 41–47) but, in his inimitable way, makes no mention of gadgets in it. All of this makes Baudrillard's discussions of the gadget in his first two books, *The System of Objects* (1996 [1968]) and *The Consumer Society* (1998 [1970]), especially valuable.

“Everything Is Becoming Gadgetry”

Baudrillard's *The System of Objects* is a classic of structuralist, interpretive semiology, drawing on Roland Barthes's (1973a, 1973b, 1992) Saussurean analysis of this new consumer sign world, but developing from it a broader social theory of consumption. *Consumption* in this sense is “an activity consisting of the systematic manipulation of signs”—of the idealistic manipulation and combination of sign-objects organized into a system governed by a “code” of signification (Baudrillard 1996 [1968]: 200). For all the high theory of *The System of Objects*, Baudrillard echoes Giedion in his emphasis upon the everyday and the domestic sphere, especially objects such as lighting, clocks, mirrors, colors, and materials. Like the committee of the Great Exhibition, he succeeds in reducing the world of consumer manufacture to four categories: the functional, the nonfunctional, the metafunctional or dysfunctional, and the socio-ideological systems of objects.

The gadget finds its place in the metafunctional system, with Baudrillard tracing its origins to the baroque, whose “demiurgic formalism,” he says, foreshadows on the artistic plane “all the themes and myths of our technological civilization.” The gadget has a similar excessive quality, Baudrillard argues: at its farthest remove from objective use-value it is “completely taken over by the imaginary,” pursuing an “obsessional” functionality and becoming either so specifically functional as to be “absolutely useless” or so polyfunctional as to answer no need other than its own functioning (1996 [1968]: 113–14). Whereas the “gadget” comes close to uselessness, Baudrillard says that the “gizmo” does at least have an operational value—the fact remains that *it works*—though his admission of its indeterminate

meaning highlights his problem of distinguishing these two categories (1996 [1968]: 114).

If, like Banham, Baudrillard struggles to define the gadget, he has, at least, noticed its rise and proliferation: “It is frightening to consider just how many things fall into the category of gizmos, just how many of our objects are covered by this empty concept.” Today, he says, “there extends a panoply of wondrous accessories culminating in the immense industrial output of everyday objects—gadgets or gizmos.” This excess of objects overwhelms our linguistic and cognitive faculties, he argues; “our civilization has more and more objects and fewer and fewer names for them” such that it is “impossible to classify the whole range of obsessional polyfunctionality” (Baudrillard 1996 [1968]: 114–15). Importantly, language is again implicated; the “gadget” that originated with the proliferation of technical objects became a category of objects whose contemporary expansion now exceeds our naming capacities.

The gadget, however, is special for Baudrillard. Though the gizmo is functionally limited, its “imaginary” is “universal,” he argues, signifying not just its own operation but “the *total* operation of the world.” The gadget and gizmo suggest that for every need there is a technical object that can solve it; hence their real referent is a world “reinvented in accordance with the technical reality principle” (Baudrillard 1996 [1968]: 116). What the gadget reveals is an entire world that appears to us in its operability as something transformed by, functioning through, and as solvable by technical objects. As such the gadget may be the key technical object.

But Baudrillard's value lies not just in this theorization of the gadget but also in his anticipation of its future development.

Noting the change in our objects from an “animistic” structure that bears witness to our presence and bodies to an “energetic” structure and technical objects that “evoke a virtual *energy*, and are thus less receptacles of our presence than vehicles of our dynamic self-image,” Baudrillard sees a further stage of development:

Modes of the imaginary follow modes of technological evolution, and it is therefore to be expected that the next mode of technical efficiency will give rise to a new imaginary mode. At present its traits are difficult to discern, but perhaps, in the wake of the animistic and energetic modes, we shall need to turn our attention to the structures of a cybernetic imaginary mode whose central myth will no longer be that of an absolute organicism, nor that of an absolute functionalism, but instead that of an absolute interrelatedness of the world. (1996 [1968]: 118)

Though he says little more about this development, it would prove to be a key insight into the gadget’s future form and use.

Baudrillard returns to the gadget in *The Consumer Society*, though with its tendency to merge with other objects there is a problem still of its definition. His solution is to reverse the problem, to see all other objects as converging on the gadget form. The gadget is “*the truth of the object in consumer society*,” he argues, as its “functional uselessness” is echoed by all other consumer objects since their own “objective function” has disappeared in favor of their “sign function.” Hence today “*anything can become a gadget* and everything potentially is one” (Baudrillard 1998 [1970]: 112). His examples of the gadget now expand, moving beyond the obviously useless like the polished cylinder paperweight to include

“the technical object” with its array of functions such as “the typewriter which can write in 13 different character sets” or “the IBM dictation machine.” The gadget emerges, he argues, when the technical object is “consigned to mental practices of a magical type or to modish social practices” (Baudrillard 1998 [1970]: 112), that is, with the production of needs that are in the mind. Thus it is the addition of functions in the technical object that tip it into gadgetry.

The gadget exemplifies the contemporary technical consumer object in other ways. Explicitly intended “for secondary functions,” the gadget is part of the logic of fashion and prestige, or a fetishistic logic, Baudrillard says, one, he adds, that “is the dominant tendency for all objects today” (1998 [1970]: 112). At the leading edge of the semiotic process, the gadget “is part of a systematic logic which lays hold of the whole of daily life in the spectacular mode,” casting “a suspicion of artificiality, fakery and uselessness . . . over the whole environment of human and social relations” (Baudrillard 1998 [1970]: 112). Despite this tendency, Baudrillard is ambivalent about its hold. While the gadget is an “impoverished” form, it also partakes of “*the exaltedness of the new*”—that “sublime period of the object” in which it may attain “the intensity, if not the quality, of the emotion of love” (Baudrillard 1998 [1970]: 113). Here, in the fascination of its newness, the gadget achieves the same “mode of intense relation” as the child experiences in his or her toys (Baudrillard 1998 [1970]: 113).

Baudrillard foregrounds here the attraction of the gadget and our relationship with it. The gadget is defined, he says, “by the way we act with it,” which is not utilitarian or symbolic “but ludic”: “It is the ludic which increasingly governs

our relations to objects, persons, culture, leisure and, at times, work, and also politics. It is the ludic which is becoming the dominant tone of our daily habitus, to the extent indeed that everything—objects, goods, relationships, services—is becoming gadgetry or gimmickry" (Baudrillard 1998 [1970]: 113–14). The ludic, Baudrillard says, is a "particular type of investment" consisting of "a play with combinations, a combinatorial modulation: a play on the technical variants or potentialities of the object" (1998 [1970]: 114). The ludic, therefore, is a specific mode of behavior, one fascinated "by the operation of machines, by childlike discovery and manipulation, by vague or passionate curiosity for the 'play' of mechanisms, the play of colours, the play of variants": "This is the very soul of passionate play, but diffuse and generalized and hence less cogent, emptied of its pathos and become mere *curiosity*—something between indifference and fascination, which might be defined by its opposition to *passion*" (Baudrillard 1998 [1970]: 114). If passion is a concrete relationship and total investment, our "ludic curiosity" in contrast is merely an interest in "the play of elements." It remains a relationship of semiotic consumption rather than of symbolic passion—in the abstract manipulation of the object's functions and its fashionable prestige. As Baudrillard concludes, "Consumption is combinatorial investment: it is exclusive of passion" (1998 [1970]: 114).

Baudrillard's discussion of the gadget is curious. He is one of the few thinkers to recognize its rise and significance, yet it is also one of the few objects to elude him. *The System of Objects* and *The Consumer Society* are notable for the acuity of their targets and analyses and the continued relevance of their ideas; however, their treatment of the gadget is less coherent,

and Baudrillard never entirely succeeds in pinning down this "empty concept." Nevertheless, his analysis is one of the best we have, and there is an awareness in it that there is more at stake than we might assume, that these overlooked and ridiculed objects might hold a clue as to the direction and future of our technical consumer culture.

Go, Go, Gadget!

As Kipling indicates, by World War I *gadget* was associated with innovation and novelty. The use of the term by military engineers and the flying corps is important, however, in highlighting another path of the gadget's development: government and military research. It's no coincidence that when the scientists on the Manhattan Project needed a code name for their new creation to hide its identity while emphasizing its novelty they hit upon the term. Hence, with the first bomb test on July 16, 1945, "the gadget" inaugurated the atomic age.

The exigencies of World War II and the Cold War spurred numerous technical innovations. The military funding of computing and network research would lay the basis for our digital gadgets, but the military also funded the development of miniaturized devices for the intelligence community. These high-tech scientific gadgets would capture the public imagination in the 1960s with the success of the spy genre. Though Ian Fleming's James Bond novels contained few gadgets, the popularity of the customized briefcase, garrote watch, and dagger shoe in the 1963 film *From Russia with Love* ensured that they were foregrounded in 1964's *Goldfinger* and the rest of the franchise. Television took up the genre with shows such as *Get Smart*, which was broadcast in 1965–70 and satirized the gadget craze

(hiding phones in shoes, a car cigarette lighter, a steering-wheel, and even a full-sized phone). *Get Smart* would influence the popular children's cartoon *Inspector Gadget*, aired in 1983–86, with its leading actor, Don Adams, also voicing the titular cyborg detective whose exclamation "Go, go, Gadget!" prefaced the appearance of a range of tools from his body. The future of man, it suggested, was to be cosubstantial with gadgetry.

Science also inspired a number of real gadgets in the postwar period. In 1946 Bell Laboratories' Miles V. Sullivan patented an "activated amusement device"—a glass heat engine marketed by Tico Laboratories in the late 1940s as "the bobble bird." This "drinking bird" toy, endlessly dipping its beak into water, sold in huge numbers and became a popular cultural phenomenon. Another scientifically inspired device was the "Newton's cradle," created and marketed by Simon Prebble in 1967. Beginning the craze for "executive toys," it helped ensure the gadget's invasion of work space with its distractions. Contemporary science fiction offered its own view of a future eased by gadgets, from the flip-top communicator in the 1966–69 series *Star Trek* that would inspire mobile phone design (Cooper 2009) to the iPad-style devices used in the 1968 film *2001: A Space Odyssey* and the 1973–79 British series *The Tomorrow People* that would later be used to challenge Apple patents (Farrell 2011).

By the 1970s, however, the public didn't need to look to action films or sci-fi for gadgets since futuristic devices began to enter the home. We forget now, but it was the gadget that began the age of popular digital technology, for within a few years of Baudrillard's claim of a coming cybernetic phase gadgets began to incorporate cheap electronics. The 1970s

saw numerous devices whose usability gave them the air of gadgetry—such as the Phonemate Model 400 answering machine (1971), Sony's LV-1901 Betamax VCR (1975), and the TPS-L2 "Walkman" (1979)—but the key development was the invention of the cheap microprocessor with the Intel 4004 in 1971. Its most important effect was in aiding the emergence of the home computer in the late 1970s, but in the years prior to this development it was gadgets and toys that sparked the domestic digital revolution.

With falling prices and increasing power, integrated circuits were placed in a range of objects, spurring developments in toys, telephony, music, gaming, video, home appliances, and consumer objects. Texas Instruments' SR-10 electronic calculator and the Hamilton Pulsar LED watch—both from 1972—were pioneering digital gadgets, while Polaroid's SX-70 camera from the same year also included chips. Home video gaming also preceded home computing with the (pre-microprocessor but still digital) Magnavox Odyssey appearing in 1972 and Sears's Pong in 1975. By 1978 chips had invaded the toy box with Texas Instruments' "Speak-and-Spell" and Milton Bradley's "Simon" memory game, while the Magnavox Model 800 Discovision videodisc player appeared the same year.

The 1980s saw further developments in digital gadgets, including the first laptop, Epson's HX-20 (1981); compact disc (CD) players such as Sony's CDP-101 (1982); Sony's "Watchman" portable TV (1982) and "Discman" portable CD player (1984); mobile phones such as the Motorola DynaTAC 8000X (1983); electronic organizers such as the Sharp OZ-7000 (1988); and popular handheld gaming devices such as the Nintendo Game Boy (1989). It was the 1990s, however, that saw the explosion of

digital gadgets as part of a broader transformation in home computing, networking, and digital media. The year 1994 saw the first widely marketed webcam, the Connectix QuickCam; 1998 saw one of the first MP3 players, the Diamond Multimedia RIO PMP300, and Panasonic's portable DVD player, the DVD-L10. Early personal digital assistants, or PDAs, appeared, such as the Apple Newton MessagePad (1994) and the PalmPilot 1000 (1996), and the TiVo HDR 110 was released in 1999. Beginning in the mid-1990s, mobile telephony tipped, aided by the first clamshell, the Motorola StarTAC in 1996, while digital cameras and video cameras became commercially successful.

Through the 2000s, new developments fed off each other. Improved connectivity and speed and increasing capabilities turned devices into multimedia, networked technologies, while devices increasingly meshed together with new online Web 2.0 services, further driving consumer take-up. Phones soon had cameras and video as standard, and some designs, such as the Motorola Razr V3, became essential fashion accessories. They also got smarter, with Internet capability. The Blackberry smartphone was released in 2002; music players tipped with the third-generation iPod (2003); the Nintendo DS appeared in 2004; the iPhone and iPod Touch appeared in 2007; cheaper cameras such as Pure Digital Technologies' Flip (2007) expanded the video market; e-readers began to take off with the Kindle (2007); the "netbook" appeared with the Asus Eee PC 700 (2007); tablet computing took off with the iPad (2010); and the Nintendo 3DS was released in 2011. New gaming experiences emerged such as the Wii's gestural system (2006) and the Xbox 360 Kinect motion-capture system (2010). Meanwhile, robot toys, from Sony's Aibo

(1999) to Animagic's Fluffy-Go-Walkies (2010) wandered across carpets freshly vacuumed by iRobot's Roomba Intelligent Floorvac (2002).

Again, we can't escape the problem of definition. All these objects take their place within other histories—of technology, invention, calculation, tools, toys, communication, and entertainment—and each could be categorized in different ways, yet they are all, in some way, essentially gadgets. So what does this word mean today? The early twentieth-century concept of a simple class of mechanical, hyperfunctional object associated with novelty and amateurishness can't capture the contemporary range of digital objects, the richness of their uses, or their cultural success. The gadget's life and place within society is clearly different from what it was a century ago. Though not entirely satisfactory, Baudrillard's work provides a useful starting point for understanding what this life and place might be.

By the early millennium, Baudrillard's claim that "everything is becoming gadgetry" seemed justifiable. With an emerging world of always-on connections, his claim of a new cybernetic imaginary based on the "absolute interrelatedness of the world" also appeared prescient. The interconnection of people through the Internet and mobile devices is obvious, but it is built upon a primary interconnection of technologies, with digitalization allowing the incorporation of all prior analogue forms as data, the passage of this data across networks, and its easy transfer between devices. Hence digital technology makes not only people and places but all information and content accessible, interrelated, and intercommunicable. The stand-alone gadget is thus valueless. The energetic gadget's total operationality of the world, as Baudrillard suggests, has

been superseded by the cybernetic gadget and the total interrelatedness and availability of the world.

This digital transformation has brought a sea change in the gadget's social status. Gadgets have lost their air of amateurishness and poor reputation to become one of the most important categories of consumer electronics, produced by some of the most successful technology companies in the world. For all that, they have managed to retain their novelty status, with their ever-expanding range of features becoming their key selling point. Hence gadgets today exist in a "perpetual beta" (O'Reilly 2005); tested in the marketplace and regularly updated with new iterations and features, they achieve a permanent and now positive "newness."

Leaving behind cupboards, toy boxes, and executive desks, the digital gadget has become the epitome of high tech, the aspirational consumer object, and perhaps the definitive contemporary form of the spectacular society. "The spectacle," Guy Debord writes, "is the moment when the commodity has attained the total occupation of social life," and the products of One Infinite Loop, Cupertino, California, especially—unveiled in much-anticipated launches to fawning media, reviewed by awestruck technorati, queued for on release day, and unboxed on YouTube—appear to achieve precisely this occupation. "The world one sees is its world," Debord adds, a comment perfectly summarizing the refractive lens offered by the digital gadget (1992: para. 42).

Central to digital gadgets' success has been their role in the rise of "me-dia" (Merrin 2008; forthcoming). Historically, the majority of the population has had very little ability to produce and share information. The print revolution expanded the volume of information available and

empowered media consumption but didn't significantly democratize production or distribution. The full flowering of the broadcast system in the late nineteenth and early twentieth centuries consolidated this situation, with only "big media" companies and corporations having the capital, organizational capacity, and ability to mass-produce and mass-distribute content for mass consumption (Gillmor 2004). Individual communication remained limited to amateur technologies and forms (e.g., photocopied fanzines and local newsletters) and personal media such as letters, telegraphy, and telephony, each of which suffered from significant limitations. Culturally, there was little interest in peer production; only professional content had value. Digital technologies changed this situation. Networked computing, mobile technologies, democratized productive tools (including publishing and editing software, digital cameras, and video cameras), broadband and Wi-Fi networks, and online Web 2.0 platforms helped create an epochal shift in the social structure of communication.

This shift was the creation of "me-dia"—the explosion of individual, horizontal, mediated interpersonal and public communication. It has propelled us from a top-down, one-to-many "broadcast era" dominated by "big media" to a "postbroadcast era" characterized by the ability of individuals to produce and disseminate their own content and connect to and share others', all outside of traditional informational structures. Me-dia is a Ptolemaic revolution in communication; it represents the reorientation of information *around individuals*, empowering them as both producers and distributors and also as the creators and managers of their own ecology of experiences and content. Me-dia thus incorporates and subsumes traditional media, which now takes its

place within a personalized media world arranged according to our own interests, decisions, attention, and choices. Hence the structural shift in communication is matched by a shift in value as our own creations, messages, comments, images, and shared links become more important to us than anything produced by the mass media. Today mainstream media content is ignored in favor of, or serves as the background to and inspiration for, our own communications. A comment or “like” on our social media profile is of more interest and value to us at any moment than the current output of entire media industries.

If media remains a form of alienation, it is a subtle one. Whereas for Marx the industrial workers’ productions confronted them as something external and “alien” to them (1981: 64), our media productions confront us instead as intimately tied to us. They appear not as the “estrangement” and loss of the self but precisely as its expression, as the external site and privileged holder of our personal life and secrets and the means of our most intimate realization. The digital gadget is thus not merely an informational and communicational device; it is central to our sense of self. No longer a peripheral technological form, its assimilation into our personal life and its expression thrusts it into the center of the technological and social environment.

Digital technology has led to other changes in the gadget’s nature and capacities. Whereas classic-era gadgets were targeted at specific users (e.g., women or executives) and specific places (e.g., the kitchen or garage), digital gadgets move easily between family members (the work tablet, for example, quickly becomes the child’s toy) and between parts of the house. Indeed, this mobility is central to their success; carried in pockets and

handbags they transform everyday life into their own connected sphere, extending their influence into every realm. In addition, while the classic gadget was defined by its hyperspecialized functionality, the digital gadget is defined by its hyperfunctionality. Beyond telephony, e-mails, and texting, the smartphone allows me to read books, newspapers, and magazines; watch videos, TV, and films; access social networking sites; follow the news; stream or play music; listen to the radio; access any images and information; and purchase goods online. Meanwhile, apps enable me to take a hearing or vision test; monitor my fitness, diet, or workout; test my urine; track my bowel movements; use a stethoscope; get surf reports; follow weather patterns; track aircraft flights; make a will; measure my sexual performance; play virtual farts; launch a rim-shot effect to accompany my jokes; wave a virtual lighter at concerts; and drink a virtual pint.

Whereas the pathology of the classic gadget lay in its devotion to its own functionality in order to serve the user—smoothing the user’s labor or giving him or her the pleasure of its performance—the digital gadget smoothly offers us a range of functions and pleasures, but in doing so it transfers its pathology to us. The obsession now lies not with the device but with us, in our desire to return continuously to the object, to pick it up, check it, and recheck it. Seeing someone pick up their phone compels us to mimic them, and we panic when we can’t find it. The gadget that once had a suspicion of uselessness now overwhelms us with its usefulness. We can never exhaust its functions; instead, its functions and use exhaust us.

No longer left on shelves or buried in drawers, gadgets no longer *languish*. Instead, we can’t let them be; we are repeatedly drawn back. Like the child

Sigmund Freud describes in "Beyond the Pleasure Principle" (2010 [1922]) whose play with a wooden reel wound with string (throwing it out and pulling it back) transforms the trauma of parental absence into a game in which repetition offers reassurance, so we too conjure away the trauma of being alone with the obsessive repetition of our gadget play. Superficially, at least, the gadget appears superior to the child's reel since answered messages and texts appear to bring us the presence of another, but in reality the reel's satisfaction eludes us. In contrast to the wooden reel that can be pulled back, we have no control over the gadget's response; unlike in "reel time," the real-time gadget continually tantalizes us with the possibility of another message in the seconds since we last checked. The impossibility of the cybernetic loop ever being finally completed and closed only makes us aware of our powerlessness, emptiness, and lack of control.

As Baudrillard suggests, this hyper-functionality and usefulness highlights the importance of the "ludic" dimension. The subject of "play" has attracted considerable attention, especially in the emerging field of video-game studies (see Frasca 1999), but Baudrillard's position is instead McLuhanist, emphasizing not game content and experience but the play with the form itself. Though early hackers enjoyed playing with machines (Levy 2010), historically most people have found computer interaction difficult and confusing. More than any company, Apple made digital technologies easy and pleasurable, with the iPod, iPhone, and iPad especially helping redefine the gadget and its experience. An important part of design for Steve Jobs was *playing* with the proposed object: "Jobs liked to be shown physical objects that he could feel, inspect, and

fondle" (Isaacson 2011: 387). As Maya Lin argues, though Jobs embraced a Zen-like simplicity his objects were not cold but "fun": "He's passionate and super-serious about design, but at the same time there's a sense of play" (quoted in Isaacson 2011: 370). Apple's retail stores expressed the same philosophy in eschewing lines of shelving and sales counters in favor of customers simply playing with the products (Isaacson 2011: 370).

Arguably, these products originated in play. The iPad owes much to Alan Kay's idea for a touch-tablet "Dynabook." Kay's essay "A Personal Computer for Children of All Ages" (1972) opens with a picture of two children playing with their connected Dynabooks and emphasizes throughout the idea of a tablet for playful exploration and creative learning. It was a lesson Apple learned. As Michael Noer points out, Jobs's iPad is "a powerful computer that an illiterate six-year-old can use without instruction" (quoted in Isaacson 2011: 498); it really is a computer "for children of all ages" to play with. Kay and Adele Goldberg, in their essay "Personal Dynamic Media," even described the emerging desktop-PC system as "an interim Dynabook" (2003 [1977]: 393), implying that the entire PC paradigm was a detour to the realization of these tablets for play.

Baudrillard, naturally, is less impressed with digital media's creative potential, seeing all computer interaction as the working through of preprogrammed capacities—"an automatic run-through of all the possibilities" (2002: 178). Even the Internet only simulates a space of freedom and discovery, he says, in offering "a multiple, but conventional, space, in which the operator interacts with known elements, pre-existent sites, established codes. Nothing exists beyond these search parameters" (Baudrillard 2002: 179). Baudrillard

is right that our play with gadgets is “a play with combinations,” but his vision of their limitations is now less convincing. This is because the once ludic gadget is now *hyperludic*. Whereas one played with the classic gadget to observe it perform and complete its single function, the hyperfunctional digital gadget is designed for endless functioning. We can never exhaust our play with gadgets or complete their performance. The mobile phone is a perpetual thumb-motion machine, trapping us in a Moebian cybernetic loop of endless responses and replies.

Why this matters is because Baudrillard sees play as functioning as a mode of integration. His analysis of consumption followed, respectively, Barthes, Thorstein Veblen, and Herbert Marcuse to see it, simultaneously, as a system of communication, of social hierarchy and distinction, and of social control (Baudrillard 1998 [1970]: 60–61, 94). In *The Consumer Society*, Baudrillard rejects the idea of consumption as a free, private, individual act fulfilling anthropological needs, seeing it instead as “an active, collective behaviour: it is something enforced, a morality, an institution. It is a whole system of values, with all that expression implies in terms of group integration and social control functions” (1998 [1970]: 81). Hence consumption is a “mode of socialization,” integrating the individual and establishing his or her conformity to the system and its code (Baudrillard 1998 [1970]: 81).

The digital gadget most obviously functions as a means of integration as a key category of consumer electronics. But unlike earlier consumer relationships that involved no knowledge or relationship beyond the point of sale, digital gadgets incorporate the user in a series of ongoing and monitored relationships—with the technology company, with one’s own

phone or Internet service provider, with the approved operating system and digital store owner, with the companies that produce the content or apps one downloads, with analytic companies embedded in this content, and with the platforms, websites, and online services that one accesses and that record one’s interactions, clicks, and activities. This system of “vertical integration” goes far beyond anything produced in the broadcast era, including all aspects of the individual and his or her use.

This integration also includes our bodies and habits, our physical pleasure in and absorption by the hyperfunctional and hyperludic. Digital gadgets demand to be held, manipulated, and explored: scroll wheels, home buttons, and touch screens pull us in, and touches, taps, double taps, pinches, zooms, rotations, swipes, swooshes, and flicks now constitute a new gestural grammar. The gadgets produce this grammar, standardizing new bodily gestures, rhythms, and habits, and companies have even tried to patent these. Apple’s patent 7844915, filed in 2007, covered touch-screen document scrolling including the “pinch to zoom” gesture, while its patent 7479949, filed in 2008, covered a range of multitouch gestures (Apple 2009, 2010). Both were ruled invalid in preliminary decisions in December 2012, not because our bodily gestures can’t be privately owned and integrated but because, in being covered by prior patents, they already are.

For the Baudrillard of *The System of Objects* even freedom can serve as a cover for incorporation. The semiotic system, for example, liberates us from earlier, more weighty symbolic systems to transform us into “an active engineer of atmosphere,” free to play with and combine signs (Baudrillard 1996 [1968]: 26). Hence, in pulling us even more into

its code, mastery of the semiotic is also a mastery *by* the semiotic. So today's users are freed from broadcast-era mass media to become active engineers—operators and managers—of their own gadgets, devoting themselves to recharging them, checking them, and deleting, clearing, and updating them. This management constitutes, therefore, an ongoing labor, while our activities also constitute another mode of "free," "immaterial," or "digital labor" as every click and swipe, every app we use or page we browse, produces data about us and hence value for private companies (Terranova 2003; Scholz 2012). If the classic-era gadget, therefore, was "labor-saving," the digital gadget is *labor-producing*.

Thus we can see that our play is not only less empowered than we might assume—in being designed into our technologies and integrating us with them—but it also forms a central part of the digital business model, integrating us into a physiological-informational economics. As John Armitage argues, the logic of hypercapitalist digital media cannot tolerate nonparticipation in its system: "The hypermodern attitude is constituted in such a way that it cannot endure any people who have never been online or even any who decide to stay among the disappeared" (2013). In this "doctrine of compulsory appearance," all must appear, take their place, be networked and available, and be physiologically and informationally integrated into the teletechnological system.

This physiological dimension is central to Baudrillard's critique of media. In his essay "Requiem for the Media," Baudrillard argues that "media ideology operates at the level of form" in the "separation" of humanity that media produce. "In their form and very operation . . . media induce a social relation," he says, one involving "the abstraction, separation and abolition

of exchange itself." Hence the media actually fabricate a "non-communication" (Baudrillard 1981 [1972]: 169). Baudrillard's rejection of all technological mediation was an extreme position in the broadcast era, but it is even more counterintuitive in a digital era where me-dia brings us closer than ever, creating friendships and communities and linking us at every moment to one another. Baudrillard, however, is uncompromising: the mobile phone user "talking away to no one," he says, represents "a living insult to the passers-by" (2003: 24). The "incrustation of the network in your head" leads, he says, to a state of living death (Baudrillard 2003: 82, 24). For Baudrillard, therefore, our digital gadgets only extend noncommunication.

While the reach of mass media into the lives of individuals was once limited, we now carry our own personal means of noncommunication everywhere. In their instant availability, the time and attention they take, the physical incorporation they produce, and our connected disconnection from the world, digital gadgets massively extend the mass media's abolition of real experience, relations, and communication. Increasingly, on a physical level, our bodies and minds are simply elsewhere. Digital gadgets' attraction also lies in flattering us. Whereas the mass media treated us as part of a mass audience, in revolving around ourselves—our posts, messages, responses, notifications, opinions, thoughts, activities, interests, and relationships—our me-dia rightly treats us as the most important element in our own media ecologies. Our digital gadgets make this flattering world ubiquitous and permanently available for our play and perusal.

Though McLuhan's chapter "The Gadget Lover" in *Understanding Media* fails to mention the gadget, its subtitle,

"Narcissus as Narcosis," is important (1994: 41). McLuhan's theme is about how we "become fascinated" by our own extended images, fail to recognize ourselves, and, like Narcissus, fall prey to the narcotizing effects of our extensions to become their "servo-mechanism" (1994: 41, 46). Our gadgets perfect exactly this narcotization: head down, thumb tapping and swiping, we become oblivious to everything else. The defining media image of the twenty-first century may well be the January 2011 shopping-mall closed-circuit television (CCTV) footage of Cathy Cruz Marrero walking straight into a fountain while on her phone (YouTube 2011).

Though, to date, little remarked upon, our gadgets are remaking our relationship with the world, often with dangerous or fatal consequences. Accidents from driving while on the phone or texting (illegal in the United Kingdom since December 2003) have cost numerous lives (see, e.g., BBC 2013), while the effects of "texting while walking" are increasingly recognized. A 2012 US report estimates that over eleven hundred people were treated in hospital emergency departments after accidents with handheld electronic devices (Glatter 2012). Footage of these incidents has become a popular entertainment on YouTube. In April 2012 a TV station helicopter following a wild bear on the loose in a Los Angeles suburb filmed a man on the phone walking straight up to it before fleeing in panic (YouTube 2012a); in July 2012, in Philadelphia, a man on his phone was filmed walking off a train platform onto the tracks (YouTube 2012b); while in January 2013 a UK woman was caught on CCTV walking into a canal in Birmingham while texting (YouTube 2013). The May 2013 launch of a new app, "CrashAlert," using the phone's camera to scan for coming obstacles, might be of some help here,

but it is likely that our problems with the real will continue (Lacey 2013).

Conclusion

We can see a trajectory of "the gadget," from a placeholder name to a specialized, functional class of consumer objects to a contemporary digital, hyperludic, hyperfunctional form that achieves a new centrality in consumer culture; in information, communication, and entertainment; and in our own personal lives. In doing so, it also achieves a mode of individual integration exceeding earlier forms of industrial machinery and broadcast media, all of which could be left behind or included in spaces and spheres of life outside of their direct influence. Discussing the early history of computing, J. G. Ballard suggested that computers would one day "mount a more subtle take-over bid," fulfilling his warning that "the totalitarian systems of the future will be subservient and ingratiating" (1998: 50). The personal, digital, me-dia gadget realizes exactly this direction, holding us closer, traveling everywhere with us, and integrating us more thoroughly than before. And it shows little sign of stopping: new, wearable devices such as Google Glass and smartwatches threaten to extend this personal integration and our physiological and mental alienation. Thus the "gadget" that originated as the aphasic expression of our mind, producing an alienation of our mouths as we struggled to find the words we wanted, ends with the integration and enclosure of our minds and the numbing and narcotization of our entire bodies. As Baudrillard suggests, and as Marrero demonstrates, this is a world of public "zombies" cast into an electromagnetic sleep (2003: 24).

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