



CONFIRM YOU ARE A HUMAN: PERSPECTIVES ON THE UNCANNY VALLEY

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ABSTRACT | The “uncanny” and the “uncanny valley” are concepts that address the experience of fascination and fear one experiences upon confronting an entity whose status as living or dead, human or machine, real or unreal, is indeterminate. Visual culture holds important clues about the meanings of the uncanny in modern, postmodern, and posthuman thinking. This essay traces the role of these concepts in art history, focusing especially on the period following 1970, when roboticist Masahiro Mori used the phrase “uncanny valley” to describe the profound discomfort triggered by near-perfect human likeness. Since that time, digital technologies have raised the stakes around aesthetic and philosophical issues of resemblance, realism, and illusion, demanding new ways of thinking about encounters between viewers and uncanny art objects, whether in real or virtual space.

KEYWORDS | Uncanny, uncanny valley, postmodernism, posthumanism, artificial intelligence, androids, cyborgs, digital imaging, robotics

Introduction: persistence of the uncanny

The concept of mixed reality (MR)—the merging of real and virtual worlds via some kind of video display—triggers optimism, confusion, and apprehension in equal measure. Because MR is wrapped up in hyperbolic claims, and actual experience with the technology is not yet widespread, humanities scholars may feel ill-equipped to assess its aesthetic qualities and social implications. However, the fact that a category is broad, ephemeral, malleable, ontological, commercial, and cross-disciplinary should not deter art historians from entering the conversation. On the contrary, because mixed reality trades upon the visual, we have a responsibility to grapple with its claims. Moreover, our field offers many methodological precedents for characterizing new forms and formats. For the purposes of this essay, I want to approach the horizon of mixed reality via the uncanny and the uncanny valley. These terms address the experience of fascination and fear one experiences upon confronting an

entity whose status as living or dead, human or machine, real or unreal, is indeterminate. Whether we configure such a situation as a valley or horizon is an open question. By examining art that activates the uncanny, we can better understand its operations and speculate about its purpose.

Brought to prominence by Sigmund Freud in a 1919 essay, “the uncanny” remains current in 21st-century theory and in common parlance, much like “surreal” and “cinematic,” two other 20th-century coinages that have specific formal denotations but today are used indiscriminately to describe feelings in everyday life.¹ Google Books Ngram viewer plots the usage of “uncanny” from an initial bump in the 1890s, through a surge in the mid-1920s, to a steep escalation starting in the mid-1990s and continuing to today. While German psychiatrist Ernst Jentsch, the first to publish on the notion of the uncanny, warned: “It is a well-known mistake to assume that the spirit of languages is a particularly acute psychologist,” he went on to concede that “every language still often provides particular instances of what is psychologically correct or at least noteworthy in the way in which it forms its expressions and concepts.”²

The recent rise in prevalence of a word meaning “strange or mysterious, especially in an unsettling way” points to pervasive psychosocial anxieties, which can be correlated with technological developments and in turn with representation. Visual culture thus holds important clues about the meanings of the uncanny in modern, postmodern, and posthuman thinking. In what follows, I will trace the concept’s role in art history, focusing especially on the period following 1970, when roboticist Masahiro Mori used the phrase “uncanny valley” to describe the profound discomfort triggered by near-perfect human likeness. Since that time, digital technologies have raised the stakes around aesthetic and philosophical issues of resemblance, realism, and illusion, demanding new ways of thinking about encounters between viewers and uncanny art objects, whether in real or virtual space.

Timeline of an idea

MODERNISM: FREUD’S ARTICLE, 1919

In English, the word *uncanny* originated in Northern and Scots dialects (“beyond ken / knowledge”) and by the 18th century connoted strangeness, untrustworthiness, and association with the supernatural. The German *unheimlich*, containing the word for “homely,” implies a departure from domestic or familiar qualities. Other languages contribute further nuances to what amounts to an indefinable, perhaps paralinguistic sensation of dread, unease, discomfort.³

Jentsch’s 1906 essay “On the Psychology of the Uncanny” posits that uncertainty about “whether an apparently living being really is animate,” or whether an inanimate being may in fact be alive, reliably produces an uncanny feeling that persists until the doubt is resolved.⁴ It can arise in ordinary circumstances (mistaking a scarecrow for a man, for example), or an artist can produce it intentionally.⁵ Wax museums are one scenario in which the uncanny is exploited to sensational effect. As a literary example, Jentsch cites E. T. A. Hoffmann’s ability, demonstrated in several Gothic horror tales, to keep the reader in suspenseful uncertainty about whether a character is a human or an automaton.

Freud, responding to Jentsch in 1919, took up a specific Hoffmann narrative in detail: the novella “The Sandman” (1816), in which a male protagonist, Nathaneal, falls in love with a woman, Olympia, and then goes mad upon discovering that she is an automaton. For Jentsch, Hoffmann’s evocations of human/machine confusion were virtuosic, making an otherwise unpleasant emotion “enjoyable in some sense.”⁶ Freud reached darker conclusions, attributing Nathaneal’s breakdown to castration anxiety and the compulsive repetition of repressed trauma. He also drew attention to the various categories of vision—outer, inner, and mechanical—that appear in the story.⁷ Like Jentsch, Freud considered

the uncanny to be a province of aesthetics, one he hoped to annex to psychoanalysis.⁸ Properly understood and brought to light through analysis, old beliefs could be discarded and the uncanny overcome. Ultimately, however, the uncanny’s resistance to definition, unpredictable occurrence and variable intensity, and uncomfortable pleasures and terrors defied even Freud’s powers of masterful explanation.

Nevertheless, his essay has reverberated in the domains of cultural critique. Anthony Vidler notes that Freud’s fascination with “unhomeliness” dovetailed with the destructive cataclysm of World War I, becoming an important concept for philosophers such as Gaston Bachelard, Walter Benjamin, and Martin Heidegger in the interwar years and then, in the writings of Theodor Adorno and others after World War II, a rationale for modernism’s techniques of estrangement and disturbance.⁹ Jo Collins and John Jervis, in their introduction to the anthology *Uncanny Modernity: Cultural Theories, Modern Anxieties*, note that Freud’s essay became newly prominent in the humanities and cultural studies in the 1970s, when it was deployed by the French poststructuralists who dominated literary theory and art history in the 1980s and ‘90s.¹⁰

ROBOTICS: MORI’S ARTICLE, 1970

Before examining that moment, it is necessary to step away from the humanities to look at concurrent developments in artificial intelligence (AI) and robotics. The year 1970 saw the publication of Masuhiro Mori’s “Bukimi No Tani” in the Japanese journal *Energy* (translated as “The Uncanny Valley” by British art critic Jasia Reichardt in 1978).¹¹ Mori observed that responses to humanlike robots shift abruptly from affinity to revulsion at a certain point when the resemblance gets closest but then fails to convince. His now well-known graph [fig. 1] shows industrial (that is, machinelike) robots as a baseline: low likeness, low affinity, with affinity increasing for more humanlike toys. When likeness increases to a critical point of very nearly human, the curve plunges drastically, creating a valley of strong negative feelings akin to those provoked by corpses or zombies. The only entities on the other side of the valley—high resemblance, high affinity—are certain kinds of dolls and actual human beings. While Mori acknowledged the psychological, perhaps evolutionary, aspects of uncanny feelings, he was primarily concerned with the uncanny valley as a design problem. He recommended the graph’s second peak—moderate likeness, considerable affinity—as the target for designing prosthetics, mannequins, robots, etc., to which humans can comfortably relate. This guided the direction (toward abstraction) of Japanese robotics for decades thereafter, despite the fact that humanlike automata had positive associations in Japanese history and popular culture.¹² Claudia Schmuckli points out in the exhibition catalogue *Beyond the Uncanny Valley: Being Human in the Age of AI* that Mori’s article coincided with a crisis around 1973 in AI research, funding,

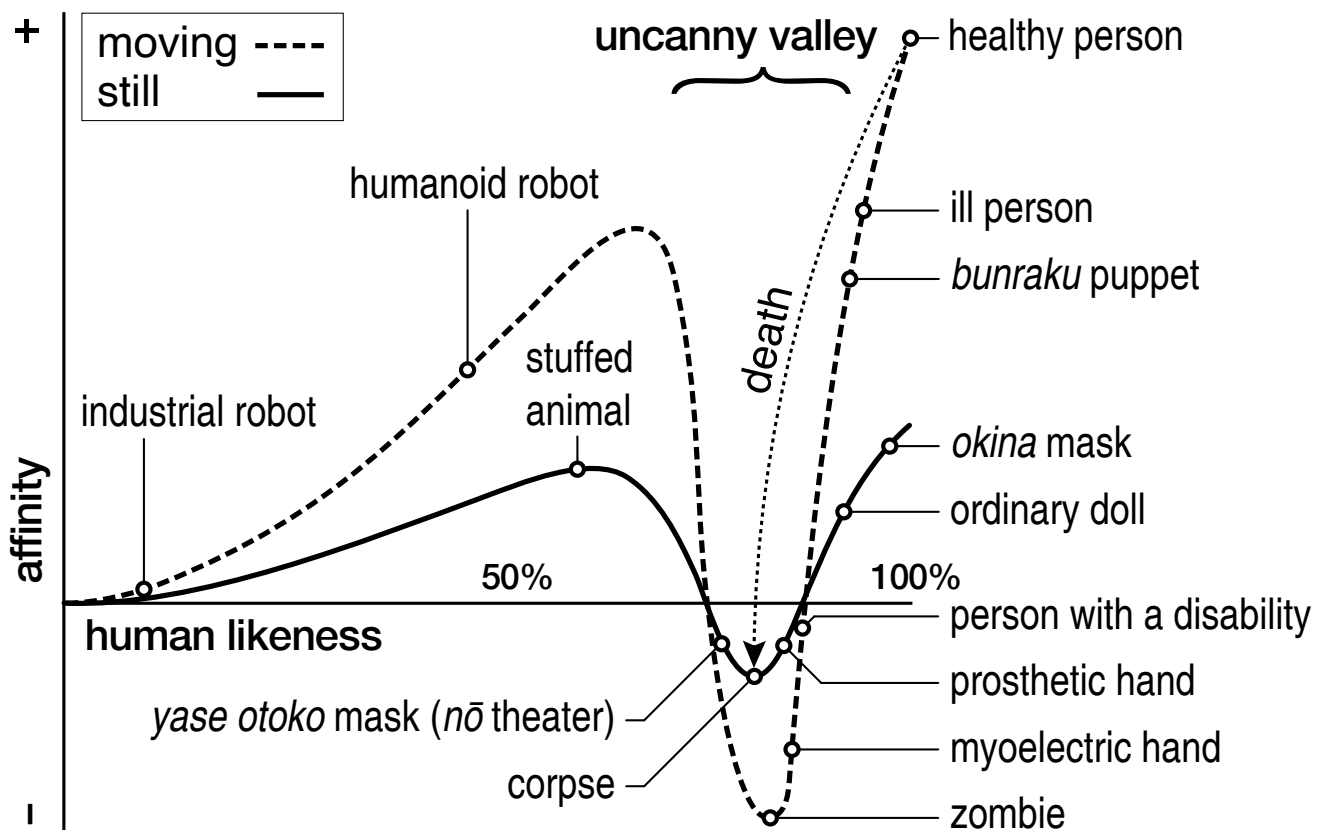


Figure 1. Masahiro Mori, *The Uncanny Valley*, 1970, translated and redrawn by Karl MacDorman and Norri Kageki in consultation with Mori, published in *IEEE Robotics and Automation* 19, no. 2 (June 2012), p. 99, courtesy of Karl MacDorman

and public confidence that curtailed new thinking about neural networks, or a theorized synthesis between brain science and computer science.¹³ Resistance to such brain modeling points to an assumption of human exceptionalism, an attitude that carried over into design. As Tobias Rees notes, “The machines produced by early AI engineers were always markedly nonhuman.”¹⁴

The sentient machine in Stanley Kubrick’s *2001: A Space Odyssey* (1968) did not physically resemble a human being. While HAL 9000 certainly crossed the machine-human barrier to defend itself when threatened with disconnection, the film’s abstraction and futuristic setting forestalled a plunge into the uncanny valley. By contrast, Duane Hanson’s hyperrealistic sculptures, first shown at exactly this time, depicted ordinary people in resin, fiberglass, and other materials. When encountered in an art gallery, sculptures such as *Drug Addict* (1974; Yale University Art Gallery) or *Janitor* (1973; Milwaukee Art Museum) provoked “both empathy and discomfort, familiarity and surprise.”¹⁵ Disruptive of modernist aesthetics, they elicited critical skepticism and public fascination in equal measure, as can be traced in the titles of his reviews: “Sculpture ‘Too Grisly’ Banned from Exhibition” (1968), “New Realism Movement is Growing with

Images Too Clear for Comfort” (1971), “Mute Figures Have Eerie Quality” (1977), “Hanson’s Realistic Sculptures Startle and Amaze Public” (1981), to name just a few among many.¹⁶

While Hanson made use of new, synthetic materials, his project was essentially aligned with traditions of Western sculpture, recently explored in the ambitious 2018 exhibition and catalogue *Like Life: Sculpture, Color, and the Body*, curated by Luke Syson, Sheena Wagstaff, Emerson Bowyer, and Brinda Kumar for the Metropolitan Museum of Art. That is to say, Hanson’s works triggered sensations of uncanniness through their replication of human features and gestures and their presence in ordinary public environments. Starting in the 1980s, digital tools opened the possibility of approaching the uncanny valley by other means, in motion and in virtual space. Notable in the early history of this technology, artist Rebecca Allen questioned the inevitability of hyperrealistic 3D rendering of humans, which was the default goal of most computer scientists. Instead, Allen intuited that the perceptual system could be triggered by schematically delineated, computer-generated human bodies, either in isolation or seen alongside humans in performances or composite videos that we would now call mixed reality.¹⁷ Allen’s portraits of the band Kraftwerk for their 1986 video “Musique Non-Stop” [fig.2]



Figure 2. Rebecca Allen, *Kraftwerk Portrait*, 1986, digital print, courtesy of the artist

brought her ideas to a mass viewership. The band already identified itself with human-machine melding; their live shows included robot versions of themselves, for which they had commissioned mannequin heads. Allen used these model heads to create digital 3D wireframes, retaining the faceted look when shading, coloring, and lighting them. She deviated from this process for only one feature: the eyes, which are photographic.¹⁸ Kraftwerk biographer Uwe Schütte describes “a particularly uncanny moment in which the computer-animated face of [Florian] Schneider suddenly opens his eyes and sings ‘music non-stop.’”¹⁹ This new type of uncanniness lodged in the imagination of a generation of MTV viewers.

Allen’s collaboration with Kraftwerk, coincident with James Cameron’s *The Terminator* (1984) and William Gibson’s novel *Neuromancer* (1984), contributed to a cultural fascination with cyborgs—cybernetic organisms, or physical beings with machinic components or enhancements—as manifestations of the uncanny. Meanwhile, in the field of AI, theoretical research on brain-inspired, neural-net architectures resumed in the 1980s, despite the expense and slow speeds of computing power.²⁰ In the last decade of the 20th century, a coalescence of ideas, imagination, and engineering would finally bring into view a horizon of mixed reality.

HUMANITIES “MASTER TROPE” OF THE 1990S

With the onset of the digital age, the 1990s saw an obsession with the uncanny across several humanities disciplines—to the extent that Martin Jay called it a “master trope” of the decade. Ernst Jentsch’s foundational essay was first translated into English in 1995, and Freud’s longer text was cited with increasing frequency. “In the past few years,” wrote Jay in 1995, “the concept has migrated from the ghetto of poststructuralist literary criticism first to the visual arts, and now to cultural studies in general.”²¹ Jacques Derrida used the uncanny to resurrect Marx’s “spectrology” and to make a larger point about the temporality of ideas. Contrary to the forward-moving direction implied by modernity’s succession of “posts,” Derrida posited time as repetitive, always haunting the present; similarly, the human project ought not to be conceived as a drive toward wholeness or transcendence (the *heimlich*), but rather as a coming to terms with plurality, exile, and diaspora (the *unheimlich*).²²

The decade’s “troubled interface between history and memory,” to use Jay’s words, yielded innovative scholarship that would be quickly absorbed into the discipline of art history and visual art practice. To name just a few examples: Anthony Vidler’s *The Architectural Uncanny: Essays in the Modern*



Figure 3. Charles Ray, Fall '91, 1992, mixed media, 96 x 26 x 36 in. (243.84 x 66.04 x 91.44 cm), The Broad Art Foundation, Los Angeles © Charles Ray, courtesy Matthew Marks Gallery

Unhomely (1992), Terry Castle's *The Female Thermometer: Eighteenth-Century Culture and the Invention of the Uncanny* (1995), Donna Haraway's *Simians, Cyborgs, and Women: The Reinvention of Nature* (1991), and N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (1999). In different ways, these influential texts provided origin stories for modern and postmodern alienation in the face of substantial technological change. This was also the moment when a definition of "mixed reality" was first published by Paul Milgram and Fumio Kishino (1994).²³ Their conceptualization of merged real and virtual imagery, only just becoming possible in technological terms, relates conceptually to the psychology and theorization of the uncanny.

In visual culture, multiplayer video games shifted from 2D to 3D graphics, raising the bar for realistic characters and worlds, and artists too brought new consideration to issues of embodiment. Indicating this turn, an exhibition titled *Post Human* curated by Jeffrey Deitch toured to five venues in Europe and Israel in 1992–93 and had additional impact via its catalogue, which combined mass-media imagery, installation views, and bold typeset mottos.²⁴ Inspired by trends in figuration, the show included works in all media and asserted technology as an enabling factor that had to be considered critically along with traditional criteria of form and meaning. As if taking Derrida's point about recurrence, Deitch summoned Duane Hanson as an "old master" of sorts, thus renovating an artist whose occupancy of the uncanny valley had always exasperated the art world. Robert Rosenblum remarked on Hanson's significance in this context: "The sensationalist hack whose effigies belonged at Mme Tussaud's was suddenly a father figure to a new generation of hip posthumans."²⁵

Among the new generation was Charles Ray, whose *Fall '91* [fig. 3] appeared in Deitch's show and on the September 1992 cover of *Artforum*. This female mannequin straddles past and present, posed in a classical contrapposto stance while wearing an up-to-the-minute power suit. She will always be new, even as her garments go out of style, but Ray explains he was not interested in "the tight zone of uncanniness pertaining to another era."²⁶ The figure's disconcerting effect comes from a scale shift: at eight feet tall, she is the familiar made unfamiliar, inviting but rebuffing the viewer's desire. "The mannequin never smiles," Ray has said, "and hence is drained of intentionality and of a soul, allowing the customer to project into the mannequin the products on offer."²⁷

Vision was central to Freud's theory of the uncanny, and it also came to the fore in the art of the 90s. Ray's mannequins have an exotropic gaze, both eyes facing outward so they can never make eye contact with a viewer. Lynne Hershman Leeson implicated the viewer differently with her 1995–98 *Dollie Clone* series, in which cameras replace the dolls' eyes,

a video camera in the left eye, a webcam in the right. The cameras transmit video footage of their surroundings to a website, and participants (whether in the gallery or remotely) can click to control the dolls' movements and points of view. When she created these works, Leeson "was looking at what the internet could do to bring people, users of this technology, together."²⁸ In retrospect, the series predicts forms of surveillance we now accept as normal.

Leeson's dolls, more than just containers for cameras, also recall Olympia, the uncanny automaton in Hoffmann's "The Sandman," whose eyes have been crafted by the titular character—a terrifying figure said to steal the eyes of children who won't go to bed. Deploying these potent tropes, Loretta Lux's photographs, first shown around 2000, were consistently described as uncanny.²⁹ While depicting real children, they are stylized, ambiguous, and eerily perfect in the manner of Ray's sculpture of a mannequin. Moreover, they have been digitally altered, the heads and eyes subtly enlarged. "Stare into the eyes of a Loretta Lux portrait long enough," wrote Carolyn Sayre in *Time* magazine, "and you're bound to feel both completely mesmerized and completely spooked."³⁰ The reception of Lux's portraits in the early 2000s points to a perception of digital technology itself as uncanny. Although her work was primarily shown and published in the context of photography, reviewers invariably noted Lux's background as a painter, presuming a connection between that training and her use of digital manipulation to produce uncanny effects.

Around the turn of the millennium, ideas around the uncanny, cyborgs, digital imaging and animation, artificial intelligence, the internet dovetailed in art and culture. Faster, cheaper, and more accessible digital tools produced new kinds of so-called post-medium art, surveyed in exhibitions such as *The Uncanny: Experiments in Cyborg Culture* (2001, Vancouver Art Gallery); *010101: Art in Technological Times* (2001, San Francisco Museum of Modern Art), and *BitStreams* (2001, Whitney Museum of American Art). As *BitStreams* curator Lawrence Rinder stated: "Imbued with unsettling emotional and psychological states, these works also reflect the pervasive sense of irreality that has come to suffuse our everyday lives in this dawning digital age. Digital technologies are contributing to a sense that the boundaries between the organic and inorganic, the known and the unknown, the real and the unreal, are being blurred beyond recognition."³¹ These words are yet another echo from the uncanny valley.

INTERDISCIPLINARY METHODOLOGIES OF THE 2000S

Part of the newness, the strangeness, of digital technologies as perceived around the turn of the twenty-first century was their apparent independence from logocentric, Western ontologies.³² Software's leveling of all information to ones and zeros was part of this decentering, but there was

also a kind of globalism in motion as well. Bruce Grenville, curator of *The Uncanny: Experiments in Cyborg Culture*, asserted a direct connection between contemporary ideas about the uncanny cyborg body and Japanese art (at least as seen in the context of global capitalism).³³

As if on cue—the uncanny does have to do with the return of the repressed, after all—Mori’s heretofore little-known essay on the uncanny valley resurfaced. At the IEEE 2005 Robotics and Animation Society International Conference on humanoid robots in Tsukuba, Japan, American roboticist Karl F. MacDorman, with the help of Minato Takashi, hastily translated the text into English for the first time.³⁴ Later that year, MacDorman convened a workshop, “Toward Social Mechanisms of Android Science,” in Stresa, Italy, as part of the annual Cognitive Science conference, with Stephen Cowley, Kerstin Dautenhahn, and Hiroshi Ishiguro.³⁵ MacDorman and his colleagues, who are advocates of humanoid robots (as companions for the elderly, for example), wanted to build upon Mori’s insights but were concerned about negative understandings of the uncanny valley, which would threaten their funding. Larger forces were at work, however. As seen in the Google Ngram, the new translation of Mori’s essay coincided with a surge in the concept’s currency across an astonishing range of domains and disciplines: engineering and robotics, computer science and computational vision, cognitive science and neuroscience, psychology, game design, visual effects, popular culture, and mass media.

Attempts to test, quantify, and refine Mori’s theory have abounded, with experimental parameters differing according to the agenda or desired outcome.³⁶ Whether studying prosthetic limbs, PTSD, eldercare, or game play, researchers often invoke Mori, his graph, and the assumed universality of the uncanny effect. Laboratories may yield ever more refined models to predict human response, but to observe those responses in real time, we have only to look at the marketplace for entertainment, social media, and the internet. With some trial and error, the relative appeal of synthetic, virtual avatars was tested in the 2000s.³⁷ In less than a generation, an entire reception history could be written, from the flop of *The Polar Express* (2004) through the success of *Avatar* (2009) to the fan-prompted modifications of *Sonic the Hedgehog* (2020).

For *Avatar*, James Cameron was convinced that a combination of CGI and IMAX 3D would result in fully realistic characters in a fully realized world.³⁸ The plot opens with a paraplegic character who can move freely in a virtual body, that of an exotic species called the Na’vi; this redemptive human-machine interaction encourages empathy in the viewer. Significantly, the Na’vi, while based on performance capture technology, are digitally altered so they differ notably from the human by color, scale, and facial features and thus do not fall into the uncanny valley. Because of these differences, viewers can gaze upon characters without

uneasiness: “their faces are a triumph of tech innovation, with tremors and twitches that make them immediately appealing and empathetic,” according to Manohla Dargis.³⁹ The visual consistency of the Na’vi and their computer-generated environment, as well Cameron’s skilled use of 3D, contributed to the immersiveness of *Avatar* and its reception as a new kind of experience, despite its rather traditional story and message. And finally, *Avatar* was pivotal not only in terms of production but also distribution: its appeal was strong enough to persuade theaters to convert to digital projection, thus marking a significant change in cinema’s materiality and medium-specificity.⁴⁰

Avatar’s release was accompanied by a video game, indicating a digitally-enabled continuity across platforms that was also surfacing in contemporary art. Cao Fei’s intervention in Second Life, an online 3D user-created virtual world launched in 2003 by the San Francisco-based firm Linden Lab, is a particularly powerful example. Second Life users have avatars—composed of basic 3D building blocks called “prims,” from *primitive*—and can make purchases, trade, build, and interact. By 2007, when Cao heard about it, Second Life was open-sourced and had improved graphics, allowing the artist and her team to create a world within the world that she called RMB City. Like *Avatar*’s Pandora, RMB City is stylized, coming close to the uncanny valley without tipping over into it, inviting sustained participation to a degree some commentators found alarming.⁴¹ RMB City’s aesthetic is hybrid of old and new, real and imaginary; somewhat chaotic, because participants were involved in its construction, it nevertheless makes a sort of cumulative sense. Inserting herself as a protagonist / player named China Tracy, Cao observed over RMB City’s two years of operation (2009–11) that people came to Second Life hoping to resolve, decode, or interpret quandaries in real life.⁴²

The fantasy of escape from the physical body and immersion in technologically created, autonomous, heterotopic worlds clearly held a lot of appeal at this moment.⁴³ Yet it was becoming evident that no clear dividing line should be drawn between digital / physical bodies and online / offline space.⁴⁴ This seemingly new space or realm of experience was nothing if not uncanny, a blend of the familiar and unfamiliar. Layered on top of modern and postmodern interpretations of the uncanny, posthumanism in critical theory and science fiction “invokes a complex dialogue around a decentered human subject, who makes it possible to explore how commonly held distinctions between the natural and the cultural have been blurred by the effects of science and technology.”⁴⁵ From Deitch’s speculative catchphrase in 1992, through Hayles’s critical analysis in 1990, and various test cases in art, film, and video games in the 2000s, the posthuman became a matter of theoretical and philosophical concern.⁴⁶



Figure 4. Stephanie Dinkins, *Conversations with Bina48*, 2014–present, mixed media © Stephanie Dinkins, courtesy of the artist

Even in an era preoccupied with digital disembodiment and virtuality, it remains the case that physical, humanlike androids pose problems recalling E. T. A. Hoffmann. The robotics lab of Hiroshi Ishiguro is renowned for developing a series of lifelike robots, the Geminoid series modeled on Ishiguro himself (2006/07) and Erica on so-called ideal females (2015).⁴⁷ Concurrently, CGI expert Paul Debevec has unveiled likewise hyperrealistic entities Digital Emily (2008–09) and Digital Ira (2013).⁴⁸ While both endeavors have sparked strong reactions for falling into the uncanny valley, the physical androids are particularly potent, raising questions of narcissism, immortality, and empathy, along with sex and gender dynamics, given the propensity for female forms. MacDorman and Ishiguro have proposed a new discipline—android science—to study the significance of human likeness in human-machine relationships.⁴⁹ It can be contended that robots designed in human form might function more seamlessly in human spaces and with human tools,⁵⁰ but most functions could be accomplished with abstracted ‘spaceman’ like forms. The primary justification for designing humanlike features, according to MacDorman and Ishiguro, is to conduct social, psychological, and cognitive research; to test the android’s “ability to sustain humanlike relationships with people.”⁵¹

This question is at the core of an ongoing project by artist Stephanie Dinkins, who investigates the capacity of

AI technology to accommodate diverse histories and modes of interactivity. In *Conversations with Bina48*, Dinkins engages with an android commissioned by Martine Rothblatt from Hanson Robotics in 2010 and modeled on Rothblatt’s wife, Bina [fig 4]. Attempting to forge a friendship with the android, Dinkins posed questions that would test the limits of programmed human subjectivity and realized through his conversation that Bina48’s AI did not include any understanding of Black female identity.⁵² This led Dinkins to embark on a new project, an AI chatbot named N’TOO (Not the Only One), programmed with stories from three generations of her own family. N’TOO is building on a narrative basis; its humanlike avatar form has not yet been determined. In interviews, Dinkins has asked if it even has to have a form, let alone a hyperrealistic one.⁵³

Dinkins’s *Conversations with Bina48* takes the form of video documentation. Even now, most people only encounter humanlike robots as represented in other media, rarely seeing actual devices. Photography and film, historically and theoretically associated with the uncanny by virtue of indexicality, are particularly potent in this regard.⁵⁴ Surrealist photographs of dolls and mannequins, not to mention the genre of science-fiction film, constitute a rich and durable iconography of the uncanny. Bearing this in mind, Wanda Tuerlinckx uses a 19th-century camera to photograph robots, including several of the most advanced androids produced by Hanson Robotics and Hiroshi Ishiguro Laboratories [fig 5].



Figure 5. Wanda Tuerlinckx, Erica, Hiroshi Ishiguro Laboratories ATR, Kyoto, Japan, 2016, inkjet print from scanned paper negative, 14 ³/₄ x 11 ³/₄ in. (37.5 x 30 cm) © Wanda Tuerlinckx, courtesy of the artist

Working in collaboration with robotics professor Erwin Boer, Tuerlinckx has gained access to research labs around the world. She occasionally felt the discomfort of uncanniness, for example when the androids moved suddenly or seemed to fix her with an intent gaze.⁵⁵ Viewers, too, have an uncanny experience, first assuming the photographs are portraits of living people and then learning they are robots. The 19th-century camera, once the new technology accused of stealing its subjects' souls, is now the means of endowing robots with living presence.

Conclusion: the role of art

Haunting all these efforts—whether in Freud's moment or our own; whether in robotics, contemporary art, or mass entertainment—are the questions: Can the uncanny valley be overcome, should that be a goal, and would be the consequences of achieving it? In the technology domain, it is an irresistible challenge to narrow and attempt to close the gap, to fine-tune humanlike qualities of expression, voice, motion, responsiveness. "Overcoming the uncanny valley" makes for a great headline. The "quest" narrative can foster a sense of progress, spur investment, and posit a future in which humans and machines interact successfully, that is, empathy without uneasiness.

But we might ask: is the uneasiness itself necessary and valuable? After all, that is one of the claims for art, at least from the modern period onward. Art is ambiguous, always challenging perceptual habits, provoking self-interrogation, and sending viewers back out into the world with altered perspectives.⁵⁶ Ultimately, the uncanny valley is not a scientific hypothesis; it is an existential conundrum rooted in the essence of selfhood, alienation, death. Thus, artistic and cultural manifestations are meaningful experimental propositions, just as prototypes in robotics labs are. Encountering uncanny works of art in a museum or gallery allows—forces—us to practice and maintain the skill of being in that uncomfortable feeling, holding an unsettling gaze, reflecting on the nature of human relationships in an era in which mediated experience may be preferred over IRL encounter.⁵⁷

A cluster of exhibitions in recent years points to yet another confluence of curatorial, artistic, and technological ideas around these issues. Cross-disciplinary and in some cases cross-generational efforts, these ambitious projects take up histories and timelines of art/technology: *Electronic Superhighway: From Experiments in Art and Technology to Art after the Internet*, (2016, Whitechapel Gallery); *Art in the Age of the Internet, 1989 to Today* (2018, ICA Boston); *The Body Electric* (2019, Walker Art Center); *AI: More than Human* (2019, Barbican Art Centre); and *Beyond the Uncanny Valley: Being Human in the Age of AI* (2020, Fine Arts Museums of San Francisco). Claudia Schmuckli, curator of *Beyond the Uncanny Valley*, summarizes her argument as follows: "the contemporary uncanny valley is no longer limited to the image of the humanlike rotor or 'thinking machine.' It is mapped by the inscrutable calculations of algorithms that are designed to mine and analyze humans' behavior and project it into tradable futures."⁵⁸ In other words, today we may be caught between two uncanny valleys—the resemblance one and the abstract/digital one—and we are coming to terms with a reality that is inherently mixed.

This essay has surveyed the origins, repetitions, and morphing of the uncanny and the uncanny valley as concepts resonating across disciplines and finding expression in contemporary art and popular culture. What accounts for their durability and malleability, a century after Freud's essay? In part, these theories speak to a persistent tendency to view the world in terms of binaries, new and old, imagined and real, alive and dead, nature and science, machine and human. They also seem to root our response to that world in a shared biological adaptation. But there can be no one way of understanding what it means to be human. The category itself must now be recognized as uncanny. From Stephanie Dinkins's *N'TOO* to Jordan Peele's *Us*, creators are moving beyond traditional artistic genres and mobilizing the uncanny in order to explore identity, race, and power in the twenty-first century; asking critical questions about the psychological costs of the uncanny valley. Looking beyond its pitfalls and toward a horizon of mixed reality means dispersing agency and holding ambiguity in suspension.

NOTES

- ¹ To borrow Deleuze's notion of "the cinematic," "the uncanny" may also be considered as a set of processes involved in the production and reproduction of social reality itself; see Gilles Deleuze, *Cinema 1, The Movement-Image*, trans. Hugh Tomlinson and Barbara Habberjam (Minneapolis: University of Minnesota Press, 1986), discussed in Kara Keeling, *The Witch's Flight: The Cinematic, the Black Femme, and the Image of Common Sense* (Durham, NC: Duke University Press, 2007).
- ² Ernst Jentsch, "On the Psychology of the Uncanny [1906]," trans. Ray Sellars, in Jo Collins and John Jervis, *Uncanny Modernity: Cultural Theories, Modern Anxieties* (London: Palgrave Macmillan, 2008), 217.
- ³ Anthony Vidler, *The Architectural Uncanny: Essays in the Modern Unhomely* (Cambridge, MA: The MIT Press, 1992), 22–23.
- ⁴ Jentsch, in Collins and Jervis, 221.
- ⁵ Jentsch notes that exact resemblance is not required and may be detrimental to the effect.
- ⁶ Jentsch, in Collins and Jervis, 224.
- ⁷ Claudia Schmuckli, "Automatic Writing and Statistical Montage," in Schmuckli, *Beyond the Uncanny Valley: Being Human in the Age of AI* (San Francisco: Fine Arts Museums of San Francisco, 2020), 10; Vidler, 33–34.
- ⁸ Collins and Jervis, "Introduction," in Collins and Jervis, 2.
- ⁹ Vidler, 7–9.
- ¹⁰ Collins and Jervis state that Freud's essay was cited in the journal *Tel Quel* in March 1970; "Introduction," in Collins and Jervis, 2. Martin Jay notes the retrieval of Freud by Hélène Cixous and Jacques Derrida in the early '70s; "The Uncanny Nineties," *Salmagundi*, no. 108 (fall 1995), 21.
- ¹¹ Masahiro Mori, "The Uncanny Valley," *Energy* 7, no. 4 (1970), 33–35. *Energy* was published by the Japanese branch of Esso Standard Oil. For the most recent English translation, see <https://spectrum.ieee.org/automaton/robotics/humanoids/the-uncanny-valley> (accessed January 18, 2021). Jasia Reichardt's *Robots: Fact, Fiction, and Prediction* (New York: Penguin Books, 1978) presented a version of Mori's essay as a short chapter, not as a translation as such, written in the third person and with two paragraphs swapped; Karl F. MacDorman, email to author, January 14, 2021.
- ¹² Karl F. MacDorman, Sandush K. Vasudevan, and Chin-Chang Ho, "Does Japan really have robot mania? Comparing attitudes by implicit and explicit measures," *AI and Society* 23, no. 4 (July 2009), 485–510.
- ¹³ Schmuckli, 10; Tobias Rees, "Machine/Intelligence: On the Philosophical Stakes of AI Today" and "AI Timelines and Glossary," in Schmuckli, 114–15, 180–82. Computing power could only produce 2-layer neural networks at that point; Warren Sack, video conversation with author, November 24, 2020.
- ¹⁴ Rees in Schmuckli, 114.
- ¹⁵ Sheena Wagstaff, "Embodies Histories," in *Like Life: Sculpture, Color, and the Body* (New York: The Metropolitan Museum of Art, 2018), 11.
- ¹⁶ See Hanson's selected bibliography on Gagosian website: https://gagosian.com/media/artists/duane-hanson/Hanson_Duane_biblio.pdf (accessed January 18, 2021).
- ¹⁷ For example, in *RAB* (1985), a collaboration with Patrice Regnier and Carter Burwell, dancers interacted with a computer-generated performer projected onstage. Rebecca Allen, phone conversation with author, January 16, 2021. Digital and physical performances were composited together for the BBC film project *Catherine Wheel* (1982), a collaboration between Allen and Twyla Tharp.
- ¹⁸ See process shots on Allen's website, www.rebeccaallen.com, and in Geeta Dayal, "Meet Kraftwerk's Original 3D Animator, Rebecca Allen," *Wired*, April 20, 2012; Amah-Rose Abrams, "Neon Lights: The Digital Art of Rebecca Allen," *The Quietus*, November 16, 2019.
- ¹⁹ Uwe Schütte, *Kraftwerk: Future Music from Germany* (London: Penguin Books, 2020).
- ²⁰ Rees in Schmuckli, 115.
- ²¹ Jay, 22.
- ²² Jay, 23–24; Derrida lectured on this topic in a 1993 series at the University of California–Riverside; later published as *Specters of Marx: The State of the Debt, the Work of Mourning, and the New International*, trans. Peggy Kamuf, intro. Bernd Magnus and Stephen Cullenberg (London: Routledge, 1994).
- ²³ Paul Milgram and Fumio Kishino, "A Taxonomy of Mixed Reality Visual Displays," *IEICE Transactions on Information Systems*, vol. E77-D, no. 12 (December 1994).
- ²⁴ "Exhibition Histories: Jeffrey Deitch on 'Post Human' in 1992/93," *Spike Art Quarterly*, no. 47. The exhibition traveled to FAE Musée d'Art Contemporain, Lausanne; Castello di Rivoli, Turin; Deichtorhallen, Hamburg; Deste Foundation, Athens; Israel Museum, Jerusalem. The catalogue (Stuttgart: Hatje Cantz: 1992) was designed by Dan Friedman.
- ²⁵ Robert Rosenblum, "Popisms: 'Post Human,'" *Artforum* 43, no. 2 (October 2004).
- ²⁶ Charles Ray and Massimiliano Gioni, "Charles Ray, A Geological Take on Time," *Art Press*, no. 458 (September 2018), 39.
- ²⁷ Ray and Gioni, 40.
- ²⁸ "Conversation: Lynn Hershman Leeson and Hito Steyerl," in Eva Respini, ed., *Art in the Age of the Internet: 1989 to Today* (Boston and New Haven: ICA and Yale University Press, 2018), 148. Leeson's *CyberRoberta* is modeled after the artist; she and Ray have both created works that are uncanny facsimiles of themselves. Freud discusses doppelgangers in some detail in "The 'Uncanny,'" *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, trans. James Strachey (London: Hogarth Press, 1955), vol. 17, 235–38.
- ²⁹ Jane Fletcher, "Loretta Lux: Spellbound," *Portfolio*, no. 42 (January 2005), 4.
- ³⁰ Carolyn Sayre, "Innovators: Lens Crafters, Loretta Lux," *Time*, June 9, 2008. Sayre notes that Lux's "formula" has made her an "artworld phenom and millionaire."
- ³¹ Lawrence Rinder, "Art in the Digital Age," *BitStreams* (New York: Whitney Museum of American Art, 2001), 1, 3.
- ³² Since that time, additional critique has been mounted around the biases in software and computing; see for example, Lisa Nakamura, *Digitizing Race: Visual Cultures of the Internet* (Minneapolis: University of Minnesota Press, 2007).
- ³³ Bruce Grenville, "Preface," *The Uncanny: Experiments in Cyborg Culture* (Vancouver: Vancouver Art Gallery, 2001), 11; see also Toshiya Ueno's essay in the same volume, "Japanimation and Techno-Orientalism." Ueno (231), questions the Western "cyberpunk" appropriation of Japanese art, contending that Japanimation "is travelling through the cultural diaspora into the world and is translated, communicated, and misunderstood." For recent discussions of Chinese and Hindu traditions and perspectives on AI, see Yuk Hui, "Machine Intelligences and Kantian Divides," and Matteo Pasquinelli, "Three Thousand Years

- of Algorithmic Rituals: The Emergence of AI from the Computation of Space," in Schmuckli, 118–22 and 124–29.
- ³⁴ As part of this larger Humanoids-2005 conference, MacDorman, Christian Keysers, and Frank Pollick organized a workshop called "Views of the Uncanny Valley"; MacDorman explains the problems around translation in "La Vallée de l'Étrange de Mori Masahiro," *É-Phaistos* 7, no. 2 (2019), 3: "Car Mori adopte un style littéraire et aborde le sujet sous différents angles, contrairement à l'approche plus communément retrouvée dans les écrits scientifiques, qui consiste en une exposition linéaire." See also Jeremy Hsu, "Robotics' Uncanny Valley Gets New Translation," *Live Science*, June 12, 2012, <https://www.livescience.com/20909-robotics-uncanny-valley-translation.html> [accessed January 8, 2021].
- ³⁵ Karl F. MacDorman, email to author, January 13, 2021. Participants included Sherry Turkle (MIT) and Colin Allen (University of Pittsburgh). See Karl F. MacDorman and Hiroshi Ishiguro, "Workshop Report: Toward social mechanisms of android science," *Interaction Studies* 7, no. 2 (2006), 289–96; and Karl F. MacDorman, "Androids as experimental apparatus: Why is there an uncanny valley and how can we exploit it?" *CogSci 2005 Workshop: Toward Social Mechanisms of Android Science* (2005), 108–18.
- ³⁶ See for example Maya B. Mathur and David B. Reichling, "Navigating a social world with robot partners: A quantitative cartography of the Uncanny Valley," *Cognition* 146 (2016), 22–32. Aims and types of quantitative experiments are usefully summarized in Angela Tinwell, *The Uncanny Valley in Games and Animation* (Boca Raton, FL: CRC Press, 2015).
- ³⁷ Karl MacDorman ("La Vallée de l'Étrange", 7) calls these arguments circular. A non-circular argument would analyze the phenomenon in relation to variables of stimuli and behavior, then seek underlying psychological and neurological mechanisms at work.
- ³⁸ Peter Sciretta, "James Cameron's Avatar to Overcome Uncanny Valley?" *Slash/Film*, May 21, 2008, <https://www.slashfilm.com/james-camersons-avatar-to-overcome-uncanny-valley/> [accessed January 10, 2021].
- ³⁹ Manohla Dargis, "A New Eden, Both Cosmic and Cinematic," *New York Times*, December 17, 2009.
- ⁴⁰ Thomas Elsaesser, "The 'Return' of 3D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39 (winter 2013), 217–46.
- ⁴¹ Fan forums immediately sprung up to articulate the allure of Pandora. See Ty Burr, "'Avatar' film creates a world that feeds into our desire to escape," *Boston Globe*, July 10, 2010; Roger Ebert, "Reviews: Avatar," *RogerEbert.com*, December 11, 2009; Jo Piazza, "Audiences Experience 'Avatar' Blues," *CNN.com*, January 11, 2010.
- ⁴² Cao Fei interviewed for *Art 21*, season 5, October 14, 2009; see art21.org [accessed January 18, 2021].
- ⁴³ Chris Berry, "Images of Urban China in Cao Fei's 'Magical Metropolises,'" *China Information* 29, no. 2 (2015), 205.
- ⁴⁴ Karen Archey, "Bodies in Space: Identity, Sexuality, and the Abstraction of the Digital and the Physical," in Lauren Cornell and Ed Halter, ed., *Mass Effect: Art and the Internet in the Twenty-First Century* (Cambridge, MA: The MIT Press, 2015), 452; see also N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999), 246.
- ⁴⁵ Eva Respini, "No Ghost Just a Shell," in Respini, 34.
- ⁴⁶ Deitch recalled in 2016 in *Spike Art Quarterly*: "I am always looking for provocative titles that can help carry the theme of an exhibition beyond the insider art world and into the wider culture. During one of my morning runs, I came up with 'Post Human.' it has been very interesting to see the term enter into language."
- ⁴⁷ Ishiguro coined the term Geminoid from *geminus*, Latin for "twin." Reportedly the AI robot Erica from Ishiguro's lab will appear in a feature film, *b*, a story of human and android scientists working on human DNA research; Jeremy Blum, "Artificially Intelligent Android 'Erica' to Star in Big-Budget Science Fiction Film," *Huffpost*, June 6, 2020, https://www.huffpost.com/entry/erica-japanese-robot-science-fiction-film_n_5ef6523dc5b6acab284181c3 [accessed January 11, 2021].
- ⁴⁸ Tinwell, 197.
- ⁴⁹ Karl F. MacDorman and Hiroshi Ishiguro, "The uncanny advantage of using androids in social and cognitive science research," *Interaction Studies* 7, no. 3 (2006), 297–337; and Karl F. MacDorman and Hiroshi Ishiguro, "Opening Pandora's uncanny box: Reply to commentaries on 'The uncanny advantage of using androids in social and cognitive science research,'" *Interaction Studies* 7, no. 3 (2006), 361–68. MacDorman notes that they had to be careful about where the androids were seen publicly, lest its anthropomorphic appearance trigger negative reactions; "La Vallée de l'Étrange," 6.
- ⁵⁰ Frank E. Pollick, "In Search of the Uncanny Valley," in Petros Daras and Oscar Mayora, eds., *International Conference on User Centric Media 2009* (Berlin and Heidelberg: Springer, 2010), 69–78.
- ⁵¹ MacDorman and Ishiguro further explain: "Androids can act as a testing ground for theories about human interaction and for theories about the role of the brain as a control system in mediating whole-bodied communication"; "The uncanny advantage," 302.
- ⁵² Janna Keegan, "Stephanie Dinkins," in Schmuckli, 37.
- ⁵³ Stephanie Dinkins in conversation with Janna Keegan, DeYoung Museum, Facebook Live, May 28, 2020. Dinkins observes that "removing direct human mimicry allows for a different kind of interaction. I am often taken by how much grace and patience visitor show *Not the Only One* even though its ability to communicate is quite limited"; email to author, February 6, 2021.
- ⁵⁴ Susan Sontag's reflections on photographs as memento mori are still resonant today; see Sontag, *On Photography* (New York: Farrar, Straus & Giroux, 1973), 11.
- ⁵⁵ Wanda Tuerlinckx, email to author, January 13, 2021.
- ⁵⁶ "White cube" spaces for the display of contemporary art emerged in sharp contrast to the ornate decor of a prior era, enabling a new kind of spectatorship. John Jervis notes that the overstuffed domestic (*heimlich*) interiors of Freud's (and Benjamin's) era can trigger both sentimentality and uncanniness; John Jervis, "Uncanny Presences," in Collins and Jervis, 17.
- ⁵⁷ Respini, 24.
- ⁵⁸ Schmuckli, 15.

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