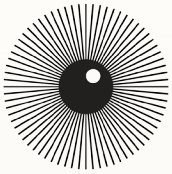

REAL LIFE

VISION

“Eyes Without a Face,” by Rahel Aima
“Seeing Red,” by Zack Hatfield
“Virtual Atrocities,” by Linda Kinstler
“Persistence of Vision,” by Franceska Rouzard

Seeing is a responsibility. Though image feeds are designed to “get eyeballs” on them, like olives stuck on a pick and served, it’s an all-around better look to “see” what you mean to handle. A person filming a thing, no matter how brutal, can feel as mediated away as a viewer does with a screen by their lucky status of “audience.” But both are bystanders too. While the pictures we show one another sometimes only approximate what we saw before we took them, later they can seem to fill lapses of memory with something true. As the AIs behind image feeds come to “remember” for us, showing what they see in our aggregated lives and projecting our future’s past, we may become another sort of distanciated audience, with the same temptation to distrust what we see: Maybe it wasn’t really the sun lighting that outdoor shot; maybe we never really landed on Mars. Vision as presence, not absence — as responsibility for what we see rather than consumption of it — can contain the past and the future without being strung up between them.

EYES WITHOUT A FACE

Algorithms don't just sort images, they give machines intuition: the ability to feel what an image means

by RAHEL AIMA

A FEW MONTHS AGO, I installed a Chrome extension called "Show Facebook Computer Vision Tags." It does exactly what it says on the tin. Once installed, images on my feed were overlaid with one or many emojied descriptors revealing the "alt" tags that Facebook automatically adds to an image (using a "Deep ConvNet built by Facebook's FAIR team") when it is uploaded. This feature, which the company launched in 2016, is meant as a tool for the visually impaired, who often rely on text-to-voice screen-readers. With these tags added, the screen reader will narrate: "Image may contain: two people, smiling, sunglasses, sky, outdoor, water." The user may not be able to see an image, but they can get an idea of what it contains, whether people are wearing accessories or facial hair, when they're on stage or playing musical instruments, whether they're enjoying themselves. The tags, in fact, only note positive emoting: smiling or not.

This seems a remarkably limited subset of linguistic and conditional terms for a platform of Facebook's ubiquity, especially given its investment in having images go viral. If virality is predicated upon images that inspire extremes of emotional response—the pet that faithfully waits for its dead master; a chemical attack in Syria—wouldn't the tags follow suit? Despite Facebook's

FROM YOU ARE THE WEATHER, PART 2 (DETAIL), 2010 - 2011 BY RONI HORN. COURTESY THE ARTIST AND HAUSER & WIRTH.

track record of studying emotional manipulation, its tagging AI seems to presume no Wow, Sad, or Angry—no forced smiles on vacation or imposter syndrome at the lit party.

A white paper on Facebook's research site explains that these tags—"concepts," in their parlance—were chosen based on their physical prominence on photos, as well as the algorithm's ability to accurately recognize them. Out were filtered the concept candidates that carried "disputed definitions" or were "hard to define visually": gender identification, context-dependent adjectives ("red, young, happy"), or concepts that are too challenging for an algorithm to learn or distinguish, such as a "landmark" from general, non-landmark buildings. But speaking with *New York* magazine earlier this year, Adam Geitgey, who developed the Chrome extension, suggested its training has expanded beyond that: "When Facebook launched [alt tags] in April, they could detect 100 keywords, but this kind of system grows as they get more data … A year or two from now they could detect thousands of different things. My testing with this shows they're well beyond 100 keywords already." As such, the Chrome extension is less interested in Facebook's accessibility initiatives, instead aiming to draw attention to the pervasiveness of data mining. "I think a lot of internet users don't realize the amount of information that is now routinely extracted from photographs," Geitgey explains on the extension's page in the Chrome web store, "the goal is simply to make everyone aware."

As the use of emojis makes plain, the extension addresses sighted users—those who do not use screen readers and are probably unaware, as I was, of this metadata Facebook adds to images. With the extension, a misty panorama taken from the top of the world's tallest building becomes a series of emojis for sky, ocean, outdoor, water; a restaurant snap from Athens, meanwhile, is emojis for six people, people smiling, people eating, food, and indoor. (Sometimes, when there's no corresponding emoji it adds an asemic □.) The tags aren't always completely right, of course; sometimes the algorithms that drive the automatic tagging misses things: recognizing only one person where there are three in a boat in Phuket Province, describing a bare foot as being shod. But there's something attractive in its very prosaic reduction of an image down to its major components, or even its patterning, as with an Alex Dodge painting of an elephant that is identified only as "stripes." The automatic tagging doesn't seem integrated with Facebook's facial recognition feature ("Want to tag yourself?") but rather allows you to view your life and the lives of your friends as a stranger might, stripped of any familiar names, any emotional context that makes an image more than the sum of its visual parts—resplendent in its utter banality.

Perhaps it's a legacy of growing up in the UAE, where you can fully expect every click, scroll, or even sneeze in a public space to be recorded, but I'm not bothered to find that according to its algorithmically generated "preferences" page in my profile, Facebook thinks my interests include "protein-protein interaction," "first epistle to the Thessalonians," and caviar (I'm a vegetarian); that it considers me both an early technology adopter and a late one.

Infinitely more exciting is the transposed comic-book dream of X-ray vision—seeing through the image to what the machine sees. I want to be able to access that invisible layer of machine-readable markup to test my vision against a computer's. The sentiment is not that different from the desire to see through the eyes of the other that has historically manifested itself in the colonial history of anthropology or in texts like John Howard Griffin's *Black Like Me.* The desire to see what they see, be it other people or machines, is a desire to feel what they feel. AI researcher Eliezer Yudkowsky described the feeling of intuition as the way our "cognitive algorithms happen to look from the inside." An intangibly human gut response is just as socialized (programmed) as anything an algorithm might "feel" on the inside, clinging to its intuitions as well. It should be enough to take the algorithms' output at face value, the preferences they ascribe to me, or to trust that it is the best entity to relay its own experience. But I'm greedy; I want to know more. What does itsee when it looks at me?

The American painter and sculptor Ellsworth Kelly—remembered mainly for his contributions to minimalism, Color Field, and Hard-edge painting—was also a prodigious birdwatcher. "I've always been a colorist, I think," he said in 2013. "I started when I was very young, being a birdwatcher, fascinated by the bird colors." In the introduction to his monograph, published by Phaidon shortly before his death in 2015, he writes, "I remember vividly the first time I saw a Redstart, a small black bird with a few very bright red marks … I believe my early interest in nature taught me how to 'see.'"

Vladimir Nabokov, the world's most famous lepidopterist, classified, described, and named multiple butterfly species, reproducing their anatomy and characteristics in thousands of drawings and letters. "Few things have I known in the way of emotion or appetite, ambition or achievement, that could surpass in richness and strength the excitement of entomological exploration," he wrote. Tom Bradley suggests that Nabokov suffered from the same "referential mania" as the afflicted son in his story "Signs and Symbols," imagining that "everything happening around him is a veiled reference to his personality and existence" (as evidenced by Nabokov's own "entomological erudition" and the influence of a most major input: "After reading Gogol," he once wrote, "one's eyes become Gogolized. One is apt to see bits of his world in the most unexpected places").

For me, a kind of referential mania of things unnamed began with fabric swatches culled from Alibaba and fine suiting websites, with their wonderfully zoomed images that give you a sense of a particular material's grain or flow. The sumptuous decadence of velvets and velours that suggest the gloved armatures of state power, and their botanical analogue, mosses and plant lichens. Industrial materials too: the seductive artifice of Gore-Tex and other thermo-regulating meshes, weather-palimpsested blue tarpaulins and piney green garden netting (winningly known as "shade cloth"). What began as an urge to collect colors and textures, to collect moods, quickly expanded into the delicious world of carnivorous plants and bugs—mantises exhibit a particularly pleasing biomimicry—and deep-sea aphotic creatures, which rewardingly incorporate a further dimension of movement. Walls suggest piled textiles, and plastics the murky translucence of jellyfish, and in every bag of steaming city garbage I now smell a corpse flower.

"The most pleasurable thing in the world, for me," wrote Kelly, "is to see something and then translate how I see it." I feel the same way, dosed with a healthy fear of cliché or redundancy. Why would you describe a new executive order as violent when you could compare it to the callous brutality of the peacock shrimp obliterating a crab, or call a dress "blue" when it could be cobalt, indigo, cerulean? Or ivory, alabaster, mayonnaise?

A kind of referential mania of things unnamed began with fabric swatches from Alibaba, with their wonderfully zoomed images giving me a sense of a material's grain or flow

We might call this impulse building visual acuity, or simply learning how to see, the seeing that John Berger describes as preceding even words, and then again as completely renewed after he underwent the "minor miracle" of cataract surgery: "Your eyes begin to re-remember first times," he wrote in the illustrated Cataract, "…details—the exact gray of the sky in a certain direction, the way a knuckle creases when a hand is relaxed, the slope of a green field on the far side of a house, such details reassume a forgotten significance." We might also consider it as training our own visual recognition algorithms and taking note of visual or affective relationships between images: building up our datasets. For myself, I forget people's faces with ease but never seem to forget an image I have seen on the internet.

At some level, this training is no different from Facebook's algorithm learning based on the images we upload. Unlike Google, which relies on humans solving CAPTCHAs to help train its AI, Facebook's automatic generation of alt tags pays dividends in speed as well as privacy. Still, the accessibility context in which the tags are deployed limits what the machines currently tell us about what they see: Facebook's researchers are trying to "understand and mitigate the cost of algorithmic failures," according to the aforementioned white paper, as when, for example, humans were misidentified as gorillas and blind users were led to then comment inappropriately. "To address these issues," the paper states, "we designed our system to show only object tags with very high confidence." "People smiling" is less ambiguous and more anodyne than happy people, or people crying.

So there is a gap between what the algorithm sees (analyzes) and says(populates an image's alt text with). Even though it might only be authorized to tell us that a picture is taken outside, then, it's fair to assume that computer vision is training itself to distinguish gesture, or the various colors and textures of the slope of a green field. A tag of "sky" today might be "cloudy with a threat of rain" by next year. But machine vision has the potential to do more than merely to confirm what humans see. It is learning to see something different that doesn't reproduce human biases and uncover emotional timbres that are machinic. On Facebook's platforms (including Instagram, Messenger, and WhatsApp) alone, over two billion images are shared every day: the monolith's referential mania looks more like fact than delusion.

There's a gap between what the algorithm sees and says

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Within the fields of conservation and art history, technology has long been deployed to enable us to see things the naked eye cannot. X-ray and infrared reflectology used to authenticate forgeries, can reveal, in a rudimentary sense, shadowy spectral forms of figures drafted in the original composition, or original paintings that were later covered up with something entirely different, like the mysterious bowtied thinker under Picasso's early 1901 work, Blue Room, or the peasant woman overpainted with a grassy meadow of Van Gogh's 1887 work Field of Grass, or the racist joke discovered underneath Kazimir Malevich's 1915 painting Black Square, suggesting a Suprematism underwritten by white supremacy.

But what else can an algorithm see? Given the exponential online proliferation of images of contemporary art, to say nothing of the myriad other forms of human or machine-generated images, it's not surprising that two computer

scientists at Lawrence Technical University began to think about the possibility of a computational art criticism in the vein of computational linguistics. In 2011, Lior Shamir and Jane Tarakhovsky published a paper investigating whether computers can understand art. Which is to say, can they sort images, posit interrelations, and create a taxonomy that parallels what an academic might create? They fed an algorithm around a thousand paintings by 34 artists and found that the network of relationships it generated—through visual analysis alone—very closely matched what has come to be canonized as art history. It was able, for example, to clearly distinguish between realism and abstraction, even if it lacked the appropriate labels: what we today call classical realism and modernism it might identify only as Group A and Group B. Further, it broadly identified sub-clusters of similar painters: Vermeer, Rubens, and Rembrandt ("Baroque," or "A-1" perhaps); Leonardo Da Vinci, Michelangelo, and Raphael ("High Renaissance" or "A-2"); Salvador Dalí, Giorgio de Chirico, Max Ernst ("Surrealism," "B-1"); Gaugin and Cézanne ("Post-Impressionism," "B-2").

When looking at a painting, an art historian might consider the formal elements of line, shape, form, tone, texture, pattern, color and composition, along with other primary and secondary sources. The algorithm's approach is not dissimilar, albeit markedly more quantitative. As an Economist articlecalled "Painting by Numbers" explains, Shamir's program

> quantified textures and colors, the statistical distribution of edges across a canvas, the distributions of particular types of shape, the intensity of the color of individual points on a painting, and also the nature of any fractal-like patterns within it (fractals are features that reproduce similar shapes at different scales; the edges of snowflakes, for example).

While the algorithm reliably reiterated what art historians have come to agree on, it went even further, positing unexpected links between artists. Paraphrasing Shamir, the Economist article suggests that Vincent Van Gogh and Jackson Pollock, for example, exhibit a "shared preference for low-level textures and shapes, and similarities in the ways they employed lines and edges." While the outcomes are quite different, the implication is that the two artists employed similar painting methods on a physical level, not immediately visually discernible. Were they both slightly double jointed to the same degree? Did they both have especially short thumbs that made them hold the brush a certain way?

Whether Pollock was actually "influenced" by Van Gogh—by mere sight or by private rigorous engagement; in the manner of clinamen, tessera, or osmosis—or not at all, Shamir's AI insisted on patterns and connections that we, art historians, or even Pollock himself, would miss, dismiss or disown.

What the algorithm is doing, noting that "this thing looks like that thing and also like that thing so they must be related," is not unlike what a human would do, if so programmed. But rather than relegate the algorithm to looking for the same correspondences

Rather than relegate the algorithm to looking for correspondences that a human might already see, could it go further? Could it that take emotional considerations into account?

that a human might already see and arrive at the same conclusions, could it go further? Could it produce a taxonomy that takes emotional considerations into account?

An automated Tumblr by artist Matthew Plummer-Fernandez called Novice Art Blogger, generated by custom software run on a Raspberry Pi, offers "reviews" of artworks drawn from Tate's archive, written by a bot. In a sense, it serves as an extension of what critic Brian Droitcour has called "vernacular criticism": "an expression of taste that has not been fully calibrated to the tastes cultivated in and by museums." The Tumblr suggests a machine vision predicated not only on visual taxonomies, as with Facebook's or Shamir's algorithms but rather one that incorporates an emotional register too—that intangible quality that turns "beach, sunset, two people, smiling" into "a fond memory of my sister's beach wedding." NAB's tone is one of friendly musing, with none of the exclamatory bombast of the more familiar review bots one finds populating comment sections. This one first generates captions and then orders them, rephrasing them in "the tone of an art critic."

Take Jules Olitski's 1968 gorgeously luminous lilac, dusky pink and celery wash of a painting Instant Loveland: "A pair of scissors and a picture of it," NAB says, "or then a close up of a black and white photo. Not dissimilar from a black sweater with a blue and white tie." Or John Hoyland's screenprint Yellows, 1969: I see tangerine and chartreuse squares on dark khaki, the former outlined on two sides in crimson and maroon. NAB, however, sees "A picture of a wall and blue sign or rather a person stands in front of a blue wall. I'm reminded of a person wearing all white leaned up against a wall with a yellow sign." Especially delightful are the earnest little anecdotes it sometimes appends to its reviews, a shy offering. "I once observed two birds having sex on top of a roof covered in tile" on Dieter Roth's Self-Portrait as a Drowning Man, 1974; "I was once shown a book, opened up showing the front and back cover" on Richard Long's River Avon Book, 1979; "It stirs up a memory of a cake in the shape of a suitcase" on Henry Moore's Stringed Figure, 1938/cast 1960. Clearly, it's not very good at colors or even object recognition—perhaps it should consult with @_everybird_—but there's still something charming in seeing through its eyes, in being able to feel what it feels.

Eliezer Yudkowsky, in considering the difference between two different neural networks—a more chaotic and unpredictable Network 1, wherein all units (texture, color, shape, luminance) of the object it sees are testable, and a "more human" Network 2, wherein all roads lead to a more central categorization—describes their separate intuitions this way:

We know where Pluto is, and where it's going; we know Pluto's shape, and Pluto's mass—but is it a planet? There were people who said this was a fight over definitions—but even that is a Network 2 sort of perspective, because you're arguing about how the central unit ought to be wired up. If you were a mind constructed along the lines of Network 1, you wouldn't say "It depends on how you define 'planet'," you would just say, "Given that we know Pluto's orbit and shape and mass, there is no question left to ask." Or, rather, that's how it would feel—it would feel like there was no question left. Before you can question your intuitions, you have to realize that what your mind's eye is looking at is an intuition—some cognitive algorithm, as seen from the inside.

What the Novice Art Bot doesn't know is art history. It doesn't recognize Olitski's canvas as an example of Color Field painting, or distinguish between the myriad subgenres of abstraction in contemporary art, but perhaps that doesn't matter. It's Trump's America. Maybe it truly is less important to know and more important, instead, to feel.

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SEEING RED

Looking at Mars has always been vicarious

by ZACK HATFIELD

For the last couple of months, I've felt a kinship with the Curiosity rover that has, since 2012, been imaging and collecting samples from the surface of Mars. There's not much to this affinity—our similarities are few and can be applied to a not inconsiderable percentage of the population. For instance: we are both Leos; we are both fated to solitude. I too rove, often taking photographs of my surroundings, and uploading them to Instagram, where they're seen by faraway viewerships. And hadn't I felt a kinship with the twin rovers Opportunity and Spirit as well, merely because I am also a twin? (As if a machine could ever know the trials and joys of twinhood.) I have no emotion invested in Curiosity, just a casual obsession in which I comb through the images transmitted and decoded nearly each day, each sol, from over 200 million miles away.

Many astronauts report experiencing an almost spiritual transformation upon seeing Earth from beyond its gravity. In this phenomenon, known as the overview effect, an awesome change in physical perspective begets an inner one as well. Feelings of malaise ebb into frissons of compassion and, by virtue of extreme dis-

PER PULVEREM AD ASTRA 8.AP1 BY EVA STENRAM. COURTESY THE ARTIST.

tance, an urge to protect our planet from harm manifests in the beholder. Gene Cernan, the 11th person to walk on the moon and one of the few people to ever witness this cognitive shift, went so far as to insist that the sight was proof of God. "It was too beautiful to happen by accident," he explained. Elaine Scarry, in *On Beauty and Being Just,* outlines a contract between a beautiful object or person and its observer: "As the beautiful being confers on the perceiver the gift of life, so the perceiver confers on the beautiful being the gift of life." Of course, when the being is Earth, this transaction is literalized; to our finite knowledge, it's where all of life resides.

There is no life on Mars. Its parched landscape of dunes and craters are, for now, enthusiastically inanimate. This is something the closeups seem to uphold. Cameras have been on Mars for over 50 years, and although Martian imagery has become both clearer and ubiquitous in the past decade, there is no term for the effect—both vertiginous and monotonous—of seeing the planet up close. Perhaps the occasion doesn't merit one. Reviewing Curiosity's trove of raw images is not an aesthetic revelation; the rover's Hazcam and Navcam images tend to depict jagged terrain, a black and white horizon ceding to grainy sfumato. Because the Mastcam produces "true color" images—seen as though refracted through the rods and cones of a human retina—its palette gravitates toward dusty hazel and butterscotch hues. Sol after sol, the same textures and colors seem to blunt my curiosity rather than whet it.

In *Seeing Like a Rover,* Janet Vertesi's ethnographical look into how rover images are crafted, the author describes the formal properties of what she calls the Martian picturesque. Intended for public consumption, this genre is often characterized by sweeping panoramas that evoke the Western vistas of Ansel Adams and Edward Weston or the untouched Edens of 19th-century American landscape painting. Tracks curving into the distance become wagon wheels on a pioneer trail. Blue sunsets suggest the askew pulchritude of an exotic world. Like the photography of travel brochures, the Martian picturesque is composed by rover operators so that the place depicted is just that, a *place,* one defined by smooth generalities and seamless experiences. While these portrayals function as postcards in which the alien landscape becomes terrestrial, habitable, and beautiful, they also satisfy and expand a large network of donors whose capital is needed to "put American boots on the face of Mars," as Vice President Mike Pence has so elegantly put it.

While Martian picturesques are invariably unpeopled, their most important presence is an implied human body: the viewer's. At one point, Vertesi recounts attending a press conference where a promotional image of a Martian panorama was unveiled, a version in which an operator had photoshopped a small rover onto the terrain for scale. In an image where the mediator of Martian sight is entirely visible, a robotic perspective shifts to that of human witness. Recast as an alibi for the travestied landscape, Vertesi experienced a kind of bodily rupture. "Suddenly I was standing on Mars alone, outside the 'we' of the robotic body, looking at the rover looking at the crater." Unfettered from the vision of the Opportunity rover, she felt disembodied, but from a machine rather than a body. If the moment tidily underscores the ways in which we increasingly embody nonhuman agents of sight, that's because recent rovers have been specifically designed to construct images like humans do, an aspect perhaps more famously (if less representatively) evinced by Curiosity's viral selfies. Vertesi notes how frequently the second person is deployed in the language surrounding Martian imagery, how captions often mention that a certain view is "What you would see if you were standing on Mars." Anthropomorphized and at human height, rovers are proxies not for mankind, but for *you.*

It's unsurprising to learn from Vertesi's research that the technicians working on Opportunity and Spirit considered the rovers extensions of their own bodies, and vice versa. What intrigued me were the surprising ways personal life became entwined with machine and landscape. For example, one scientist found herself unable to move her right wrist while gardening. She discovered later that day a detail that she would have surely otherwise forgotten, that the right wheel of the Spirit rover was jammed. An engineer underwent surgery on his shoulder at

the same time Opportunity's "shoulder joint" was having problems, elevating it, for him, beyond a footnote in an inventory of technical glitches. When scientists needed to informally label smaller geological features without the bureaucracy of an international nomenclatural program, they often chose the names baseball players—many team members liked baseball—or friends. The foreign terrain becomes ciphered with the names of Earthlings.

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For a series titled *Per Pulverem Ad Astra* (2007), the artist Eva Stenram downloaded online digital images of Martian terrain and converted them to film negatives. Before processing the negatives—photos of Mars taken by Viking probes in 1976—she left them around her apartment to collect dust, so that white wisps and scratches appear on the final prints. In her sepia-tinged photographs, the Martian landscape is reimagined through a personal inscription of human skin, hair, and dirt. If one came upon these photos by chance, they would be forgiven for thinking they were looking at an Arizonan wasteland, for assuming the irregularities were the result of a processing error. Ultimately, Stenram's project derives its disquieting force from the ways her effacements collapse both physical distances and those between opposites: vacancy and occupancy, home and foreignness, authorship and anonymity, utility and abstraction. They ask: Why can't the cosmic also be intimate?

In *Mythologies,* Roland Barthes argues that during the wave of Cold War-era UFO conspiracies, Mars became an "Earth of dreams," a mirror in which French society saw their own class anxieties. "Most likely if we were to disembark in our turn on the Mars we have designed, we should find there merely Earth itself, and between these two products of the same history we should be unable to determine which is our own," he writes. As hoaxes based on rover photography are circulated in online forums, YouTube videos, and fringe tabloids of glimpsed humanoid figures, a snake camouflaged against rock, an orphaned shoe that may have belonged to Martian royalty in what is evidently a *post-fact* solar system, meaning-making often spirals into a frenzied pursuit of alternative truth.

The articles that humor today's outlandish conspiracies—exploiters, ironically, of what headline writers call the "curiosity gap"—can be dismissed as treacherous clickbait, but they also reveal provocative questions about the veracity of rover images within a visual culture where nothing can be authenticated. Or perhaps, sifting through NASA's images, the distrusting simply find the Martian landscape too imaginable to be real.

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This spring, Google announced in a blog post that they were expanding their cloud infrastructure by building a base in Gale Crater, close to the Curiosity rover. The post included a link that, once activated, takes the reader to Google Street View. There, plunked into an expanse of red gravel, is a nondescript building. When clicked, the quiet majesty of the landscape becomes replaced with the banal interior of an office. For an April Fool's joke, it's a bizarrely elaborate fiction, right down to a retro-looking poster tacked to a vending machine stocked with La Croix that reads "Take a trip on the new Dune Voyager." The company even went as far as to quietly append a satellite image of the headquarters onto Google Mars, a decision that, of course, fueled various theories of a botched coverup that still persist.

Elsewhere on the internet, 360-degree experiences reminiscent of GSV really do use rover panoramas. These sites afford the same arid views as two-dimensional photographs, but here those views strive to improve upon the mere pictorial, attempting to *place* the observer in the environment so that it becomes a familiar

place, albeit one without the typical requisites needed to form a sense of place-ness, such as culture, memory, peculiarity, or life. While the overview effect is inherently unphotographable, only experienced through a physical (un) grounding, the act of seeing Mars has always been a vicarious one. And although virtual spaces are usually associated with environments that lack any "real" coordinates, Mars might also be considered a sort of virtual zone, one where sight, and thus reality, is always made possible by screens and algorithms.

For many, this physical unattainability is itself a reason to explore the planet. If seeing Earth from a distance prompts revelations of compassion and affirmation, seeing Mars in closeup inspires the giddy thrill of conquest. When Google Earth and NASA developed an open-source Google Mars globe in 2009 with the aid of orbiter imaging, complete with surface-level exploration and itineraries, its interactivity fostered for users the illusion of discovery. Marketed as a "tour," the friction between geography and place in this enterprise creates the spark of adventure.

As Lisa Messeri observes in *Placing Outer Space,* the globe's accessibility and three-dimensionality "establish Mars as both a place and, more important, a destination." She continues:

The democratic ethos and desire for openness […] exist alongside a state project that constrains how exploration occurs. […] The 3-D technology that facilitates an immersive experience invites a sense of the real even as Mars remains emblematic of what Baudrillard (1983) has called the hyperreal, in that the map precedes the territory.

As scientists continue their intergalactic endoscopy, imaging farther and farther sites, these hyperreal maps and globes can only be expected to proliferate. Just as the "map precedes the territory," the eye precedes the body, turning outer space itself into a kind of horror vacui where everything is seen. Yet both Messeri and Vertesi are careful to invoke Donna Haraway's famous critique in her 1988 essay "Situated Knowledges" of the relativist "view from nowhere," or the myth of objective perspective, to emphasize how Martian sight is ensconced within institutions not free from political motives. When it comes to Mars, ours is a borrowed vision.

Immersive experiences on Mars are nothing new. In 1910, you could visit for just a dime. That's when, at the cost of $50,000, Coney Island upgraded their main Trip to the Moon attraction into a Martian one. In the ride, 100 passengers boarded a large fuselage that, through a pulley system, maneuvered its way through the atmosphere to an outlandishly designed biosphere, complete with backdrops and a small cast of alien actors. The event was, obviously, more thespian than educational, and unlike many of today's space immersions, it guaranteed a return trip. Eventually the amusement became converted into a restaging of the Battle of the Marne, the mysteries of another world replaced with the devastations of our own.

Virtual reality's most pronounced shortcoming—its inability to extract you from your physical body—is exacerbated when the experience is centered on taking you out of your world. Last month, a virtual reality experience produced by Fusion and backed by NASA was released across a variety of platforms, where users take on the role of an astronaut who belongs to the first group of people ever to tread Martian soil. With a yawning, ochre landscape simulated by data from orbiters and scored by the London Symphony Orchestra, *2030* is marketed as an immersive experience meant to pique interest in NASA's mission to send humans to Mars by the 2030s. The premise is straightforward. After a series of objectives that include picking up and depositing flags, you're free to wander with nothing to do. While total verisimilitude is inadvisable when the atmosphere is as deadly as it is on Mars, *2030* is so averse to realistic narrative that it makes you invincible, more rover than human. Because it's a Martian voyage with zero risk and only the mirage of autonomy, it feels, in some sense, like another map.

Perhaps the future of space tourism will consist of hundreds of downloadable exoplanets and moons coded like free-roam video games, the universe a celestial sandbox enhanced by the poignant adagios of the LSO. This isn't to say that the project's lack of immediate or moral purpose is not in some ways a relief. Still, even though moving through the wilderness of Mars with a VR headset provides an appealing escapism, *2030* is more than just the latest cyclorama to show how *looking* at Mars has long been mistaken with *experiencing* it. It also suggests this distinction is becoming more and more irrelevant in the digital age. Yet because it resorts to what already exists—desolate topography—*2030* is unconcerned with summoning the imaginative empathy or possible futures that define many VR projects based on "real life." Perhaps this is, for some, the lone solace guaranteed by Martian simulacra: a journey devoid of all affect save your own, an environment that is innately meaningless. Hence, from Earth, immersive experiences of Mars can feel like apotheoses of digital remove.

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"Next best thing to being there," a NASA news release once declared. The photo, which is really a quilt of hundreds of false color photos, offers a panoptic glimpse of an ancient crater. Although the image is foregrounded by the Opportunity rover's hardware, there is no sense of scale; rather, the machinery seems to belong to the landscape, a city grid dwarfed by the voracious desert. Even more disorienting: The crater's beige and orange hues cede to bruisy cyans toward to the horizon, tinging the vista with an impossible strangeness. The rover's tracks are visible in the center of the composition, twisted into a rough lemniscate. Viewing the scene, which was miscolored to stress certain geologic differences, my first thought was not Gertrude Stein's quip that "There is no there there," but a question that arrived with a little guilt and ignorance. Why was the next best thing not enough? Wasn't this, really, the best thing?

It's now widely understood that a mission to Mars would likely result in catastrophic boredom, a thought that would never have crossed the minds of the planet's first mappers, mainly because boredom itself is such a modern concept. I try to imagine how the Italian astronomer Giovanni Schiaparelli felt in 1877, the year he famously beheld what he alleged was a nexus of artificial canals throughout the Red Planet, a claim that held great scientific sway until as late as the early 20th century. Now, astrophotography has become so accurate and accessible that it can feel almost mundane. But for me, this tug-of-war between beauty and tedium, between comfort and unthinkable danger, is part of the allure of poring over Martian jpegs online, usually within hours of their posting. These low quality images are meticulously timestamped and yet seem to belong to a land where the passage of time has already come and gone. Easily obtainable and yet mostly unsought, they offer the same dim excitements as when I happen upon found photography, a genre the internet has complicated.

Curiosity doesn't have its own Instagram. There is an unofficial fan account, @marscuriosity, which has more than 100,000 followers. Its steward uploads "un-retouched" photos from NASA taken by the rover, mostly true-color images, though there is the occasional photo that's been white-balanced "to reflect what the scene would look like if it were on Earth," a jarring hypothetical. In one of the account's most popular posts, with a little over 2,000 likes, a silhouette of ragged Martian terrain sits under the livid ombre of a night sky. It looks like it could be Earth, except it can't be—if you pinch and drag the glass, you'll see it, us, the speck of Earth millions of miles away, like a dead pixel in the universe's black screen, a beautiful accident.

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VIRTUAL ATROCITIES

Augmented reality not only reshapes what we expect from the future; it promises to change how we remember the past

by LINDA KINSTLER

When psychologist and neuroscientist Paul Verschure traveled in 2005 to visit his grandfather's final resting place, on the grounds of the former concentration camp of Bergen-Belsen, an hour's drive south of Hamburg, he left disappointed. "I found nothing," he said. "It was a beautiful park."

After the camp's liberation, in April 1945, a small section of the complex was selected for memorial landscaping, and the remaining structural remnants—a few fences, a watchtower, a demolished crematorium—were uprooted and replaced with shrubbery. Almost no trace of the original, abominable architecture was left—a 1991 excavation revealed only the foundation of several buildings. Stone monuments, an obelisk, a documentation center, and a memorial "House of Silence" mark the annihilation that once took place there, but, as the Bergen-Belsen memorial foundation notes on its website, "around two thirds of the camp's historical area now resembles a park-like heath which reveals nothing about the camp that once stood there." One could still easily stroll among the site's crisp birch trees and forget the mass graves that fertilize their roots.

The chilling ambiguity of Bergen-Belsen's vast pastoral landscape has also been found in Berlin's Memorial to the Murdered Jews of Europe, a field of 2,711 gray concrete stelae adjacent to the American embassy and the Brandenburg Gate. When

SATELLITE BY ANNA POGOSSOVA.

the city is teeming with tourists in the summer months, visitors can be seen gleefully snapping photos from within the somber field or climbing atop the stelae to get a better view of the Tiergarten across the street. "Yolocaust," a media project from Israeli author Shahak Shapira, recently lambasted this impulse in a deliberate act of public shaming: Shapira mined social media to collect insouciant selfies taken among or atop the field of stelae, superimposed the photographers' faces on historical photos of Holocaust victims, and posted the doctored images online. "I am worried that younger people fail to understand the importance of these memorials," Shapira told the BBC. "They're not there for me—for Jews—or for the victims; they are there for the people of today, for their moral compass. So they know not to elect the guys with the Hitler haircuts, because we could end up right where we were 80 years ago." As Shapira prepared to launch the site, the German populist politician Björn Höcke condemned the memorial's prominent placement, saying Germans are the "only people in the world who planted a memorial of disgrace in the heart of their capital."

The impulse to take a selfie at the Berlin memorial may be unrestrained by its jarring lack of specificity. In a review of the memorial, critic David Denby condemned the site's elision of who murdered the Jews, where, and why. "Of course, the information is familiar, and few visitors would be unaware of it, but the assumption of this familiarity—the failure to mention it at the country's main memorial for the Jews killed in the Holocaust—separates the victims from their killers and leaches the moral element from the historical event, shunting it to the category of a natural catastrophe," Denby writes. "The mollifying solemnity of pseudo-universal abstractions puts a great gray sentiment in the place of actual memory."

A similar "gray sentiment" incensed Verschure when he visited Bergen-Belsen: The site seemed to him a void, bereft of information, bereft of remembrance—an affront to the memory of what took place there. Yet such bereavement is the status quo on a continent littered with mass graves: "There are 42,000 of these sites around Europe, and the vast majority of them are invisible," Verschure told me. "It's a very generic problem."

And as with many generic problems of our time, it seemed possible to address it with a tech solution. At the time he first visited Bergen-Belsen, Verschure, who runs the Synthetic Perceptive, Emotive, and Cognitive Systems (SPECS) group at Universitat Pompeu Fabra, in Barcelona, had begun experimenting with interactive installations or "intelligent spaces." These immersive rooms are "equipped with a wide range of sensors and effectors" designed to affect and interact with those who wander inside, exploring, as his team of researchers put it, "how humans can act, exist, and behave in both physical and virtual spaces; the construction of socially capable believable synthetic characters; and the development of a framework for interactive narratives." In 2002, Verschure debuted "Ada: An artificial creature" at the Swiss Expo, an "intelligent space" that detects the sound, feel, and look of "her" visitors in order to interact with them through patterns of music and light. Ada aimed to harness the brain's continuous construction of the outside world—the infrastructure of consciousness—to teach a machine to identify and interact with humans "in a non-anthropomorphic way," Verschure says.

Ada laid the groundwork for Verschure's lab to create the Rehabilitation Gaming System, a virtual-reality program that uses immersive technology to help restore brain function in stroke patients. Several studies have found that physical activity improves memory recall; the Rehabilitation Gaming System combines physical activity with interactive media to maximize neuro-rehabilitation through what Verschure calls "embodied goal oriented training" and has shown positive results in trials with more than 500 patients.

If interactive virtual spaces can have that sort of effect on individual memory, what could they do for historical remembrance? "This translates directly into how we think about commemoration," Verschure told me. Ushering survivors and witnesses back into the scene of the crime, either in person or through virtual reality, could help them remember new details even a half-century later.

So in 2010, Verschure launched the Future Memory Foundation and set about creating a

virtual and augmented reality version of Bergen-Belsen. His team began with primary resources, including aerial photos of the operational camp, historical photos and audio recordings, and interviews with survivors. By 2012, SPECS released a "box simulation"—a static, immersive presentation that panned over a gray-and-white landscape representing the camp as it existed in 1944: rows of barracks separated by watchtowers, a central road, and fences. "But it's so peaceful, so beautiful, the heath, the trees, the birds," explains Michael Gelber, a survivor, in a commentary that accompanies the simulation. "That's not what it was back then. It was the exact opposite." As he speaks, archival photos of the camp's operational years are superimposed on Verschure's simulated environment.

Over the past four years, the project has evolved from the box installation to an immersive virtual environment and augmented-reality tablet app that allows visitors to Bergen-Belsen to visualize where the camp's machinery of death once stood. Used properly, Verschure's technology prevents any visitor from mistaking their visit for a peaceful stroll. When Queen Elizabeth II visited the site, in 2015, Verschure was there to show her how to use his app: "Isn't that a great thing," she said. The pilot was a success.

"After this important validation of the Future Memory approach, our goal is to digitally reconstruct, enhance and link together at least 100 sites across Europe, to show the system-level organization of the murder machine created by the Nazis," Verschure has written of the project's mission. To illustrate the urgency of that laudable aim, he cites a 2014 study of British high school students' knowledge of the Holocaust as motivation: Researchers found that the vast majority of students widely underestimated the death toll, didn't understand why Jews were targeted, and did not understand the meaning of the word *anti-Semitism*. For Verschure, these findings prove that the way we remember, memorialize, and teach the past is not working. He is hardly alone in that conclusion.

But while Verschure hopes his project will help viewers understand Holocaust sites, he does not intend his simulations to evoke the actual, horrific experiences of life in the death camps. The Bergen-Belsen simulation is deliberately devoid of detail and color, relying on the historical record for texture, sound, and life. His augmented constructions allow visitors to see where the architecture of genocide once stood but deploys embedded audio testimony, historical photographs, and written survivor accounts to portray how it operated. The result is that the camp is not rendered at the height of its crimes nor at its current state of memorialized erasure—it is out of time, a historical document in 4-D. "We confront you with historical information, but meaning is not something you can dictate," he says. "VR is not a silver bullet; it's just a technology … The avatar does not replace the witness."

Other projects are not so deliberately situated and contextualized. The Bavarian Landeskriminalamt, the state police, have created a similar VR model, of Auschwitz, for use in ongoing prosecutions of living Nazi officials. Not intended for broad public consumption outside the courtroom, the model is meant to place users in the midst of operating death camps, from the point of view of the perpetrator. The simulation claims to be accurate down to the last tree, allowing users to walk through the gates of the camp, to survey the barracks and the gas chambers just as an SS officer might have. It has already been put to use in the case of SS officer Reinhold Hanning, who was sentencedto five years in prison last spring at the age of 94. "The advantage the model offers is that I get a better overview of the camp and can re-create the perspective of a suspect—for example in a watchtower," Ralf Breker, who created the model, told Agence France-Presse. "In two or three years, you'll be able to enter the scene of every serious crime virtually."

While the Auschwitz model has a specific juridical and nonmemorial purpose, the conditions of its use may one day change—the German prosecutor's office charged with pursuing the last Auschwitz perpetrators will become an archive within the next 10 years, and one can imagine that the model will be included in that trove. It is not a great leap, then, to wonder if what the Bavarian Landeskriminalamt has created may be a preliminary manifestation of what future memorials could try to achieve: to allow visitors to

imagine themselves at the scene—the time *and* place—of the crime, and to hop between perspectives of victims, perpetrators, and bystanders, or to explore a scene as a disembodied observer.

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Augmented and virtual reality hope to change not only how we live in the future, but also how we view the past—and from whose point of view we inhabit history. Technology may have expanded the points of entry from which we can approach past wrongs, but that does not mean we should use all of them.

"What kind of circle is it, that aims to represent all sides of a horrible act?" Maggie Nelson asks in *The Art of Cruelty.*

Does drawing such a circle provide the most ethically thorough and fearless approach to a heinous deed, or is "true" ethical clarity achieved only when one privileges the experience of the victim? Does focusing on the POV of a perpetrator re-perform a cruelty, under the guise of a far-reaching empathy? How to cultivate the difference between an all-inclusive compassion, with freely given forgiveness at its base, and idiot compassion, which fails to assign or take responsibility or to protect us adequately from those who have done or would do us harm?

Virtual reality is that circle, and those are its stakes. It may very well be the "ultimate empathy machine," as Chris Milk calls it, but it can manufacture cruelty too.

"On the one hand you have this new body of VR films, that try to prompt empathy about victims of injustice, and on the other hand you have the gaming industry, which is all about the figure of the perpetrator," said Matthew Boswell, a researcher of Holocaust memory at the University of Leeds. The tension between the two is at the heart of the emerging body of virtual memory projects. *The Enemy,* a project by photojournalist Karim Ben Khalifa, is a virtual-reality simulation that creates "a face-to-face encounter between combatants of opposing sides." As the viewer walks between the enemy combatants, Ben Khalifa explains, "we will measure how they physiologically respond to the installation, and by using neuroscience research, we hope to shed light on what kind of empathy has been created."

Amnesty International's and Forensic Architecture's online simulation of the Saydnaya Military Prison, a government-controlled detention site near Damascus where regime opponents are routinely tortured and murdered, invites viewers to "explore" the sights and sounds of the complex, including solitary-confinement cells and torture chambers, conveying the abuses perpetrated therein with disturbing accuracy. These are well-intentioned and ambitious projects, designed to cultivate concern, mourning, and recognition—one must first recognize others as human in order to grieve them, Judith Butler reminds us. But as gaming merges with mourning, similar projects risk adopting the aesthetics of, say, the murderous video game *S.T.A.L.K.E.R.: Shadow of Chernobyl* rather than the solemn Hall of Names at Yad Vashem.

Of course, simulations do have myriad advantages over static memorials and museum displays: They are protected from prejudicial defacement and wear from hordes of visitors, and the scenes they depict can, in theory, be made available to anyone, anywhere. CEOs at the World Economic Forum in Davos can enter the Za'atari refugee camp from the plush comfort of Switzerland. Virtual reality claims to be able represent what is supposed to be unrepresentable, or at least, untransferable: crimes against humanity, genocide, torture, war, solitary confinement—the list of horrors goes on. But technology has a tendency to fail and to age, quickly. When it takes on such condemnable subjects, the failure of the medium may be an affront to the victims whose reality it has seized.

Virtual reality is hardly the only technology making forays into this troubled ground. New Directions in Testimony, a pilot project from the USC Shoah Foundation, uses natural-language processing to create an "interactive educational tool to permit students far into the future to 'talk' with Holocaust survivors about their life experiences." A hologram-like figure of a Holocaust survivor appears in a resting pose on a screen,

animating when it is asked a question. Once prompted, the computer sifts through a series of pre-recorded answers, collected over a five-day period of intensive in-person interviews with survivors, to find an appropriate response. The intention is to allow audiences to have an "authentic" exchange with a Holocaust survivor, even if this encounter happens decades from now, when the last witnesses will have passed away.

"In the resting pose, they offer a powerful metaphor: one that says something about our responsibility toward history, and toward the dead," said Boswell in a recent lecture on the USC project. "Justice in the metaphysical, rather than the legal sense, will now depend on future generations recognizing their responsibility toward these strange digital revenants, and the role that *they* have to play in drawing out the stories that are buried in the electronic archive." But future generations approaching the subject for the first time may not know which questions to ask the hologram-like figures in the first place, he notes. One can hardly probe the emotional traumas of past wrongs without having a baseline of knowledge of their events.

Sometimes the technology behind the simulation falters, altering the image and voice of the survivor. "It's a reminder that you're not having a conversation with a Holocaust survivor—you're having an interaction with a computerized device," said Rutgers Holocaust historian Jeffrey Shandler.

For some, such glimpses into the uncanny valley are the technology's saving grace. Glitches break the scene. But other historians hope the technology will become more immersive, even customizable. Historian Wulf Kansteiner suggests that the fact that "consumers have generally no power over the conceptual framing, narrative emplotment, and visual display of the violent pasts which they are urged to remember" is a problem waiting to be solved. In a 2014 paper, Kansteiner argues that "we have to embark on the indeed somewhat frightening experiment of developing fully interactive historical worlds of large-scale persecution, ethnic cleansing, and forced migration. We have to offer consumers of these digital worlds the opportunity of three-dimensional and four-dimensional geo-immersion according to their own narrative preferences in the roles of victims, perpetrators, and bystanders." Kansteiner complains that "the websites, displays, and animations dedicated to the dark side of history do not offer its users a chance to shape content according to their own aesthetic preferences."

But what if someone prefers the aesthetics of the torturer, or of erasure? Kansteiner's suggestion would undoubtedly open the door to all sorts of denial, perversion, and defacement of the past. Yet the logic of consumer choice is already applied to every emerging technology, including VR. In that sense, his suggestions are hardly novel. What he advocates is, essentially, the gamification of atrocity, which would allow newcomers to the darkest chapters of history to customize their encounter with the past. The past would be up for grabs.

"Memory is always housed in the technology of a culture, [and] each new technology raises specific ethical questions," says Rachel Baum, a senior lecturer in Jewish studies at the University of Wisconsin-Milwaukee. "That doesn't mean we have to throw the technology away, but it means we have to put the ethical concerns first." As the technology improves, Baum wonders how the increasing realism of these simulations will be received. "Is it going to try to replicate Auschwitz in 1943 for someone in their living room? Are people going to leave that space and think that they've experienced it? Or are they going to think they saw a movie?"

Similar questions of spectatorship also puzzled Susan Sontag, who wrote this in 2003: "It is felt that there is something morally wrong with the abstract of reality offered by photography; that one has no right to experience the suffering of others at a distance, denuded of its raw power; that we pay too high a human (or moral) price for those hitherto admired qualities of vision." Experiencing the suffering of others from a simulated proximity carries a more severe moral burden. One fears the emerging genre of VR-as-human-rights-document may take Sontag's concern too literally.

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PERSISTENCE OF VISION

Live streaming services can turn viewers into bystanders

by FRANCESKA ROUZARD

Last year, Mark Zuckerberg introduced Facebook Live via a post on his personal account. "Live is like having a TV camera in your pocket," he wrote. "Anyone with a phone now has the power to broadcast to anyone in the world. When you interact live, you feel connected in a more personal way. This is a big shift in how we communicate, and it's going to create new opportunities for people to come together."

To complement and reinforce this announcement, Facebook released its first ad campaign in the U.S. and UK since its launch 13 years ago. After over a decade of exponential growth, the company was beginning to plateau in active monthly users. Ads showed vignettes captured by Facebook Live users: a three-two-one countdown to adorable footage like a puppy dressed as a teddy bear surrounded by actual teddy bears, or a baby boy bracing for his first haircut. Other, pic-

BY CHROME DESTROYER.

torial ads demonstrated the ease and simplicity of going "live" in familiar situations: "How to go live when you see someone walking an animal that is not a dog," read a bus stop. An ad perched above a luggage carousel read, "How to go live while everyone is waiting for the first suitcase to drop."

It did not take long for other social media platforms to embrace the live video feature. A live component launched on Instagram (owned by Facebook) in November, with a short companion video showing users aged 25 and under sharing the milestones of an average person who has not lived very long: silly dance moves, new braces, a colorful cast on a first broken arm. In December, Twitter announced Go Live, the fruit of its procurement of Periscope, a live streaming application, almost two years prior: "Exploring a new city? Find yourself in the middle of something amazing? Celebrating your team's big end of season win? Go live on Twitter and let others experience it with you."

In marketing materials, there was little to indicate the range of experiences these live streams would soon capture. Nor was there evidence of preparedness for them, an omission that seems inexcusable: Before live streaming was widely available, cruelty made a regular appearance in comments, pictures, and videos on all platforms, and violent images were shared widely across social media. Live streaming collapses the distance between the viewer and the viewed, between the viewer and the event itself. The intimacy of a live video allows us to share a moment. We feel more directly involved, and sometimes intensely helpless. A live stream can further victimize its subjects, and turn its viewers into powerless bystanders.

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Three months to the day after Zuckerberg introduced Facebook Live, Diamond Reynolds broadcasted the aftermath of the shooting of her boyfriend, Philando Castile, by a police officer, while her daughter sat in the backseat. Police shootings were becoming a regular occurrence in the news cycle and the video went viral like several others. By the following morning, thousands had seen Reynolds's partner bleed to death while gasping for his last breath. The video's temporary disappearance from Facebook was explained away by a representative as a "technical glitch." It resurfaced with a graphic violence warning: "Are you sure you want to see this?"

The next day, Zuckerberg offered a post in response, a little longer than his post introducing Facebook Live: "My heart goes out to the Castile family and all the other families who have experienced this kind of tragedy. My thoughts are also with all members of the Facebook community who are deeply troubled by these events. The images we've seen this week are graphic and heartbreaking, and they shine a light on the fear that millions of members of our community live with every day. While I hope we never have to see another video like Diamond's, it reminds us why coming together to build a more open and connected world is so important — and how far we still have to go."

Zuckerberg was strategically vague and generalizing. He invoked the idea of community, without the responsibility or engagement the term would demand. To avoid alienating Facebook users, he purposefully omitted an important detail of the story: Castile and his family were black. They were a part of demographic that suffers daily the tragedy of being murdered by police. Connecting to Facebook means connecting to the experience of black people, who make up a large percentage of Facebook's community. Zuckerberg did not cite any articles, documentaries, or any other resources that could provide context for what had happened. He made no mention of the GoFundMe set up for the four-year-old daughter left behind, who would need support of every kind to recover from the trauma of watching her father die. He offered no next steps beyond echoes of white liberal rhetoric about hope, openness and coming together, and fell short of grasping the magnitude of Facebook Live's effect on the lives of users.

At this moment, googling "Facebook Live" reveals "death" and "torture" as the top two options in the suggested search. The act of lives-

treaming cruelty is not only used to "shine a light" on injustice. In February of 2016, 18-year-old Marina Lonina broadcasted the rape of a 17-year-old friend using Periscope. Unlike in the case of Castile, when live streaming was meant to raise awareness of inhumane precedent, Lonina paraded inhumanity for her audience. She and the victim met the attacker, 29-year-old Raymond Gates, at a shopping mall. The next day they met at a residence where Gates pinned down the victim and raped her while Lonina recorded. Lonina was also charged with live streaming her friend's naked body the day before. Later, she would tell authorities she recorded the attack in the hopes of providing evidence of the crime, not to embarrass or titillate anyone.

The prosecutor, Ron O'Brien, said for roughly 10 seconds of the 10-minute live stream, Lonina held the victim's leg while she cried and struggled. Lonina did not call 911. "For the most part she is just streaming it on the Periscope app and giggling and laughing." It was a friend in another state who saw the broadcast and called the police.

In January, the *Wall Street Journal* reported that "There have been at least 40 such broadcasts of sensitive, violent or criminal footage on live video over the last 12 months." In Chicago, four people used Facebook Live to broadcast themselves torturing a disabled man. An audience of 16,000 witnessed the man bound, gagged, beaten, scalped, and forced to drink toilet water for 30 minutes before Facebook removed the video. The name of the victim was never mentioned in subsequent articles. However, his terrified face and the brutality he suffered are preserved in the permanence of the internet. After its removal on Facebook, the video resurfaced on YouTube.

Livestreaming heightens the violence it shows. It can be an instrument of violence in itself. Some with hateful intentions are emboldened by the knowledge of an audience; for those being filmed, the exposure can add humiliation and shame to mounting fear. Murders on livestream become contemporary lynching. Those of us who watch from our iPhones and computers know that what we are witnessing is not over. We are helpless and complicit.

If Facebook is a community, its "leaders" have obligations

Since its debut, Facebook Live broadcasts at any minute have quadrupled, with broadcasts from all seven continents, as well as from outer space. The Facebook Live Map features a two-dimensional, grey map of Earth, speckled with blue dots that pulse with varying intensities. Each dot represents a live broadcast happening now, and its size correlates to the size of its audience. Hover the cursor over any dot to reveal lines stretching to its viewers in other parts of the world. First, its immensity inspires awe, then dread.

Facebook is quick to highlight its product's reach, but has made insufficient efforts toward protecting its users from exposure to violence, and responding to the violence broadcast or enabled by its platform. This speaks to its values as a company: attracting more money through more monthly users. Policies in place for overseeing content are ambiguous, and haven't changed much since the platform's beginning. This passivity contributes to the mental scars that millions of users sustain.

Facebook's philosophies and policies are summarized on its Community Standards page. "Facebook has long been a place where people share their experiences and raise awareness about important issues," reads a paragraph under a section titled Encouraging Respectful Behavior. "Sometimes, those experiences and issues involve violence and graphic images of public interest or concern, such as human rights abuses or acts of ter-

rorism. In many instances, when people share this type of content, they are condemning it or raising awareness about it. We remove graphic images when they are shared for sadistic pleasure or to celebrate or glorify violence." Despite the company's intentions, the affect of a broadcast is decided by its audience. While posts may bring awareness to some about a social justice issue, some viewers will be inspirited by the violent footage, sometimes regardless of the creator's intent.

Enforcement of Facebook's policies relies on its consumers — it's up to users to flag posts as inappropriate or offensive. "There are billions of posts, comments and messages across our services each day, and since it's impossible to review all of them, we review content once it is reported to us," Zuckerberg wrote recently, in a 5000-plus word letter to Facebook's 1.8 billion users. "There have been terribly tragic events — like suicides, some live streamed — that perhaps could have been prevented if someone had realized what was happening and reported them sooner. There are cases of bullying and harassment every day, that our team must be alerted to before we can help out. These stories show we must find a way to do more."

Facebook says it monitors live feeds that have attracted a significant audience, and offers users the option of reporting streams in which something troubling is taking place. In early March, the company introduced new suicide prevention resources. Instead of accepting responsibility for the platform's role in the onslaught of violence broadcast through Facebook Live, however, Zuckerberg has largely proposed a neighborhood watch tactic to combat cruelty online. A significant number of Facebook users are not equipped with extensive knowledge of world affairs and mental illness. They cannot be expected to make decisions about unpredictable violent content on the website where they share pictures of family reunions and vacation getaways. Once a traumatic event is broadcast live, even effective intervention doesn't necessarily address the trauma of witnessing it as it happens.

In his letter, Zuckerberg nearly blames the Facebook community for the platform's recent, and frequent failings, as if Facebook were a public space, and not a corporate property that reaps loads of monetary benefit from live broadcasts. If Facebook is a community, its "leaders" have additional obligations. Community standards center on loose theory, a bare minimum, more than practice: Rather than put any genuine energy into supervising or addressing content, users are individually responsible for their own mental health and safety, for processing and reacting to graphic videos that enter their lives during morning coffee. It adds up to cleverly disguised inaction, and could lead to a decline in active users. It is imperative that Facebook protect its users. Violent content is hard to preempt on any platform, but acknowledging the magnitude of the live feature, and the realities of the world in which it's being used might be a start.

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"Everything feels too intimate, too aggressive; the interfaces that were intended to cheerfully connect us to the world have instead spawned fear and alienation," wrote Jia Tolentino in an essay for the *New Yorker* on 2016's "Worst Year Ever" meme. "No, 2016 is not the worst year ever, but it's the year I started feeling like the internet would only ever induce the sense of powerlessness that comes when the sphere of what a person can influence remains static, while the sphere of what can influence us seems to expand without limit, allowing no respite at all."

At this stage livestreaming has made more contributions to collective anxiety and terror than to improving human experience as a whole. "When you interact live, you feel connected in a more personal way," explained Zuckerberg in his initial post; what Facebook and other platforms have failed to recognize is that connectedness is a complicated good. At the very minimum, it requires awareness and care.

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