

Comparative Media Studies | Writing

In Medias Res

CMSW.MIT.EDU FALL 2016



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Cambridge, Massachusetts, USA 02139
617.253.3599 / cmsw@mit.edu / cmsw.mit.edu
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Head

Edward Schiappa

Research Managers

Federico Casalegno, Mobile Experience Lab
Ian Condry and T.L. Taylor, Creative Communities Initiative
Ethan Zuckerman, Center for Civic Media
Kurt Fendt, HyperStudio
Fox Harrell, ICE Lab
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cmsw.mit.edu/people

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THE YEAR OF VR DOCUMENTARY

By Edward Schiappa, John E. Burchard Professor of Humanities



Greetings and an enthusiastic welcome to everyone to this election-free publication. This past year has provided us, as media scholars and writers, countless degrees' and tenure cases' worth of presidential (or un-presidential) material to work through. The surreality of so many election moments may account for the focus of this issue of *In Medias Res* and indeed of CMS/W's work since 2015 and 2016: the long-awaited breakthrough of virtual reality technology and storytelling, now in widespread use by artists, journalists, hobbyists, and, really, anyone with a smartphone.

Our cover story, then, is one of three pieces on virtual reality you'll read in the coming pages. It features the collaboration, as written up by the *New York Times*, between CMS/W Associate Professor Fox Harrell and visiting photojournalist Karim Ben Khelifa, who together developed a project to use an Oculus Rift VR headset as the platform for an experiment into empathy. "The Enemy" attempts to overcome what Ben Khelifa saw in places like Afghanistan, where there "was a culture of warfare that often perpetuated itself through misunderstanding and misinformation, with no mechanism for those of opposing sects or political forces to gain a sense of the enemy as a fellow human being."

We then take a step back for more context and get a peek at work produced by our Open Documentary Lab following its conference "Virtually There: Documentary Meets Virtual Reality". The summary included here

acknowledges the growing influence VR, as a medium and set of production practices, has on documentarians but cautions that "we're not there yet. Technologies, like investors, come and go."

The third piece is a deeper look.

Open Documentary Lab director William Uricchio joins his old colleague (and co-founder of our program) Henry Jenkins, and together they discuss ODL's 2015 report "Mapping the Intersection of Two Cultures: Interactive Documentary and Digital Journalism". Throughout its history, CMS/W — with great credit to both Jenkins and Uricchio — has managed to identify early on realignments and reimaginings of media forms and methods seemingly thought to be nailed down. That has been true of games as a transdisciplinary field, of civic media, and now too of documentary journalism. Their conversation touches upon documentary journalism's role in American democracy, its future funding models, and the enormous challenge of constructing documentaries that complement today's ways of creating, curating, sharing, and consuming stories.

As in last year's magazine, we are making a bigger point of featuring student work — not just reports from the field but academic and creative writing. The merger three years ago between Comparative Media Studies and Writing and Humanistic Studies has foregrounded the extraordinary writing produced by MIT students who aren't "our" students. A piece on fusion was written by an Aeronautics and Astronautics major for one of our introductory writing subjects. Another is a story by a now-graduated major in Electrical Engineering and Computer Science, who won one of our Ilona Karmel Writing Prizes, in the science fiction category.

We highlight excellent graduate student writing as well, with recent grad Lily Bui's conference paper on climate change through the lens of mourning and Evan Higgins' on "The Wire".

And for the first time, we include a research paper by a faculty member, with Sasha Costanza-Chock's co-authored work on youth civic engagement in the Scratch programming community. We're also pleased

to share some of Professor Heather Hendershot's writing on conservative icon William F. Buckley, who throughout his years hosting the public affairs show *Firing Line* could be a harsh critic of feminism while being one of the few people willing to give feminists a space to present their arguments to a national audience. (Hendershot's book *Open to Debate: How William F. Buckley Put Liberal America on the Firing Line* was published this fall.)

You'll find our updates on research groups and community members, though there's one name not yet mentioned that we should. Professor Lisa Parks, whose research focuses on satellite technologies, surveillance media cultures, and more, is joining us as a faculty member after heading the Film and Media Studies department at the University of California, Santa Barbara. We're thrilled to have her join us as a colleague and teacher; keep an eye out for her new book, currently titled *Life in the Age of Drone Warfare*, to be published by Duke University Press) next year.

And a big note of congratulations to professor of science writing Tom Levenson, who this year was awarded a fellowship by the John Simon Guggenheim Foundation. It's a highly competitive mid-career prize and will allow Tom to develop his work exploring the 18th century "South Sea Bubble" and, by extension, the role the scientific revolution played in modern financial capitalism and the "wealth and woe" that proceeded. The fellowship is especially meaningful in the Levenson family: Tom's father J. C. Levenson was an awardee in 1958 for his work in American literature.

Last, November always marks our information sessions for the master's programs in Science Writing and Comparative Media Studies, and we would love to have you there, whether you're a prospective student considering applying or you're looking to learn more about the work we do; the CMS information session on November 17 will be followed in the evening by a public event featuring four alumni. Learn more about it all at cmsw.mit.edu.

Edward Schiappa



SEXISM IN SCIENCE LEADS TO WILLFUL BLINDNESS

Thomas Levenson, Professor of Science Writing

*This piece first appeared in August 2015 in the Boston Globe:
cmswm.it/sexism-in-science-boston-globe*

“There are several ways of looking at Delicate Arch,” Edward Abbey proclaims, recalling his seasons as a ranger in Arches National Park in 1957 and 1958. “Depending on your preconceptions, you may see the eroded remnant of a sandstone fin,” he writes in what has become a classic of American nature writing, “a triumphal arch for a procession of angels, an illogical geologic freak, a happening — a something that happened and will never happen quite that way again, a frame more significant than its picture.”

Abbey published *Desert Solitaire: A Season in the Wilderness* a decade after his tours at Arches. In the nearly 50 years since, it has become part of the canon for the faith that the American wild has value beyond measure. This summer I took it as my guide on our family vacation, a road trip across southern Utah with my wife and teenage son.

The book was as advertised — iconoclastic, beautiful, bombastic, sometimes slyly fictional, a blend of memoir, polemic, essay, travelogue, elegy, manifesto — and always, unequivocally, an unbending defense of the idea that the human spirit requires wilderness. “The beauty of Delicate Arch explains nothing,” Abbey insists, and then within a paragraph joyfully contradicts himself: “A weird lovely fantastic object out of nature like Delicate Arch has the curious ability to remind us...that out there is a different world, older and greater and deeper by far than ours, a world which surrounds and sustains the little world of men.” It’s a great book.

But as I kept reading, it became ever harder to ignore something that Abbey clearly did: Women.

There are unnamed girls in the book, recalled as objects of love and lust; one unnamed Mormon wife who kindly agreed to link her soul with his; 19th-century prairie women writers dismissed with mock-titles like *No Sin in the Saddle*. But not one actual woman with her own voice, agency, or, above all, even the possibility of participation in what the wilderness offered Abbey himself. It fails the Bechdel test,

in other words. So for all the soul-affirming, spirit-testing celebration of skill and toughness and human spark in the face of nature’s implacable indifference — Abbey’s desert was a man’s world.

That lapse, that blindness to half of the world, doesn’t render “*Desert Solitaire*” null and void. It remains powerful, vital reading — and in any event, one can always trot out the familiar rationalizations: It’s a work of its time; Abbey was following convention in rolling humankind into “man”; Abbey’s goals are on the side of the angels. Surely that trumps his lapses, whatever they may be.

Except they don’t. By their absence, women are written out of what Abbey himself saw as transcendently necessary for the good life. Anyone reading those essays today has to write them back in.

So, through Arches and across Abbey country, I argued with the man. Usually I’d say trying to talk sense to the writer — long dead — of a 50-year-old book would be private recreation. Who cares, after all, what some old guy thought about women in the backcountry? But then, Sir Tim Hunt opened his mouth.

Before June 9, 2015, Hunt was very well known to not very many people. He shared the Nobel Prize in 2001 for discoveries on the molecular mechanisms that regulate cell division, a process called the cell cycle. It made him a celebrity among working biologists but hardly in any pop-culture sense.

That changed overnight, when, at the World Conference of Science Journalists held in Seoul, Hunt told an audience of women journalists and scientists of the problems posed by women in the lab: “You fall in love with them, they fall in love with you, and when you criticize them they cry.” Hunt went on to muse that gender-segregated labs might be a good idea before switching to more standard lunch-speech platitudes congratulating Korean female scientists for all their good work.

The inevitable happened. Several of those present shared the event on Twitter and other social media platforms, Hunt — no longer actively engaged in bench research — was asked to resign from a pair of honorary positions, and, best of all, dozens of women scientists

joyously shared their passion for science under the Twitter hashtag #distractinglysexy.

In some sense, this was the best possible outcome, one in which Hunt performed an inadvertent service: Women scientists showing with wit and verve how little they cared for Hunt's antediluvian attitudes, and how much joy they found in their work.

The backlash that followed was probably predictable, driven by the impulse to protect a powerful man from the minor embarrassment of being exposed as an antiquated fool. Some prominent British scientists rallied to Hunt's defense against what Richard Dawkins called "a baying witch-hunt...unleashed among our academic thought police." Twitterers snarled at Hunt's critics, claiming that an Internet mob had ruined the laureate's career. A sustained and deeply misleading set of posts and articles soon followed, seeking to rewrite the record of that fateful lunch in Seoul, asserting that Hunt had been joking; that his remarks were misrepresented to bring a great man down.

That furor has largely died down now, but the underlying reality remains: proximately, that Hunt truly did say what he said, and subsequently affirmed that he meant it — and, much more significantly that in doing so, he told a vital truth, though not the one he imagined.

That is: To suggest Hunt had to have been joking, is to say the practice of science has changed, that no longer is it as hostile to women as everyone concedes it was until not that long ago. Marie Curie remains famous; Rosalind Franklin is a touchstone; a fictionalized Barbara McClintock is the star of children's books because they were exceptional. Theirs are heroic tales — with a hard emphasis on the battles these women had to fight — that show that it is possible to imagine a life in science for a woman.

A constant theme of those lives as retold now? Curie and Franklin and all the others can be seen as great figures from a history that we have long since left behind — or rather, it's seductively easy to see ourselves not only as more knowledgeable than our predecessors, but wiser.

In that context, Hunt's real accomplishment in Korea — amplified by the backlash in his defense — was to blow up such self-congratulation, reminding everyone a dishonorable history isn't actually past, that the habits of the mind that distinguish between the genders did not magically disappear sometime in the last few decades.

That's hardly news to those who live the daily life of the lab, of course. For just one example, in 2010, researchers at Yale performed a now notorious résumé study to show the persistence of gender bias at the entry level of science. Professor Jo Handelsman, a molecular biologist; a post-doc Corinne Moss Racusin; and other colleagues prepared résumés that differed in only one detail: in half of them, the subject's name was John, and in the other half, Jennifer.

Those résumés with (again, identical) supporting material were sent out to 127 scientists who were asked to rate the applicants as potential lab managers. When the replies came back, "John" trumped "Jennifer" on every trait except likability — and was slotted in for a salary \$3,730 dollars higher than his fictional female twin.

That result held up no matter whether those rating the application were women or men — a classic signature of implicit bias, the thumb on the scale invisible even to those pressing down. Such blindness is

the defining symptom of the pathology Eileen Pollack documented in her 2013 article on the missing women of science: how, from the beginnings of their education, women in science face the constant pressure of interactions with advisors, research managers, recommenders, and the like who never say a women shouldn't do science... but still perceive Jennifer as worth 12 percent less than John.

Hunt's remarks made explicit the usually unconscious — or at least unstated — beliefs that constrain any ambitions Jennifer might have. There's a cost to bias, as always — most obviously, in the waste of talent and energy that follows unequal treatment — but there is a deeper loss involved too, one to be found within what Edward Abbey saw in his summer of rock.

Abbey followed me all the way across Utah, from Arches' harrowing elegance to the fools-rush-in mazes of Canyonlands, past Capitol Reef and over the hill towards Bryce and Zion. I took it with me into California, up into the fire watchtower on top of Mount Harkness, where over the summer of 1966, Abbey had written what became *Desert Solitaire*.

I read the last few pages there, as a guest of this year's lookout, Dave LaGrove. When I was done, I thanked him and clambered down to the mountaintop. Later, I returned to the passage about Delicate Arch quoted above.

A little further down that same page, Abbey finds in that formation his credo, written here in perhaps its most compact form: "If this ring of stone is marvelous then all which shaped it is marvelous, and our journey here on earth, able to see and touch and hear in the midst of tangible and mysterious things-in-themselves, is the most strange and daring of all adventures."

Scientists, the best ones, say something very similar. Albert Einstein in his account of the moment he felt the call of the scientific life recalled that instead of "an existence which is dominated by wishes, hopes, and primitive feelings," he felt drawn to "this huge world, which exists independently of us human beings...a great eternal riddle, at least partially accessible to our inspection and thinking." For Einstein the wilderness of science, the point at which the researcher leaves the map, offered a path into the good life, a well lived one. Wrestling with that unknown, Einstein told one audience, yields a "state of mind...akin to that of the religious worshiper or a lover."

Einstein, like Abbey, found it almost impossible to imagine women among those who might venture off the map. I'm willing to bet neither man noticed who wasn't there.

But we do now — which is what torques the meaning drawn from their memories, and from the more explicit dismissiveness shooting through the Hunt imbroglio. When the prize is transcendence, it is more than wrong to hobble any person in pursuit of strange and daring adventures. It is inexcusable.

Yes, certainly and thankfully, we've seen formal barriers drop to participation in science by women and other groups unseen in the lab over the last few decades. Yet, sadly and infuriatingly, the habits of mind that once almost entirely barred women from the lab remain, less potent, perhaps, but still at work. The Delicate Arch, as remembered in a secular psalm that exceeds the vision of its singer, reminds us yet again that such views are dangerous nonsense. ●

IN THROUGH THE BACK DOOR

T.L. Taylor, Professor of Comparative Media Studies



This piece appeared in the October 12, 2016, issue of MIT's newspaper, The Tech, as part of its series on MIT community members with working-class backgrounds: thetech.com/2016/10/12/in-through-the-back-door

I remember hearing over the years how people felt once they got tenure. A sigh of relief, a feeling of recognition, the sense they had made it, that they were somehow now okay.

I never felt that.

Those who knew me well would reassure me (so many times over the years) that I'd done it, that I wouldn't be fired at any moment, that I'd jumped the hoops correctly (many of us know imposter syndrome all too well). But it never "took," and I never felt what people described.

"In through the back door" is how I've always felt about my academic path. Though I've been lucky to land on my feet (and I do mean to invoke luck, very explicitly), my life as an academic has always felt, at least psychologically, pretty precarious.

However, the more I work with first-generation college students, the more I want to reassure them that such feelings are normal and that we don't all come to the university through traditional paths. I increasingly think that making a range of experiences visible is important, and I'm fortunate to not feel as vulnerable as I once did.

I'm from a white working class family. My father graduated high school and was a machinist, then house painter, then janitor/maintenance worker. My mom dropped out of school as a teenager but went back and finished as an adult after many odds-and-ends jobs. Though I was a good (if undirected) student when I was young, when I was 12 and a half my mom died, and life kind of went off the rails.

Junior high and high school mostly became about hanging on just

enough. I got funneled into home economics and stenography and working at the campus convenience store. I got sent out to the VA hospital to learn how to file. I never took the SAT.

The early elementary school kernel of being deemed "smart" (mostly because I read books and tested okay) was ultimately quite fragile, lost as a variety of other structural factors came to the foreground. I didn't know how to think, talk, or ask about my future. I graduated, moved out, and got a job as a graveyard waitress at Denny's.

It was only after an older woman I respected told me I should try to "do something with my life" that I ended up seeing what my local community college, Chaffey (in Rancho Cucamonga, California), could offer. I figured I could take a class or two during the day while I worked at night.

Community college became one of the most important experiences of my life. Though I kept waitressing full time to make ends meet, that shot at college changed my path.

The community college system in California gave people like me another chance at education. Not only did I receive encouragement and praise for my inquisitive nature, I gained exposure to topics I'd never encountered before (for example, sociology, the field I went on to specialize in). I got health care through the medical office on campus. I got small subsidies to buy my books.

I got the kind of mentorship that happens when you run into a professor in the corridor and the following conversation occurs:

"Are you applying to Cal?"

"Yeah, Cal State Fullerton."

"No, Cal. UC Berkeley."

"What is that?"

...and the explanation and advice that follows.

Photo by Bryce Vickmark

I eventually ended up at UCB thanks to the state system that intentionally creates transfer paths for students like myself and keeps them affordable.

It's hard to trace your trajectory somewhere. It's too easy to fall into clichéd meritocratic myths, to forget your privilege. Though I was raised in a working class household, my whiteness was always a non-trivial part of my opportunities.

Remembering all the small pivots, and missed ones, that make up the whole is an impossible task. The truth is much messier, tangled up with chance and effort and privilege and any other number of variables that simply can't be pulled apart.

CV's hold stories in truncated, telegraphed form. When I was promoted to full professor last year, it got me thinking about adding my community college experience to my CV. When I told a few of my students about my plan, their cheers of encouragement made me smile, even feel proud, and I was buoyed by their enthusiasm for sharing that part of my trajectory.




In an era where online education is touted, my community college experience remains for me a powerful reminder of how important our everyday face-to-face connections, and the support structures that touch many aspects of our lives, can be (from educational to medical to financial).

In a moment of growing economic disparity, the second chance offered to folks like myself — one that didn't leave me overly burdened with debt for an undergraduate education — seems even more critical to preserve.

And while a classic liberal education seems under constant threat from the push to instrumentalize learning for narrow job purposes, being exposed to a range of subjects and ways of thinking — many of which I never encountered in high school — was hugely important for my own development. A liberal arts education is something even working class folks deserve.

Though I probably will always feel some sense of having come in through the back door, never totally at ease in the professional world in which I find myself, I want to make visible these diverse paths and cheer on those who take them. I can't untangle my own path fully, but one thing I can do is put my community college experience on my CV. I've left it off for far too long. ●

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HIGHLIGHTED 2016 EVENTS

AN EVENING WITH JOHN HODGMAN

John Hodgman brings his razor-sharp wit to MIT for a moderated discussion on his career and the state of comedy today.
November 10 @ 6:00 pm
MIT Building 26, Room 100

GRADUATE PROGRAM INFORMATION SESSIONS

Comparative Media Studies

Thursday, November 17 @ 10:00 am – 12:00 pm
MIT Building E51, Room 095
Registration required: cmsw.mit.edu/cms-infosession16
Or view live online at cmsw.mit.edu

Graduate Program in Science Writing

Friday, November 18 @ 3:00 pm – 5:00 pm
MIT Building 14E, Room 304
Registration required: cmsw.mit.edu/sciwrite-infosession16
Or view live online at cmsw.mit.edu

DESIGNING HISTORIES OF SLAVERY FOR THE DATABASE AGE

Podcast: cmsw.mit.edu/vincentbrown

Wrestling creatively with archival problems of the social history of slavery, Vincent Brown charts pathways for pondering history's most painful subjects.

VIRTUAL REALITY MEETS DOCUMENTARY

Video and podcast: cmsw.mit.edu/virtualmeetsdoc

Featuring the leading creators in the virtual reality space, helping us better understand VR's potentials and implications for documentary and journalism.

WHAT DO PEOPLE DO ALL DAY?

Podcast: cmsw.mit.edu/nickseaver

CMS alum Nick Seaver asks, "If we want to make sense of new algorithmic industries, we'll need to understand how they make sense of themselves."



WILLIAM F. BUCKLEY WAS NO FEMINIST, BUT HE WAS AN (UNINTENTIONAL) ALLY

BY INVITING FEMALE INTELLECTUALS ONTO HIS TV SHOW AND TAKING THEIR ARGUMENTS SERIOUSLY, BUCKLEY SHOWED THAT THEIR IDEAS WERE WORTH LISTENING TO — GIVING FEMINISTS A PLATFORM TO REACH AN INFLUENTIAL AUDIENCE.

Heather Hendershot, Professor of Film and Media Studies

William F. Buckley was not a feminist. This hardly constitutes a shocking revelation. In the 1960s, the women's liberation movement was not a welcome cultural turn for him. He could, by contrast, more fully understand the pressing concerns of the civil rights movement, and acknowledged that racism was a pernicious problem. Likewise, he understood that countercultural youth — antiwar activists, poets, musicians — were seeking a better world, even as he disagreed about what made the world flawed and what would make it better.

Many kinds of disaffected and rebellious liberals were, like the hippies, comprehensible to Buckley, and he was eager to debate them on *Firing Line*, the TV show he hosted from 1966 to 1999. But he just didn't get feminism.

On the whole, Buckley supported the notion of "equal rights" (as he defined them) but not of the "equal rights movement," which he felt had gone in an altogether too radical direction. True to form, he opposed the kinds of structural changes that many feminists called for — both the reformist liberals of the National Organization for Women and the more radical, revolutionary left-wing crowd.

Yes, sexism and inequality existed. Yes, it was unfair that working women were denied promotions simply because they were women. But such problems were not insurmountable. Strange notions that women could stop shaving their legs, stop bearing primary responsibility for housework and child care, stop taking their husbands' last names, stop taking husbands at all — what on earth did this have to do with "equality"?

Yet Buckley was not unsympathetic to all of feminism's goals, nor did he harbor the callous antipathy toward the movement typical of so many on the right. On *Firing Line*, Buckley consistently maintained that women were not "inferior" to men, but simply "different" and worthy of male protection and respect. This did not mean that women should be legally disadvantaged, paid less than men, and so on.

"Firing Line stood out for Buckley's genuine attempts to engage with, decipher, and debunk feminist goals, while allowing his feminist guests to have their say."

Today, such ideas sound conservative, if not rabidly so, but taken in the context of the late 1960s and early 1970s, some of Buckley's notions about women teetered on the edge of progressive. After all, he admired professionally successful women and did not declare that they were destroying the traditional home. Consider that in 1969, many conservatives were absolutely livid that a female character on *Sesame Street* was employed outside the home as a nurse. Anti-feminists were digging in their heels and did not like the changes they were seeing on TV, never mind the changes under way beyond the screen.

In this climate, the fact that Buckley invited accomplished female lawyers, professors, and activists onto his TV show to debate political issues seems rather enlightened. To put it rather conventionally, in attacking feminism on *Firing Line* in the 1970s, Buckley attempted — with uneven success — to be a perfect gentleman. He opposed the women's lib movement, but was respectful of feminist intellectuals and eager to hear and debate their ideas. By inviting them on his show and treating their arguments seriously, he gave them legitimacy — proving by example that theirs were ideas worth listening to, and giving feminism a coveted platform to reach an influential audience.

Over the course of hundreds of *Firing Line* episodes, Buckley revealed himself as a figure somewhat different than he is sometimes remembered, and whether you're politically on the left, right, or more towards the center, there is much to learn from watching the show. *Firing Line* was a space where people on the left and right could have

honest debate in a forum where discourse was not driven by sound-bites. Instead of an endless churn of talking heads, Firing Line hosted real, long conversations. In our charged era of partisan hot takes, Firing Line offers an example of not only how we can discuss politics and ideas, but also of how we can listen to and engage with those with whom we disagree.

Buckley was sometimes puzzled by feminism, wondering aloud on his TV show why women would want to eliminate chivalrous behavior, but his primary interest throughout the 1970s was in sparring with smart feminist guests, debating the very issue of patriarchal oppression, while also questioning the pros and cons of the Equal Rights Amendment.

Firing Line's presentation of women's lib was unique by virtue of the fact that Buckley had very specific worries, such as his near-obsessive concern about the potential impact of feminism on spoken and written language. And while the notion of disrupting traditional institutions was troubling to Buckley, he was not venomous in his rhetoric opposing it.

On the other hand, Buckley was quite comfortable expressing the old male chauvinist platitude that women could hardly claim to be disempowered in light of how bossy they generally were. On an episode of Firing Line that centered on freedom of expression, he exclaimed to feminist lawyer Harriet Pilpel, "God, the women I know aren't oppressed as regards their freedom of expression....Supposing it were documented that women speak twice as much as men. Would that take care of the problem?" Pilpel firmly told him off and iced the cake of her counterargument by observing that, "the amount of time available to women and for the discussion of women's issues is minuscule as far as television is concerned." She was completely right — though it was, of course, ironic to make this observation to a male chauvinist hosting one of the few shows that did provide reasonable time for such discussion.

Elsewhere on TV, feminists were given much less time for thoughtful self-expression. Take Not for Women Only, a patently misnamed morning talk show hosted by Barbara Walters. In 1973, NOW cofounder Betty Friedan and her daughter appeared on the program to answer hard-hitting questions like, "Are you ever embarrassed by your mother?" It was utter pabulum. Friedan's *The Feminine Mystique* had been a major force in kicking off second-wave feminism in the United States in 1963. Ten years later, change had happened, but the goals of that movement were still very much a work in progress, and mainstream media discussion of feminism was typically slim, hostile, or dismissive.

In this context, Firing Line stood out for Buckley's genuine attempts to engage with, decipher, and debunk feminist goals, while allowing his feminist guests to have their say.

For guests like Friedan, who spoke best in sound bites or when reading from prepared texts, Buckley's approach was no blessing. In debating abortion with Buckley on Firing Line in 1971, Friedan seems to feel like she's got a real trump card:

FRIEDAN: Supposing that a uterus was implanted in you, and therefore you had to consider this in terms of an issue that was real for you, not just an abstract issue for someone else. I doubt that suddenly you would — you know, just as surely you don't consider yourself less important than all the sperm that might fertilize eggs that don't fertilize eggs, so you couldn't consider yourself as a person...less important than an unborn fetus.

What would William F. Buckley do if implanted with a uterus? It sounds like a setup for an off-color joke. Not taken aback for a second, Buckley responds that he would take care of a fetus with the same sense of responsibility as he would in caring for a senile father or mother. In sum, Friedan speechified on women's liberation without really engaging with Buckley. She was not invited back for 23 years. Friedan simply didn't have the chops for TV. Buckley would have to look elsewhere for articulate experts on his favorite feminist topic: the Equal Rights Amendment.

The ERA came up quite often on Firing Line, and, really, the show offered the best TV coverage available. The rest of the mainstream electronic and print media tended simply to amplify women's internal disagreements about the amendment. The real action was taking place outside the spotlight, where lobbyists, activists, and politicians were duking it out, but that was of little interest to the mainstream media.

Buckley was largely disinterested in the typical "catfight" angle. He knew that some women disagreed about the ERA, but he had no desire to exploit this fact in particular. If Firing Line did often pair women against each other to discuss feminism, it did so not in the name of sensationalism but, rather, because they were the most informed and prominent experts on the topic.

Buckley's conservative guests shared predictable concerns about the practical consequences of the ERA (the specter of women engaged in military combat loomed large) and, more generally, about the ways that the women's movement would potentially shake the very foundations of traditional interactions between the sexes.

On the anti-feminist side, a frequent guest was Phyllis Schlafly, a powerful and successful conservative political operative, lawyer and mother of six, who insisted that legally mandated "equality" would unleash the natural male desire to exploit women.

As the women's liberationists of the 1970s enthusiastically noted that the ERA would efficiently invalidate hundreds of discriminatory laws regarding employment, property and family relations, Schlafly predicted that the ERA would unleash a maelstrom of husbandly negligence, as men would no longer be required to support their wives. "Even though love may go out the window," she wrote in *The Power of the Positive Woman*, "the [financial] obligation should remain. ERA would eliminate that obligation." Wives already had it great, she claimed, with housework requiring only a few hours each day, leaving a woman the opportunity to pursue full or part-time work outside the home, or time "to indulge to her heart's content in a wide variety of interesting educational or cultural or homemaking activities." (A typical American stay-at-home mom might find this notion



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somewhat far-fetched.)

Making the first of six Firing Line appearances in 1973, Schlafly sat on the dais in a prim salmon-colored sweater, navy blue skirt discreetly covering her knees, hair swept up with more than a whisper of Final Net. She was the most gracious anti-feminist imaginable — an alarming hybrid of Emily Post and some Bizarro-World Susan B. Anthony. She was utterly composed and never seemed to stop smiling. This was the kind of person you could imagine taking a conference call from Jesse Helms and Nancy Reagan while frosting a Bundt cake.

Unlike Friedan, Schlafly was a media dynamo, a savvy activist who fully understood the nuances of style and spin. For instance, at a public debate with Schlafly in 1973, Friedan had notoriously blustered, “I’d like to burn you at the stake!” The line has often been repeated, though Schlafly’s response is in many ways more interesting: “I’m glad you said that, because it just shows the intemperate nature of proponents of ERA.” The retort perfectly illustrates Schlafly’s capacity to craft a public image for the anti-ERA movement. As NOW members swung further left in the late 1970s, Schlafly dressed her team in tasteful blouses, gave them advice about what makeup looked best on TV, and encouraged them to present homemade pies to legislators opposing ERA.

Now, really, there are as many poorly groomed, uneducated, and rude conservatives in America as there are poorly groomed, uneducated, and rude liberals. But in her TV appearances, Schlafly managed to convey the impression that she was a typical conservative. Comments about burning her at the stake — these things only made her stronger. This prim activist — a delicate flower who had paid her way through college during World War II by working nights testing rifle and machine gun ammo — was perfectly suited to expound upon the dangers of the ERA on Firing Line.

Schlafly and Buckley were aligned on several fronts regarding women’s issues. Neither was opposed to women working, for example, and Buckley certainly had no problem with Schlafly’s hard push to get Republican women more active in the GOP, moving beyond being “merely doorbell pushers” and envelope stuffers to actively shaping the party platform. But in many ways, Schlafly swung further right than Buckley. Looking back on the ERA in 2006, Schlafly stated that she “simply didn’t believe we needed a constitutional amendment to protect women’s rights....I knew of only one law that was discriminatory toward women, a law in North Dakota stipulating that a wife had to have her husband’s permission to make wine.” One suspects that Buckley would have found it far-fetched to assert that the right to vinification was the single legal inequity facing women in the 1970s.

Similarly, in 1981, Schlafly stated before a Senate Labor Committee hearing on workplace sexual harassment, “Men hardly ever ask sexual favors of women from whom the certain answer is ‘no.’ Virtuous women are seldom accosted by unwelcome sexual propositions or familiarities, obscene talk or profane language.” Buckley was not so naïve as to believe that only the impure of heart were subjected to unwanted sexual come-ons from men.

On the left, feminists like Germaine Greer appeared on Firing Line to advocate strongly for the disruption of conventional family relationships and structures. Or, as Buckley put it, on a 1973 program with Dr. Ann Scott from NOW, “[Y]our sister, Germaine Greer...feels that the family is really a very pernicious institution and that the genuine liberation of women won’t come until after the family, the whole idea of the family — the ‘molecular unit,’ she calls it — is destroyed.” Clearly irked, Scott corrects him: “nuclear, nuclear unit.” This rare rhetorical gaffe on Buckley’s part revealed how strange the terms of the movement were to him.

And what of the reference to Scott as Greer’s sister? It is initially perplexing, as Scott looks nothing like Greer and doesn’t speak in Greer’s Oxbridge tones. Remarkably, Buckley was using “sister” in the broad feminist sense without making even the slightest suggestion of sarcasm, though he would use scare quotes just moments later in referencing “woman power.” This was one of his many moments of chivalrous pugilism. If feminists called each other “sister,” he was willing to play along — up to a point.

The feminist movement’s oft-expressed desire to restructure or destroy the “molecular” family was a pressing concern for Buckley, but he seemed just as perturbed by the notion that matters of etiquette might be revised. Like Schlafly, he expressed anxiety that men would no longer graciously protect the weaker sex. Doors would no longer be opened for women, and moreover, they would be allowed to go down on sinking ships. Buckley exhibited a particularly strong concern about the linguistic impact of feminism (when Friedan had appeared in 1971, he archly introduced her as the “founding father of the women’s liberation movement”).

During the Q&A session during Friedan’s 1971 episode, Lynne Williams, a regular on the questioning panel, suggested that she wanted “to do a little consciousness raising” with Buckley. She had recently married and had decided to keep her last name. Why then did Mr. Buckley continue to refer to her as “Miss Williams” instead of “Mrs. Williams”? Friedan interjected that “Ms.” was the solution, but Williams rejected this as too difficult to pronounce. Buckley continued: “I would, of course, call you anything you like...Miss Millett, who is the author of *Sexual Politics*, I’m told won’t come on this program unless I refer to her as ‘Kate,’ which I find...sort of decomposing, psychologically decomposing. I call some of my best friends on this program ‘Mr. So-and-so,’ and ‘Miss So-and-so,’ whatever, simply because I tend to feel that it observes a formality which is an act of respect for the audience. I think notoriously the practice has been for people, who also have professional lives, to call themselves ‘Miss So-and-so.’ We called Miss Rosalyn Tureck here ‘Miss,’ and she’s been married four times.”

Williams asked if there was “something more serious” about “Miss,” and Buckley interestingly replied, “The ‘Miss’ in effect says to your own constituency, whether it’s professional or artistic, that they want very much to stress the fact of your being different from merely the connubial choice of your husband.” In effect, Buckley was positing that “Miss” established not unmarriedness, as many feminists claimed, but professional independence. There was no need for the acoustically jarring “Ms.” neologism when a conventional word would

suffice perfectly well. Of course, the feminists would ultimately win the battle for “Ms.,” but it’s interesting that Buckley had thoroughly thought through the quandary and come up with a rhetorical solution he found reverential to the successful female professional. Again, chivalrous pugilism.

Buckley took particular pleasure in discussing the language of women’s liberation with Germaine Greer on *Firing Line*. He opened his 1973 show with *The Female Eunuch* author by asking her opinion of new feminist-inflected rules about how the sexes should be referenced in textbooks. Greer was adamant that such questions were being addressed in entirely the wrong way:

GREER: The whole linguistic question of women’s liberation is difficult because of the strange paradox of our position... Are you to make “he” and “she” words equal in estimation or are you to screen out “she” as forever incapable of equaling “he” in estimation, grammatically? ...

BUCKLEY: But there’s no implied hierarchy, as far as I can see.

GREER: Oh, there is, because —

BUCKLEY: Well, now, [textbook publisher] Scott-Foresman says you should never refer to “early man.” You should refer to “early humans,” which means that you can’t use a synecdoche.

GREER: But not only that. What it means is that the real attitude is going to be concealed by a form of primitive censorship, by a kind of ritual observance, whereas the actual situation won’t change. It’s like calling people “Ms.” when in fact they’re married. It doesn’t change the character of their marriage, and I think it’s a sort of hypocrisy.

BUCKLEY: In other words, you think that the emphasis on nomenclature is preposterous?

GREER: Well, I think it’s such a trivial aspect of a real struggle that I think it’s part of a general movement to co-opt a struggle for existence, really, and turn it into something futile.

Greer’s radical structural analysis was spot-on: Changing language was meaningless if you couldn’t address the foundational issues that made language biased in the first place. Buckley, conversely, felt that language was not biased, but that there must surely be elegant and reasonable ways to adjust our rhetoric in response to changing social conditions and norms. At base, he was delighted to converse with someone who was skeptical about the linguistic demands being made by mainstream liberal feminism.

Needless to say, Buckley found much of Greer’s analysis lunatic — she found great merit in communal childrearing, for example — but he was delighted to hear anyone speak critically of the feminist assault on everyday language, and, politics aside, this woman could really craft a sentence. With someone like Norman Mailer, Buckley could rhetorically spar, but when Greer came on the show, it was like a fencing match. Greer could certainly parry any highbrow literary thrust Buckley might make, and she poked fun at him like a British schoolmarm for quoting Alcibiades: “Oh, come, come...we certainly are flying high today.”

Discussing the exploitation of sex, Greer goes so far as to note that Buckley is “a very pretty man,” which makes Buckley laugh, but not the studio audience. The “very pretty man” moment is both

uncomfortable and riveting. It’s far-fetched to imagine that Greer was actually hitting on Buckley, and really, if you are debating feminism with a patriarch and you want to characterize him, pretty is one of the more emasculating word choices. Overall, it’s an engaging episode precisely because Greer and Buckley are so finely matched in terms of wit and intellect, yet their personalities are so different, and it is never totally clear who is out-arguing whom. At one point, Buckley finds himself agreeing with Greer about the proper, compassionate treatment of rape victims. “If that’s part of the women’s liberation movement, I’m for it,” he says. As if realizing he has gone over the edge in agreeing with sound feminist ideas, he changes the topic, asking abruptly, “Why do you want a communist state?”

Greer appeared only once on *Firing Line*, which is somewhat surprising, as Buckley thought she had given a whiz-bang performance. He tellingly included her in two later greatest-hits episodes. In his thank-you note to her after the 1973 show, he wrote, “Goddamn it you are really good.”

The least successful *Firing Line* episodes were often those featuring conservative guests. One exception was the riveting Margaret Thatcher episode in 1975. Most of the conversation centered on economic policy and the ins and outs of bureaucracy. Left to her own devices, Thatcher would surely not have said anything for or against feminism. She could not possibly have been less interested in the topic. But during the Q&A session, Jeff Greenfield (today a regular contributor to *Politico Magazine*) observed that there had been an increased number of women running for public office in the U.S. the preceding year, and that “their conservative ideology helps to overcome one of the stereotypical objections [to women who run for office]...there’s a feeling among the electorate...that women tend to think more emotionally, they’re somehow less hard-nosed.”

Greenfield remarks upon Thatcher’s conservative reputation: Did her ideology help her overcome stereotypical objections to women holding office?

Thatcher takes immediate offense, irked by the notion that her gender is of interest to anyone. One senses sweat breaking out on Greenfield’s upper lip:

THATCHER: No. Would you be so very surprised if I said that at home on the whole we just look at the person and not necessarily the sex?

BUCKLEY: Yes.

THATCHER: You would? Well, that’s because you’re a man, you’re limited...Honestly, I regard these questions as very trivial. You don’t mind my saying so?

GREENFIELD: And if I did, what would I do?

THATCHER: Look, we look at a person to see if they’ve got the abilities. Now, I’ve heard this argument frequently, that women are really rather more emotional than men. Really, women are intensely practical. Again, I don’t mean that flippantly. We are an intensely practical sex. We often get on with the job; we don’t always talk about it as much as men; but we get on doing it....Now you ask me — look, am I emotional? I don’t know.

GREENFIELD: No, no, no... I think that is a misinterpretation.

THATCHER: You decided not. All right.

BUCKLEY: Excuse me, Mrs. Thatcher, but isn't a logical consequence of what you've just said that there are very few competent women in England?

THATCHER: No, not at all.

BUCKLEY: Because there are very few women politicians. And if everybody proceeds to elect people without any reference to sex, it must mean that they choose men 99 percent of the time because they're superior. [audience laughter]

THATCHER: No, I'm afraid that women are...very much more modest in running for Parliament than men. Nothing like as many of them put up [run for office], you know. Now, that's not because the ability isn't there. Many of them are tied up with bringing up families, etc., and they're therefore out of the political scene for quite a time. We have far fewer women candidates than men candidates, and so it's not surprising that fewer get elected. There is an enormous ability there, an ability which could be tapped for both commerce and industry and for political life. We have far more in local affairs because it's not so difficult for them geographically to get to their local authority as it is to spend mid-week in London. But I wouldn't put anything like the stress on the question that you do.

GREENFIELD: It just interests me —

THATCHER: I mean, it amazes me that you regard it as a phenomenon. It really does.

GREENFIELD: But of course you are —

THATCHER: I'm just an ordinary politician.

GREENFIELD: No, no...The first head of a major party in Britain who's a woman in its history is a phenomenon. Welcome, but a phenomenon. What's interested me is that it does not seem to have entered into the decision-making process when you took over the leadership of the Conservative Party. Whereas here, it is almost impossible for a woman to run for office and particularly an executive office...without that becoming almost a dominant issue. We've elected, for the first time in America, a woman governor, not elected on her husband's coattails, and it was almost the only issue against her.

THATCHER: But look: I was a cabinet minister. I was secretary of state for both education and science. It so happened that I was perhaps the only person in the cabinet at that time who had scientific qualifications. And all of the people who I worked with in the scientific field said, "Thank goodness we've got someone who speaks the same language." There was no question of "are you a man or woman holding that office?" It was a [question of the] person who was [most] suitable for the job.

Greenfield's questions are spot-on, and it is absolute nonsense for Thatcher to deny the uniqueness of her own position and to reject the opportunity to consider if it is, indeed, easier for conservative women to get ahead in politics than liberal women. Buckley knows that Greenfield is on the right track with his line of questioning. No sexism in British politics? Poppycock! Buckley pushes back, but, predictably, the Iron Lady does not give an inch. We see here, as we would time and time again, that Buckley seemed to have his most cogent thoughts about gender issues when he disagreed with conservative women. These were also the only women who could put him in his place.

Particularly notable was the pummeling he received from Clare

Boothe Luce.

Luce and Buckley were friends, and the two were politically aligned on numerous fronts. Like Buckley, she was passionately anti-communist, adamantly in favor of the free market, and tenaciously opposed to FDR's policies and their aftermath. However, she had been a booster for the GOP and for Eisenhower, and this put her at variance with Buckley, who thought Ike was too moderate; she was never quite as far to the right as Buckley. Buckley had supported McCarthyism, for example, though he had reservations about the man, while Luce had complained that all of the hullabaloo stirred up by McCarthy and HUAC was a ridiculous distraction from the real work of fighting communism. Further, she certainly wasn't as socially conservative as Buckley. In 1943, when the "Wayward Wives Bill" came before Congress, which would have eliminated government benefits for women who were unfaithful while their husbands fought the war, Congresswoman Luce suggested that an amendment be added "that if the serviceman is unfaithful overseas, the wife's allowance be doubled." The bill died.

Luce's later work for *National Review* and other publications in the years following the Bay of Pigs invasion fiasco would, however, propel her to "her emergence as an oracle of Republican conservatism," as Wilfrid Sheed wrote in his biography. Past the prime of her career, Luce was drawn to Buckley seeking friendship and personal and political alliances. Even though there generally wasn't much tension to propel their discussions, Buckley enjoyed having Luce on Firing Line. And, really, the shows weren't bad, because the two had a strong rapport and Luce was quite articulate and interested in a number of issues that Buckley rarely engaged with, such as overpopulation and environmentalism. She was a powerful woman who exuded charm and confidence.

Unlike Buckley, she had not been born with a silver spoon in her mouth or graced with a palatial family estate in Connecticut. Luce had been born in a humble home, out of wedlock, in Spanish Harlem. Like Buckley, she was a devout Catholic (though, unlike him, a convert) and outspoken about her faith, and was in possession of tremendous wealth (her husband, Henry Luce, was the impresario who published *Time* and *Life*, among other magazines), and was a cosmopolitan type with a taste for the finer things. Luce had a distinctive sense of style and a particular taste for bespoke dresses "with deep, lined pockets for her spectacles, powder compact, lipstick, small notepad, and gold Cartier pen," Sylvia Jukes Morris noted, all of which freed her from the tyranny of the handbag.

Like Buckley, she had pursued a political career; unlike him, she was successful in those efforts, winning election to the House of Representatives twice in the 1940s, and having been ambassador to Italy during the Eisenhower administration. She had several times been contemplated as a possible Republican vice presidential candidate. Over the years, she had taken numerous lovers — wealthy businessmen, dashing military men — before her dramatic turn to Catholicism at age 42 tempered her infidelity. Buckley was adventurous, but Luce was an adventuress. Even while ostensibly walking the straight and narrow in her Catholic years, she had not hesitated to drop acid with her priest.

Vogue had once compared encountering Luce “to being dynamited by angel cake.” She could definitively hold her own with Buckley on *Firing Line*. In 1975, when Luce asked to appear (her fourth visit) specifically to discuss feminism, Buckley could hardly refuse. He opened with a spirited introduction:

BUCKLEY: The Equal Rights Amendment which, for a while, appeared to be on the verge of adoption, appears once again to be stalled, suggesting a subliminal resistance to formal equality for women which surprises not at all Mrs. Clare Boothe Luce, who, throughout her life, has given her time equally to pleading the cause of female equality and demonstrating the fact of female superiority....

Clare Boothe Luce was never a failure, which is different from saying she has never been unhappy. As a young woman, she became very quickly the managing editor of *Vanity Fair*. After an unsuccessful marriage, she became Mrs. Henry Luce and began writing Broadway plays, mostly successful.... She acted, from time to time, as a war correspondent for her husband’s magazines before entering Congress as a representative from Fairfield County. She was appointed ambassador to Italy by President Eisenhower and subsequently ambassador to Brazil, a post she did not in fact achieve because of the exercise of one of her most seductive faculties, to wit her occasional inability to curb her tongue. She is currently a member of the President’s Advisory Board on International Intelligence.... I should like to begin by asking her whether she finds implicit condescension in the rhetorical formulations with which men tend to introduce her.

There is so much to unpack in this. First, Buckley pointedly opens by noting that the ERA has sputtered once again, a fact of no small interest to Luce, who had lobbied for the bill in Washington and even dropped pro-ERA leaflets from a plane over New York State in 1923.

In response to the bait with which he had concluded his introduction, Luce notes that Buckley had managed to get through the whole thing with only one “masculine putdown”: he had referred to her inability to “hold her tongue.” Had Buckley “been speaking of a man who spoke out and made enemies for himself,” she explains, he would have said of such a man that he was “blunt” or “overly candid.” But “hold her tongue” is specifically “a phrase that men frequently use about children and women.”

Buckley inadvertently confirms that this is exactly what he had in mind when he responds, “Sort of comes out of *Taming of the Shrew*?” Luce bluntly rebuts: “No, it comes out of man’s desire, highly successful, through the centuries to master women.” Luce gives over much of the program to explaining exactly what made Jesus a feminist.

After much spirited discussion, Buckley seeks to tie things up. Smiling, flirtatious, and utterly in command of the conversation, Luce responds, “Bill, I’m much too fond of you to tell you what I really think about you.” “Publicly,” Buckley interjects almost bashfully, making any perceptive viewer understand that Luce has told him off privately on numerous occasions. Luce grins, shoots him an impossibly sexy septuagenarian look through her Coke-bottle glasses, and states categorically, “I think you’re one of the most charming and subtle and sophisticated of male chauvinists.” It was a knockout blow.

The defeated Buckley escaped to the Q&A.

Friedan, Greer, and Schlafly were all famously for or against feminism, and one quite expects to see them appear on *Firing Line* debating the issue. But the feminist who appeared most often was not a political celebrity but a relative unknown: Harriet Pilpel.

Pilpel was general counsel for Planned Parenthood during the years when the Supreme Court ended bans on contraception and abortion. A board member of the American Civil Liberties Union, Pilpel had “insisted, in 1964, that the ACLU defend women’s reproductive rights and the civil liberties of homosexuals, two issues it had until then refused to touch.” Pilpel was the liberal’s liberal. As the right extended its attack on sex education to attacking abortion, gay rights, and pornography, Pilpel confronted the same issues from the other side.

Since she had appeared on *Firing Line* some 30 times, one might assume that Pilpel had some kind of flair for TV. To be sure, she was a skilled, articulate public speaker. She was very busy on the liberal, legal lecture circuit and regularly guested on shows such as *Good Morning America*, *Donahue*, and *The MacNeil/Lehrer Report*. Pilpel radiated competence and was always very well prepared, with pages and pages of hand-scrawled notes on her lap. She was a very proficient lawyer who happened to be comfortable on TV, but her charisma was low-key, and she was not exactly glamorous.

Pilpel was capable with her facts, but her quips were few and far between. She was not there to banter. What was perhaps most interesting about her repeat appearances on the show was not her articulate support of women’s rights — which was indeed quite impressive — but what she inadvertently accomplished: showing that feminism was about as mainstream as your aunt Mildred. Sure, Buckley had hosted more radical types, but Pilpel served as the show’s feminist refrain for more than a decade, and her low-key, businesslike approach to the topic offered the strongest antidote imaginable to the radical, bra-burner image. Buckley surely had not meant to present a “normal” image of feminism, but he had done exactly that.

William F. Buckley has been mythologized as a hero of the conservative movement, and even if you are opposed to that movement, it is right to praise him for his thoughtful televisual interactions with liberals. Sadly, this kind of reasoned political debate is sorely lacking in today’s TV landscape. Notwithstanding the firecracker tempers that went off on some of the *Firing Line* debates of the 1990s, and the “bare knuckled intellectual brawls” that were not uncommon in the earliest years of the show, Buckley was consistently open to honest debate with his ideological opponents. One feels this openness strongly in most of the episodes centered on feminism and the women’s movement, where Buckley patiently engaged with ideas that seemed particularly foreign to him.

But despite his careful listening to the opposition, it was very rare for him to change his mind on any political issue — a reality particularly clear in his interactions with feminists.

On this point, perhaps we should give the last word to Margaret Thatcher: he was a man, he was limited. ●

MEETING “THE OTHER” FACE TO FACE

WITH “THE ENEMY” PROJECT, PHOTOJOURNALIST KARIM BEN KHELIFA AND ASSOCIATE PROFESSOR FOX HARRELL ENGENDER A FORM OF EMPATHY BEYOND THE REACH OF TRADITIONAL DOCUMENTARY FILM.

Randy Kennedy, *The New York Times*



Photos by Karim Ben Khelifa. Above: Fox Harrell in a VR headset.

This piece appeared on October 30th in the Art and Design section of The New York Times and is republished with permission. Karim Ben Khelifa is a visiting artist with the Open Documentary Lab and Fox Harrell’s Imagination, Computation, and Expression Laboratory, as well as with MIT’s Center for Art, Science, and Technology.

Sitting in a conference room at a hotel near MIT, I slip on large headphones and an Oculus Rift virtual reality headset and wriggle into the straps of a backpack, weighed down with a computer and a battery. It feels as if I were getting ready for a spacewalk or a deep-sea dive.

But when I stand, I quickly find myself in a featureless all-white room, a kind of Platonic vestibule. On the walls at either end are striking poster-size black-and-white portraits taken by the noted Belgian-Tunisian photographer Karim Ben Khelifa, one showing a young Israeli soldier and another a Palestinian fighter about the same age, whose face is almost completely hidden by a black hood.

Then the portraits disappear, replaced by doors, which open. I walk the two combatants — Abu Khaled, a fighter for the Popular Front for the Liberation of Palestine, and Gilad Peled, an Israeli soldier — seeming, except for a little pixelation and rigid body movement, like flesh-and-blood people who are actually in the room with me.

Their presence, in a deeply affecting experiment in communication, called “The Enemy,”¹ underway at MIT, is the result of a collaboration between Mr. Ben Khelifa and Fox Harrell, an associate professor of digital media. It holds the promise of opening up new frontiers for the integration of journalism and art in a socially oriented 21st-century performance piece poised at technology’s cutting edge.²

The work grows out of more than half a century of collaborations

between the world of art and the worlds of science and technology, spurred by pioneers like Experiments in Art and Technology, begun in 1967 by the Bell Labs engineers Billy Klüver and Fred Waldhauer and the artists Robert Rauschenberg and Robert Whitman. MIT has been at the forefront of such cross-pollination, which has taken off at schools around the world in recent years.

In an interview before I experienced the virtual reality environment, Mr. Ben Khelifa, 44, said the idea emerged from a frustration that deepened over almost 20 years he spent as a photojournalist covering strife — often entrenched, interminable warfare — mostly

“An MIT sophomore tested the project after I did and emerged with a mesmerized flush on her face. ‘It feels so much more personal than just reading about these things online,’ she said. ‘When someone’s right there talking to you, you want to listen.’”

in the Middle East. “Being a Tunisian growing up in Belgium, I think I always felt like I was wearing two different kinds of shoes,” he said. “In Iraq and Afghanistan, I could sometimes see things about fighters on both sides of the conflict that some other Europeans couldn’t.”

What he saw there was a culture of warfare that often perpetuated itself through misunderstanding and misinformation, with no mechanism for those of opposing sects or political forces to gain a sense of the enemy as a fellow human being. “I began to think, ‘I’m meeting the same people over and over again,’” he said. “I’m seeing

¹ theenemyishere.org

² “The Enemy - Teaser VR, mixed and AR experiences”: [youtube.com/watch?v=gU4MDYCb15k](https://www.youtube.com/watch?v=gU4MDYCb15k)



A dyptique of two of the six protagonists in the installation. Left: Jean De Dieu from the FDLR. Right: A patient from the FARDC (the government army).

people I knew as kids, and now they're grown-up fighters, in power, fighting the same fight. And you start to think about your work in terms of: 'Am I helping to change anything? Am I having any impact?' "He added: 'I thought of myself as a war illustrator. I started calling myself that.'"

Over the last two years, as a visiting artist at the university's Center for Art, Science and Technology, he transformed what he initially conceived of as an unconventional photo and testimonial project involving fighters into a far more unconventional way of hearing and seeing his subjects, hoping to be able to engender a form of empathy beyond the reach of traditional documentary film. He interviewed Mr. Khaled in Gaza and Mr. Peled in Tel Aviv, asking them the same six questions — basic ones like "Who's your enemy and why?"; "What is peace for you?"; "Have you ever killed one of your enemies?"; "Where do you see yourself in 20 years?"

Then he and a small crew captured three-dimensional scans of the men and photographed them from multiple angles. (He later repeated this process in the Democratic Republic of Congo. He is expanding the project to El Salvador, which is being decimated by gang violence.³)

With help from several technology and digital media companies⁴ and funding from a collection of prominent foundations⁵, he began to build avatars of his interviewees and ways for them to move and respond inside a virtual world so realistic it makes even a 3-D movie seem like an artifact from the distant past. Mr. Harrell describes it as "long-form journalism in a totally new form."

³ abcnews.go.com/International/el-salvador-murder-capital-world-gang-violence-life/story?id=39177963

⁴ theenemyishere.org/#team

⁵ cultureshockny.com/2015/04/01/culture-shock-us-partner-the-enemy-2

"It should have a kind of lush imaginative vitality to it — a kind of lyricism," he said of the effect that he and Mr. Ben Khelifa have been working to achieve, polishing the project with the help of test viewers since introducing it to mainstream audiences in 2015 at the Tribeca Film Festival. He added: "You have something here you don't have in any other form of journalism: body language."

And, indeed, inside the world they have made, the power comes from the feeling of listening to the interviewees speak (you hear Mr. Ben Khelifa's disembodied voice asking the questions, and the men's voices answer, overlaid by the voice of an interpreter) as your body viscerally senses a person standing a few feet away from you, his eyes following yours as he talks, his chest rising and falling as he breathes. I listened intently and immediately felt compelled, out of basic politeness, to remain in front of one interviewee until he had finished answering all of his questions before crossing the room to the other man. I could have sworn the 37 minutes that Mr. Ben Khelifa told me I had been inside the world, listening to the first two enemies and then to those from Congo, was no more than 15.

Sofia Ayala, an MIT sophomore, tested the project after I did and emerged — as I did — with a mesmerized flush on her face, a feeling of meeting someone not really there. "It makes it feel so much more personal than just reading about these things online," she said. "When someone's right there talking to you, you want to listen."

While Mr. Ben Khelifa hopes the project will eventually reach large audiences in the way documentary films do now, he said his target audience was "really the next generation of fighters from wherever we are."

"In many places I've been, you're given your enemy when you're born," he said. "You grow up with this 'other' always out there. The best we can hope is that the 'other' will now be able to come into the same room with you for a while, where you can listen to him, and see

VIRTUALLY THERE: DOCUMENTARY MEETS VIRTUAL REALITY

The Open Documentary Lab team

In May 2016, our Open Documentary Lab, along with the John D. and Catherine T. MacArthur Foundation and the Phi Centre, hosted “Virtually There: Documentary Meets Virtual Reality,” a two-day conference on the state of the art of VR. Major sponsors, in addition to MacArthur and Phi, were multi-platform media company Fusion, the Ford Foundation’s JustFilms initiative for social justice storytelling, and the Wyncote Foundation. The Open Documentary Lab just published a report distilling the lessons of the conference, from which this executive summary comes. Those interested in this work can review footage recorded live at the conference: cmswm.it/vrconference.

The words “Virtually There” suggest several meanings. Like the virtual reality at the center of this conference report, they refer to an elusive condition, a state of almost palpable presence of something that is, in fact, not actually there. But they also refer to the long-term condition of technological solutions designed to achieve this goal. Historically speaking, each new breakthrough has been greeted as a sign that we have almost achieved our goal of creating the ultimate simulation machine...that we are virtually there.

As a conference, Virtually There gathered together leading makers, technologists, academics, curators, and critics for two days of intensive demonstrations and discussions regarding the possibilities and implications of using VR for documentary. In these still early days, when competing consumer-grade VR systems together with massive capital investment and still-evolving user scenarios all generate a lot of noise, VR is in a state of interpretive flexibility. The conference sought to make use of that malleability, discussing strategies of working with various stakeholders in order to make the most of VR’s creative, critical, and civic potentials.

Speakers addressed the challenges of the new medium’s aesthetics, ethics, and issues of access, while interrogating the medium’s added value to the documentary tradition. Some speakers drew upon historical precedent for their insights, while others drew on their experiments as creators, and still others on various forms of field and laboratory work. Together, they mapped the contours of VR as a desire, as a technological ensemble, and as a set of possibilities for the documentary form.

This conference report summarizes the main threads of the discussion, linking where appropriate to the event’s online recording and to external reports.

The main takeaways included:

- **Virtual Reality has been a long time coming.** We should remember that we’re not there yet. Technologies, like investors, come and go. We would do well to interrogate the underlying desires and expectations that will allow this latest technological

iteration to thrive, helping us to imagine what might come next.

- **Language matters.** We need to become far more specific at a moment when the term VR masks quite different technologies and experiences. It ranges from 360 video to 3D capture techniques (3D scanning, videogrammetry, and photogrammetry) to computer-generated imagery, all of which can be used to create pre-rendered experiences — while real-time interaction is currently limited to 3D capture and CGI. Notions of ethics, aesthetics, immersion, and interaction each have different meanings and implications in these very different manifestations of VR.
- **Embrace the medium’s potentials.** Like media before it, VR has unique characteristics and potentials. It requires a stylistic grammar of its own, rather than simply repurposing storytelling techniques borrowed from older media. This admonition also applies to “reality”: are we fated to pursue ever-more accurate illusions of the real, or can we use VR to see and understand the world in new and critical ways?
- **Who will have access to VR, and with what effect?** Access to new technologies brings with it the possibility of self-representation, which is fundamental to an equitable society. How might we encourage widespread fluency with, and access to, real-time VR? How can a VR experience such as co-presence be leveraged as a civic asset? And what distribution channels will enable widespread sharing of VR, rather than top-down marketing?
- **Research! Research! Research!** VR poses a host of new and previously underexplored questions. Neuroscientists suspect that we process VR as experience rather than representation, lending support to the “empathy machine” argument and raising questions about related cognitive development. Our ideas regarding narrative, point-of-view, presence, and even subjectivity have been fundamentally challenged by VR. And as pupil-tracking technologies and responsive texts loom on the horizon, investigation into the mechanics, aesthetics, and ethics of the medium is essential if we are to understand its implications and possibilities.
- **Brace for some unexpected developments.** Real-time VR, slippage across the boundaries of VR and alternate reality, and even ongoing experiments in direct stimulation of the brain, all suggest that the long term agenda of “being there” first mentioned in Robert Barker’s 1787 patent for the panorama is still finding new expressions. Stepping back from the cutting-edge of the latest “next big thing” may enable us to draw from our experiences of the past, and bring perspective to bear on these developments. ●

CHARTING DOCUMENTARY'S FUTURES

Henry Jenkins interviews William Uricchio

Henry Jenkins is a professor at the University of Southern California and formerly Director of the Comparative Media Studies program. William Uricchio is a professor in Comparative Media Studies and founder and principal investigator of our Open Documentary Lab. This interview first appeared on Jenkins' website, henryjenkins.org, in January 2016.

For the better part of a decade, William Uricchio and I worked side by side, partners in crime, as we forged the Comparative Media Studies program at MIT. I came to lean heavily on his diplomatic skills, his zen-like temperament, and especially his broad range of knowledge and interests, as between us, we touched every student who came through that masters program. The expansive intellectual rationale of our approach to Comparative Media Studies was as much his as it was mine, especially as he made the case for why we should understand contemporary developments in relation to their historical antecedents and as he made the argument for bringing more transnational perspectives to bear on the processes of media change.

I returned to Cambridge during my academic leave in the fall of 2015, after being away for most of the past seven years, and it was a chance for me to develop a stronger sense of what the program has become, how it operates today. What I found was a program that was thriving — fantastic students doing ground-breaking work, an expanding and strong intellectual community, a solid focus on social justice and media change, and a real commitment to research that is going to have impact beyond the academy. Amongst many new research initiatives, there has been the emergence of the Open Documentary Lab, a vibrant community that has drawn together researchers and documentary producers from around the Boston area who want to explore the future of nonfiction media-making. And the Lab has begun to attract active interest from around the world from people at places like the Canadian Film Board or the BBC who share their interest in understanding how documentary is being reinvented in the context of today's participatory culture and transmedia production.

Here's how the lab describes itself on its home page:

Drawing on MIT's legacy of media innovation and its deep commitment to open and accessible information, the MIT Open Documentary Lab brings storytellers, technologists, and scholars together to explore new documentary forms with a particular focus on collaborative, interactive, and immersive storytelling. The Lab understands documentary as a project rather than as a genre bound to a particular medium: documentary offers ways of exploring, representing, and critically engaging the world. It explores the potentials of emerging technologies and techniques to enhance the documentary project by including new voices, telling new stories and reaching new publics. A center for documentary research, the Lab offers

courses, workshops, a fellows program, public lectures, and conferences; it incubates experimental projects; and it develops tools, resources, reports, and critical discourse. These activities, and the partnerships with artists, journalists, technologists, and media makers that they have enabled, aim to push documentary's boundaries and deepen the impact and reach of innovative reality-based storytelling. In the spirit of MIT's open courseware and open source software movements, the Open Documentary Lab is inclusive, collaborative and committed to sharing knowledge, networks, and tools. "Open" in its understanding of documentary's forms and potentials, the Lab is catalyst, partner and guide to the future of reality-based storytelling.

Last fall, the Lab released an important white paper, "Mapping the Intersection of Two Cultures: Interactive Documentary and Digital Journalism"¹ that MIT's Open Documentary Lab prepared with the support of the John D. and Catherine T. MacArthur Foundation. Under the supervision of the lab's principal investigator, William Uricchio, the team developing this report included Sarah Wolozin, who directs the Open Doc Lab, and Lily Bui, Sean Flynn, and Deniz Tortum, who are CMS grad students.

The report is rich in front-line perspectives, describing the behind-the-scenes debates that took place around the production of some of today's most significant examples of immersive journalism and interactive documentary, and sharing some core insights about best practices for doing such work. The report is visionary in its scope yet it is also deeply grounded in the perspective of documentary producers and journalists, who live in the imperfect and transitional state of the here and now. I believe this report is going to open up some important conversations amongst many people who both fear and embrace the changes that are impacting the closely related worlds of news and documentary. I am therefore happy to have a chance to showcase this significant undertaking here, especially insofar as it has given me yet another chance to interact with my longtime friend and colleague, William Uricchio. What emerged through this interview is something really special to me as William thoughtfully and thoroughly responded to my probing questions, and certainly gives as well as he got throughout this exchange.

JENKINS: Most recent accounts of the state of journalism in the digital age have emphasized the bad news — describing all of the risks and challenges — but your report also describes some of the new opportunities and the ways that newspapers and other legacy media organizations are restructuring themselves to take advantage of the changing media environment. So, what do you see as some of the opportunities for new kinds of news and documentary production emerging at the present moment?

¹ opendoclab.mit.edu/interactivejournalism

URICCHIO: Yes, lots of doom and gloom out there! It helps to take a more analytical approach to the problems facing quality journalism and that has indeed resulted in finding a number of opportunities that can be of tangible use to legacy organizations at a moment of change. I'd like to begin by invoking what's always struck me as one of James Carey's great insights into how we think about communication. Carey notes that we too often focus only on the transmission of information — and by we, I include academics as well as journalists. And with this narrow focus, we often neglect communication's ritual dimension. Carey's notion of ritual entails much more than the habit of reading a newspaper with breakfast or closing-out the evening news broadcast with tomorrow's weather (yes, no matter how dismal the news, there will be a tomorrow!). Instead he understands ritual as creating shared concepts and habits by drawing on participation, sharing, association, and fellowship.

Facebook and BuzzFeed, while a little erratic on the transmission side, understand this and they and others like them have hard-wired ritual into their systems. And their user-base understands it as well. At a fundamental level, the opportunities for new kinds of journalism and documentary production turn not so much on the availability of new technologies, but rather on the use of those technologies to bring ritual into the picture. In other words, simply putting news content, no matter how good, online with the hope of expanding audience reach and engagement misses the point. Instead, finding ways to enhance user participation, to intensify immersive experiences, and to encourage sharing and community building all help to embrace the ritual dimension noted by Carey. It's not so much about the de-professionalization of the news (in fact, our study focuses on quality journalism), as it is the expansion of news as a process that includes a community of participants, expanded textual forms, and a reconfigured production pipeline. Participation leads to greater engagement, inclusiveness, relevance...and better-informed communities.

Despite its rock-solid appearance, journalistic convention has transformed over the past several hundred years, and today we face an accelerated rate of change. Whereas for much of the 20th century, journalism served as a definer of truths, today's high-connectivity and intensive information flow have enabled new expectations and given journalism a new agenda, helping it to inform the connection between publics and sources, shaping conversations in addition to defining truths.

Our report approaches this shift by looking at concrete examples in recent interactive and immersive documentary and journalism. The past decade has seen some remarkable experimentation in fact-based storytelling (the Open Documentary Lab's docubase is the go-to place to see this work), some of which encourages users to explore multiple sides of a given issue, interacting with the material gathered and structured by journalists and documentarians. Our report basically takes a deep dive into lessons-learned and best practices that can be of use as journalism continues to transform.

Whether looking at how individual organizations such as The Guardian or Frontline have responded to these new demands, or looking at collaborations across organizations, or looking at the new workflows and interactions that appear on the individual project level,

VR offers a surfeit of information. This makes directing the user's attention or "constructing the gaze" a difficult task. Indeed, it's one of the reasons VR storytelling is still in its infancy: how to impose structure and direction, other than to mimic film conventions?

the report offers case-based insights into the developments that are changing the faces of documentary and journalism.

In some ways, your report is bringing together two forms of media production — journalism and documentary — that have historically been understood as distinct, even though they have both sought to get the public to be more aware and more responsive to urgent social conditions. These two fields often operate according to different professional ideologies and different standards of ethics. Why have they stayed separate for so long and in what ways are we starting to see some convergence between them?

If I had to boil the difference between the journalistic and documentary traditions down to a caricature, I'd say that since the mid 1920s, journalism has been bound by a commitment to "facts" and documentary by a commitment to "truth". OK — both are slippery words, and the two are not irreconcilable. But an insistence on the "facts" as journalistic fact-checkers define them can sometimes leave a larger truth hanging in the balance; and the pursuit of "truth" can call upon innovative and imaginative strategies that would be nixed by any fact-checker worth her salt.

The distinction between the two is deeply rooted in institutional history, with the several hundred-year-old "fourth estate," as Carlyle called the press, finding a protected niche in places like the U.S. constitution and playing a fundamental role in governance in most cultures. In this context, an insistence upon verifiable data makes sense.

Documentary, by contrast, at least if we stick to the classic telling of the tale, emerged in the film medium in the form of a re-enacted, character-based drama that strove for a greater truth (Flaherty's 1926 *Moana*), or what John Grierson later called "the creative treatment of actuality."

Journalism has been long bound by professionalization, certification, codes of behavior and rules; while documentary has thrived as an eclectic intention-based assemblage of experiments (mostly formal), techniques (mostly narrative) and effects (mostly generating insight and empathy). Epistemological differences, institutional differences, media differences...even differences in which part of the academy they are studied...no wonder the two traditions seem to be worlds apart!

As I said, this description is something of a caricature, and these two non-fiction storytelling traditions have at times overlapped, especially in the domain of essayistic journalism or places like Frontline, where

documentary makers hew to journalistic rules, and The New York Times, The Guardian and The Economist, all of which have in-house documentary units. But even here, an insistence on fact provides the bottom line for a story to count as journalistic, even if drawing heavily on documentary notions of story, character and engagement.

So what changed, and why do these two forms now seem more open to sharing with one another? The steady shift of users of both forms to mobile, digital platforms; the emergence of interactive and visually immersive forms of telling stories; and the popularity of operations like Facebook, BuzzFeed and Vice, have all put pressure on those who simply wanted to put the printed page, television feed or 16mm film online. Traditional newspaper readership and news viewership, like documentary viewership, are not only declining...but aging. And while troubling from a business perspective, this decline is of far greater concern to the needs of an informed public and the civic process.

True, the just-mentioned digital startups have embraced “news” as part of their remit (and in the process, raided legacy journalistic organizations and made some very impressive hires), and some of them can claim vast communities of young users, but the quality, context and mission of that embrace is neither clear nor consistent. Indeed, the surfeit of information and the poor ratio of signal to noise that we are experiencing “out there” makes the work of the tried and true legacy journalistic operations more important than ever.

It's here that the new documentary provides a valuable set of assets for the journalistic endeavor, offering ways for it to keep core values while embracing a more user-centric and participatory ethos that makes the most of the new media ecosystem.

Documentary's relative freedom from institutional constraint has enabled its makers to experiment in ways that are difficult for traditional journalists. Moreover, as journalism becomes more of a curator of information and shaper of conversations, documentary's demonstrated ability to contextualize and explain through well-chosen instances has proven newly relevant. The interactive documentaries produced to date offer a compendium of approaches, interfaces, user experiences, tools and even strategies for working with crowd-sourced and co-created content all of which journalists can assess, draw from and transform.

So I guess I would say that by finding themselves in the same boat, both journalists and documentarians have discovered commonalities of purpose and technique. Interactive documentary is fast developing a repertoire of techniques that work well in today's “digital first” and increasingly participatory environment and digital journalism still commands considerable reputation and audience reach.

The dust has not settled, of course, but as we work towards journalism's and documentary's next iterations, the one thing that is clear is that they have more in common now than at any other point in their histories.

And the best indication of this commonality takes the form of the many interactive features, data-driven stories and even immersive approaches to information organization that have been appearing with increasing regularity on the digital sites of leading journalism organizations.

You argue that the story should dictate the form, yet many aspects of the form of American journalism — the inverted pyramid for example and the core shape of the lead paragraph — have remain fixed without regard to the story. Some traditional journalists would argue that these formulas allows for quick production of news and for interoperability amongst collaborators. So, how do you make the case to such traditionalists for a broader range of different kinds of news stories?

Journalistic form has changed continually over the centuries, some elements sticking and some new ones displacing old. Things like headlines and the inverted pyramid appeared for the reasons you mention, plus enabling readers to orient themselves and, when required, make quick work of the day's news. They work well and seem to be sticking in the digital environment, arguably a predecessor of the “listicle”.

We are witnessing an evolutionary process, but one that is accelerated as much because of a change in the use of media technologies as because of a change in the larger information situation of the user and her attendant expectations. The move from print and broadcast to digital platforms has brought with it many new affordances, and while traditionalists can stick with techniques that have proven effective with the printed page or news clip (rightly arguing that the digital can easily incorporate the page and the clip), digital media technologies — including the small mobile screens that currently loom large in most user experiences — have been put to many other uses that could enhance both journalism and user engagement.

To be honest, I don't know of any journalistic organizations, no matter how traditional, that have failed in their digital operations to make use of embedded links, or auto-generated links to past stories, or an array of user tracking applications. These have changed the presentation of news and relationship to the user, just as digital processes have changed the workflow within the newsroom. Their impact can be read as subtle or profound, depending on one's point of view. But even the most traditional journalistic organization is acutely aware of Vice, BuzzFeed and Facebook's Instant Articles initiative, their fast-growing market share, and appeal to younger readers.

Our report's conclusion that “story dictates form” simply means that there is no “one size fits all” convention for storytelling. The digital has brought with it an expanded set of approaches, has offered new — and digitally relevant — options. The report says that now that we have more choices, we should use them critically and strategically — not just jump on the bandwagon of the new (or stick fetishistically to the old). A data-rich story might benefit from visualizations and even personalization through interaction; whereas the same techniques would add little to a personal profile. The new is no more a panacea than the old, but it does offer expanded choice.

But at a moment when the media ecosystem is fast changing, with consequences financial, informational, and generational, we need better to understand the affordances of the new. This by no means entails discarding lessons hard won over centuries of journalistic practice, but it also means not necessarily sticking to paper and broadcast-based habits just because they happen to be well established. And particularly as the role of the user continues to grow, journalists and

documentary makers need actively to consider the fit of form and content rather than slipping into inherited defaults.

You correctly note that one of the strengths of legacy media is that they have such deep archives of materials that rarely get used. I am often struck by the ways that comedy news media dig deep into news archives to juxtapose current and past statements by political leaders, for example, and thus show contradictions in their positions over time. But even though such context can be very helpful in understanding current events, we rarely see it used by mainstream journalists. Are there good examples of how news organizations are tapping their archives?

The archive issue is a crucial one, both as you note, for giving depth, context and added meaning to a story...but also because it is something of an “ace in the hole” for most legacy organizations. The very fact that these organizations have persisted over time usually means that they have perspective, memory, and archives.

The archive is an asset that results from long-term involvement with a beat, community, or nation, and as such is one of legacy journalism's key distinguishing features from digital start-ups. Archives offer ways of telling stories that potentially differentiate and give a competitive advantage to legacy journalism organizations. As journalists intensify their efforts to contextualize and explain rather than just report, archives offer low hanging fruit.

Users, for their part, seem increasingly active, using Google or social media to supplement what they read in a given report, getting more information about a place or person or event. And — to make it a trifecta — digital technologies offer solutions for the space constraints that have long plagued print and broadcast journalists and the contradictory demands of readers, some of whom may want a short experience while others want a deep dive.

Wouldn't it be great to give readers access to the documents referenced or summarized in a story, or to earlier versions of a story, or to see more than one or two images? While not for every user, it allows journalists to have their cake and eat it, too: a tightly formed “traditional” story can be accompanied by in-house resources, accommodating both those users who just want the facts as well as those who want to discover them for themselves. And if we're right about the move of journalism to become more of a curator of a public conversation, expanded use of the archive offers a terrific transitional tool. All to say, it's never been easier nor more important to incorporate archival holdings into everyday journalism.

One of our case studies, Kat Cizek's *A Short History of the Highrise*² — a joint endeavor by Op Docs at The New York Times and the National Film Board of Canada — is a terrific example. Part of Kat and the NFB's Emmy Award-winning *Highrise* series of interactive documentaries, *A Short History's* partnership with the Times made brilliant use of the Times' photo morgue to tell the story of man's many experiments with vertical living. The interface is described as “a visual accordian” allowing the viewer to “dig deeper into the project's themes with additional archival materials, text and miniature games.” The viewer can simply watch an archive-based video overview, but

can also stop the video flow to explore the individual photos, listen to interviews, and even turn the photos over to see the traces of their history at the Times. The project accommodates both casual and serious viewers, makes brilliant use of the largely overlooked photo morgue, and in the process offers an insightful look both into the high-rise and how we (and the Times) have looked at it over the years.

A Short History picked up Emmy, Peabody, and World Press Photo Awards, so it's an exceptional example. As with many of these early experiments, quite a bit of time and money go into developing a robust and user-friendly interface. But one can imagine that more examples will yield greater efficiencies, whether in the form of re-usable tools or even modifiable templates.

For example, back in 2009, the New York Times used a tool to slide back and forth across two photos taken from an identical position, but years apart. Called “Before and After,” it was used to good effect in a piece called “The Berlin Wall 20 Years Later: A Division Through Time.”³ The same basic device is still in use, for example in The Guardian's “The American Civil War Then and Now”⁴, offering an effective way to showcase the photo archive.

Another great example of the creative use of archives and tools comes from The Guardian's “The Counted”⁵, an ongoing, partially crowd-sourced, interactive report on people killed by police in the US. It's an archive in the making, a living archive, piling up the sad details case-by-case, day-by-day, and doing something that only an archive can do: contextualizing historically the incidents that seem to happen three or four times a day across America, helping us to see the bigger picture.

Bottom line: archival resources allow today's fact-based storytellers to harvest the riches of the past, bringing new life, context, and meaning to their findings. And digital media offer journalists the means and space and users the flexibility to make the most of these affordances.

Some of the more interactive elements you describe take time to develop and this means slowing down the pace of news production and taking a long view perspective of social issues. How can we reconcile this with the 24-hour news cycle and other factors which are speeding up the production, circulation, and consumption of news?

Temporality is one of the most intriguing dimensions of today's journalism scene. On one hand, Twitter and other services have reduced the lag between event and report to just about nothing. OK, these aren't traditional fact-checked reports, but in the aggregate they tend to give a first heads-up about breaking news, and even legacy journalism is making increasing use of tweets in their coverage. On the other, in a world bubbling with reports of all kinds and qualities, the need for context, perspective and plain old pattern recognition has never been greater.

³ nytimes.com/interactive/2009/11/09/world/europe/20091109-berlinwallthennow.html

⁴ theguardian.com/artanddesign/ng-interactive/2015/jun/22/american-civil-war-photography-interactive

⁵ theguardian.com/us-news/series/counted-us-police-killings

² nytimes.com/projects/2013/high-rise

The traditional 24 hour cycle is under siege from both sides: it can't keep pace with networked digital sources, and has generally left the reflective contextualizing work to occasional investigative and feature stories or to specialized venues such as magazines and programs like Frontline. All to say that the time cycles that have worked for the better part of a century no longer seem to be addressing public needs.

The Guardian was quick to try to redress this, embracing breaking news (even minute-by-minute blog reports of the Republican and Democratic presidential debates or the Academy Awards), carrying on with the traditional 24-hour cycle, and redoubling its feature work. And it's in this last context that they have carried out much of their interactive work. The verdict is still out on how legacy organizations will deal with this challenge — having it all, Guardian-style — won't necessarily work for everyone.

The Guardian's experimental stance has yielded some great innovative work that blurs the divide between immediate and long-term journalism. "The Counted," that I've already mentioned, hews to the 24 hour cycle, but aggregates the daily updates, encouraging readers to look for patterns (age, ethnicity, location, etc.) as the data collects over the course of the year. It harvests the daily news, folds it into a larger context, offers analytic tools, and in the process renders the normally hyper-local into something of national import. In fact, it reveals that many incidents are not reported, or are reported so locally that the rest of the country has no idea of the scale of the problem.

So experiments like these that complicate the familiar temporalities and logics of journalism offer signs that multiple news cycles can intertwine, and actually contribute to one another to deliver a powerful set of insights that would otherwise be missed.

More generally, though, you are right: most interactives are like feature stories, "evergreens" capable of drawing in users well after the initial publication date. And in this, they are particularly good at contextualizing, explaining, and offering multiple points of view.

For the moment, they are labor-intensive, but developers are sharing bits of code and tools among themselves, flexible content management systems and even templates are beginning to appear, and in general the process is accelerating. Some thought leaders fear that these efficiencies could go too far, that the innovation that has driven new kinds of user experience will reify into rigid one-size-fits-all templates. And indeed, the front office has a habit of thinking about the bottom line and these are still early days in terms of expanded story form. But I mention this simply to say that it's clear that these efficiencies can and will speed up the process, even though it is essential for leading organizations to continue exploring and building innovative story technologies that work with the platforms most familiar to the public.

On the documentary side, the American public has probably never had access to as many different documentaries as they do now — more are playing on television, more are getting theatrical runs, more are playing on the festival circuit, more are available through online platforms. So, how has this context impacted the ways documentary producers work today? How do they stand out in a cluttered environment? They are under increased pressure from funders to demonstrate their impact, but how do they insure impact in such a complicated media environment?

It's been a curious time for the documentary form. It's being pushed on one side by the interactive, immersive, location-based forms that our report explores, where the boundaries are being redefined through new technologies, techniques, and empowered users. And on the other side, the traditional linear form is blurring thanks to a broad spectrum of reality television, from Animal Planet's programming to series such as MythBusters. These predictably formatted programs technically hew to Grierson's definition, but for the most part seem like extreme dilutions of documentary's capacity to engage meaningfully with the world.

Meanwhile, there is indeed a lot of excellent linear documentary out there — I've been to a couple of remarkable festivals over the past few months — but sad to say, very little of what I've seen will ever be seen again, unless it's at another festival or by very adventurous uses of Netflix. The more socially critical and engaged, the poorer the opportunities for theatrical or televisual distribution...and it's still early days in terms of the various modalities of internet distribution.

The developments that we've been tracking address the "attention" problem in a couple of ways. First, they are in many cases designed for the viewing platforms that seem increasingly dominant: smart phones and tablets, that is, relatively small mobile screens with touch interfaces. In this sense, they are digital native productions, making use of links, user interventions, etc. already well understood from everyday encounters with these technologies. They take the form of a new vernacular, rather than repurposing the older forms of dramatic narrative film, television and the long form story.

Secondly, in a number of cases, they attempt to be immersive. This might take as extreme a form as Karim Ben Khelifa's *The Enemy*⁶, which uses Oculus Rift to bring an interview to life; or as simple a form as *Question Bridge*⁷ (Hank Willis Thomas, Kamal Sinclair, Chris Johnson and Bayeté Ross Smith) which lets users follow their interests by controlling the configuration of questions and answers.

And as this suggests, thirdly, a high degree of customization is often possible, as users make decisions about what they want to see, which characters or perspectives they want to follow, or where they want to dive more deeply.

These approaches to attention also, unfortunately, make the lack of attention quite visible. Whereas linear documentaries continue to flow along regardless of whether one is watching, asleep or in the next room making a sandwich, interactives usually stop cold the moment that one has stopped interacting with them. And in a world of data tracking, that is not always good news for interactives. Attention can be more sharply measured, but the metrics regimes between linear and interactive aren't necessarily compatible.

This gets to your second question: impact. I find this a fraught area in general, and in particular in the case of interactives, where we have tended to extend the logics of assessing fixed linear texts to texts with a very different set of conditions and affordances. There has been a recent spate of impact assessment studies that have essentially (and often unknowingly) worked in parallel with the television industry,

⁶ theenemyishere.org

⁷ questionbridge.com

where, as Philip Napoli puts it, interest in exposure has been replaced by interest in engagement.

That is, the vast proliferation of program options has weakened the market share of any one program and therefore logics of economic value; and at the very same moment, new and more fine-grained tools are available, encouraging the industry to shift from quantitative to qualitative arguments. Nielsen's partnership with Twitter, and the importance of social media as a site of "engagement," are all about this shift.

Anyway, in the more refined world of academics and foundations concerned with social change, the same basic shift in thinking is underway. How can we use the new tools available to us (Twitter feeds and Facebook mentions) better to understand engagement, impact and social change?

It's a fair question, of course, and there are good reasons to ask what kind of impact a documentary had and what we can learn in order to improve down the road. But at the moment, we seem caught up in defaults that largely extend the thinking of the broadcast past and its obsession with comparative metrics and standardization, redoubling it with the data trails users of digital media leave behind. And that, it seems to me, does a great disservice to the affordances of the interactive forms we've been investigating.

There is a world of difference between, on one hand, taking a guided tour of a city, where one sits back and listens to an informed and compelling tale, and on the other, wandering through the city on one's own, where there is much greater latitude in terms of where to direct attention and different requirements for engagement. I'm not (yet) convinced that the latter experience can be measured on the same standardized customer satisfaction form as the former. So while I am by no means adverse to assessment, I guess I'd say that the verdict is still out on best impact assessment practices for the interactive space, though many of my colleagues seem comfortable with tweaking the tools developed for fixed linear experiences and porting them over to interactives.

With support from the Fledgling Fund, the MIT Open Documentary Lab partnered with the Tribeca Film Institute to bring together leading social impact assessment researchers and practitioners to examine how participatory and interactive media can be used to enhance social justice initiatives. The goal of the Media Impact Assessment Working Group was to provide common strategies and frameworks for the measurement and assessment of documentary media-based engagement campaigns — including both long-form films linked to cross-platform campaigns, and interactive, participatory, or non-linear forms of storytelling. As I said, there is a lot of work out there — reports galore — but I think there are still more compelling questions than answers in these early days of interactive, immersive and participatory forms.

Your lab is focused on "open documentaries." What does this phrase mean to you and what are some examples of how these techniques have been deployed?

Open...We use this term for a couple of reasons. One important

cluster of motives comes from our institutional setting: MIT.

Back in the 1960s and '70s, Ricky Leacock, probably best known for his work with direct cinema⁸, was increasingly involved in developing a film technology that would put the tools of documentary production into everyone's hands. His work with sound Super 8mm was, we now know, doomed by the soon to emerge technology of portable video, but his endeavor was right on target: how can we take the next step from "direct cinema"? How can we empower the documentary subject to take up the means of representation and tell their own story? How can we enable widespread participation in the documentary project, opening up the filmmaker-subject dynamic in important ways?

A second factor is the work of Glorianna Davenport's group at the Media Lab. Starting in the 1980s, Glorianna and her team developed some remarkably sophisticated interactive platforms — conceptual equivalents of what we are still doing today. The difference was that projects like *Elastic Charles* involved stacks of computers and laser disks to implement — they were technology intensive in the worst way. But they opened up the user's ability to explore an issue, to assemble the parts in ways that made sense to them.

A third MIT-related invocation of "open" comes from the legacy of people like Hal Ableson, Gerald Sussman, Richard Stallman, and others who were instrumental in founding initiatives such as the free software movement and Creative Commons. With a goal of opening up code and creative work for sharing and creative reiteration, their work helped us to appreciate the importance of opening up the processes, techniques and even tools behind the screen, and of incorporating the principles of sharing and participation into the bones of the documentary project.

Together, Leacock's participatory technology, Davenport's interactive texts and Ableson et al.'s sharing and learning economy all contributed key elements to our work. Sure, today's widespread and networked mobile technologies and a tech-savvy population are important, but more important are the underlying principles. Understanding them and fighting the good fight to keep and expand them is essential, especially if we seek to enhance critical engagement and encourage widespread participation in the project of representing and changing the world.

Beyond "open" as an adjective, we also use it as a verb, since our lab's task is to open debate, to open the documentary form to new participants, to explore the possibilities of new technologies, and to understand the expressive capacities of new textual possibilities. It's a big agenda, and in part means revisiting documentary's past to "liberate" it from the film medium (the documentary ethos, we argue in *Moments of Innovation*, has been around for centuries and taken many different media forms).

And finally, consistent with the spirit of CMS that binds your and my histories together, we do our best to open our lab's doors and ideas to anyone who might benefit from our work...and at the same time, to be open to and learn from the many different experiences out there in the world.

⁸ [youtube.com/watch?v=8TsAnUmIzYY](https://www.youtube.com/watch?v=8TsAnUmIzYY)

This all hits documentary in several ways. First, more people than ever before are equipped to make documentaries, to reflect on and give form to their ideas and observations. High definition video cameras are built into most smartphones, and Vine and YouTube upload rates suggest that producing moving images is increasingly the norm. Second, networked distribution enables unprecedented global reach. Third, the tools for designing interactive and participatory texts have never been so accessible, both in the senses of easy and free. And meanwhile, interactivity has been increasingly normalized in our encounters with situated texts, that is, we have become comfortable navigating our way through texts and contexts, effectively constructing our own meta-texts (whether our mobile devices, audio-visual systems, or DVDs). This all adds up to an incentive to think about newly enabled users, new ways of telling stories, and new ways of connecting with one another.

The report's focus on immersion as a dimension of news and documentary may be new to many readers, despite the New York Times' recent venture into virtual reality. So, can you share a bit more about the current state of immersive journalism and why you think this is a trend which we should be paying attention to rather than a passing fad? How would you respond to fears that immersion is more a tool for shaping emotional response rather than a resource for fostering reasoned argument? Can news stories be both immersive (and thus framed by a particular vantage point) and objective in the traditional sense of the term?

To answer your last question first, if we take immersive technology in the form of VR to mean 360-degree, 3D imaging systems (there is a lot of slippage in the meanings of both “immersive” and “VR”), I actually think that it's easier to be less subjective, or at least to circumvent the problem of a particular point-of-view common to linear narratives in film, video, words and even traditional photography.

One of its affordances as a medium, and a great advantage or disadvantage depending on one's goals, is that VR offers a surfeit of information. This makes directing the user's attention or “constructing the gaze” a difficult task.

Indeed, it's one of the reasons VR storytelling is still in its infancy: how to impose structure and direction, other than to mimic film conventions? In these early days, VR storytelling feels a lot like the first decade of cinematic storytelling, when the conventions from another medium (theater) informed the endeavors of a new medium still finding its feet.

I recently experienced Waves of Grace⁹, a terrific project about an Ebola survivor whose immunity offers a story of hope, made by Gabo Arora and Chris Milk for the UN in collaboration with Vice Media. It's clear that the makers have a point of view, a story that they want to communicate. And while reader-response theory tells us that viewers can and will make their own meanings from texts, in this case, the viewer has 360 degrees at his disposal, and in my case, I'm pretty sure that I constructed a counter-narrative possibly abusing my freedom to

look around, to look “behind” or opposite the makers' focus, to see things they weren't talking about and perhaps didn't want to take up.

More objective? I think the viewer has more options, can look around at what would normally be “off-screen space” in a film or video image, and that means viewers have greater latitude in figuring out not only what they are supposed to look at, but also the larger setting and context.

The bigger issue, according to some research, is that we might be processing these encounters the same way we do real-world experiences, and not the way we process film or photography or words. That is, we might be processing them as experience not representation.

Emile Bruneau's work¹⁰ in cognitive neuroscience at MIT, for instance, focuses on synaptic plasticity and explores the extent to which VR experiences play out differently than the representational domain we are more familiar with. He's doing this, among other places, with user experiences of Karim Ben Khalifa's *The Enemy* that I mentioned earlier, and it's very exciting work even if worrying for its larger implications. Emile is coming at it from a conflict resolution perspective, which is terrific; but if his thesis is correct, we need to understand the process much better in order to brace ourselves for the onslaught of other less benevolent appropriations.

I think immersive experiences put a new twist on the old “showing-telling” distinction. Showing is far more difficult to contain than telling, seems more impactful in terms of how it is experienced and remembered, and as Confucius tells us, can be re-told in thousands of words and thus in countless ways. VR takes showing to the next level, not only always presenting us with an excess of information, but in so doing, forcing us to attend to only a small portion of what is available, and giving us that information as experience. I think it would be difficult to argue that it is a tool for reasoned argument — the abstraction of words and numbers is still best for that, with image and sound beginning the slippery slope to affect (I guess that's what the Reformation was all about!).

But VR can be a great attention-getter, a quick and easy way to create a sense of presence and place. By creating the impression of being somewhere, by giving the viewer the freedom to look up, down and all around, a lot of crucial contextual information can be derived that would, in more limited linear scenarios, require careful selection and plotting, only to wind up giving us the director's or writer's point of view.

Immersion can offer a counterweight to indifference. It can lure us into being interested in a topic we might otherwise gloss over, can encourage a search for facts, or a desire to learn. Rational debate, as a mode of discourse, is usually driven by some sort of motive. Immersion can help to create that motive, but — at least until we develop better ways of shaping and directing immersive experiences — it is not, in itself, a mode of discourse.

So with this in mind, I would not dismiss it as a journalistic fad, but rather look to it working in tandem with other media expressions. *Ebola Outbreak: A Virtual Journey*¹¹ (Dan Edge, working with The-

⁹ [youtube.com/watch?v=0lwG6MfGvwI](https://www.youtube.com/watch?v=0lwG6MfGvwI)

¹⁰ [youtube.com/watch?v=McrXGQg5svY](https://www.youtube.com/watch?v=McrXGQg5svY)

¹¹ play.google.com/store/apps/details?id=com.frontline.ebolaoutbreak

SecretLocation) uses Google Cardboard, an inexpensive and relatively easy way to reach the public, to create a 3D 360 degree immersive environment tied to Frontline's Outbreak¹², a broadcast documentary. This Frontline production is a great example of forward-looking journalism, bound at the hip with documentary of course. It played out across media with partnerships and media manifestations from the New York Times to YouTube, and the immersive app was, in that sense, just another arrow in the quiver of an organization trying to expand and engage its audience while expanding the modalities of getting its story across.

Emphasizing audience engagement poses its own issues, since news organizations have historically distinguished themselves from the commercial drivers that shape the rest of their network's operations and journalists often resent the push to reach more viewers. At the same time, news organizations have seen their job as informing but not necessarily mobilizing the public, a goal more likely to be associated with documentary producers or activists. So, in what senses should journalists care about engagement?

The 20th century is rich with embodiments of the journalistic profession, from news hounds, to crusaders, to hard-bitten cynics, to gonzo journalists, each articulating a different set of relations between journalists and their publics as well as their larger institutional bases. And while it's probably true that many of today's practitioners hew to notions of independence, integrity and authority that would be familiar to journalists of generations gone by, the increasingly dire conditions facing many American print organizations seems to be encouraging a more public-friendly stance.

I have the impression that many of the journalists who a few years back were forced to include their email address with their bylines and grudgingly cope with tweets, are now more willing to interact with their public and to even track the number of hits their stories are getting.

News organizations, for all of their rhetoric about informing the public, not mobilizing it, also seem to be changing. This seems driven as much by the political polarization of the American public sphere, as by charges from the political right that "the media" is too leftist, as by an outright political agenda on the part of some news organizations and funders (Fox News and Richard Mellon Scaiff's Pittsburgh Tribune-Review, to name but two). That Fox News trademarked "Fair & Balanced" and "We Report. You Decide" as news slogans is one of the clearest signs that the old platitudes have been transformed into marketing tools, not commitments. Journalism — just like the larger environment it inhabits — is changing.

All that said, I think the engagement issue plays out on a somewhat different dimension. It's similar to what I said about immersive VR: it can help to generate interest, while making no claims to being a mode of discourse. First, it can indeed support the bottom line by attracting and holding readers and viewers. That's a double-edged sword, of course, as the annals of Yellow Journalism demonstrate. But

the history of Pulitzer's New York World also shows that an engaged audience will stick with a paper even when the reporting improves! In other words, engagement is independent from journalistic quality in the traditional sense.

Second, engagement can be extensive. It can help to move people from an interest in the reports they read or see to the actual world and civic processes around them. If the journalistic information is solid, then whatever interventions follow will at least have the benefit of being well-informed.

Third, I think the pursuit of engagement has led to some very interesting innovations. Our report discusses *Localore* and WBEZ-Chicago's *Curious City*¹³, a program where the ideas for what should be covered and the ensuing research itself comes from the public. It's a great example of co-creation, and how it can foster community engagement. In a very different way, the Center for Investigative Reporting's *Off/Page*¹⁴ and *Storyworks*¹⁵ projects are each based on partnerships with non-traditional players (YouthSpeaks, a literary nonprofit, and Tides Theater, respectively) to report news stories in ways that speak to particular communities. And The Oakland Tribune's *Oakland Voices*¹⁶ (with sister projects in Sacramento, California, and Jackson, Mississippi) trains local residents to become multi-media storytellers, which extends its range of news coverage and points of view, and enhances community engagement. These developments and more like them are essential steps towards pushing the journalistic form ahead, towards helping it reach publics that it has too long ignored, and towards keeping it in step with the ever-changing needs of its publics.

Engagement is user-centric. Rather than proclaiming from the lofty position of professional authority, it invites involvement, situates relevance, demonstrates the need for further information and consideration.

Alas, the news no longer seems self-evident. Today's public faces a withering array of choices, a number of which pander shamelessly to their interests. It's an empowered public, which is not to say an informed one; a public with tools, access, and the means to express and share ideas. These developments are some of the reasons we believe that journalism is moving away from being a straightforward transmitter of information to a redefined position as a convener, curator and shaper of an informed conversation between publics and sources. It's the difference between a monologue and a dialogue. And today's public is increasingly part of the conversation.

One of our key bits of advice to journalists is to "begin with the user...". While we are still in the early days of this new dialogic infoscape, acknowledging that the folks out there in the public are more than mere recipients of whatever journalism organizations cast their way seems like an essential starting point. They are potential partners (*Curious City*), localizers (*Off/Page*), people with particular interests and needs that can be reached through a number of the interactive,

¹³ curiouscity.wbez.org

¹⁴ cironline.org/projects/offpage-project/blog

¹⁵ cironline.org/storyworks

¹⁶ oaklandvoices.us

¹² pbs.org/wgbh/frontline/film/outbreak

immersive, and engaging approaches possible with today's technologies.

If a significant public does its reading and viewing on mobile devices, then we need to think about reaching them there, not simply by squeezing the printed page down to phone screen size, and not simply finding alternate ways to convey that information in small format. We also need to consider users' desires to navigate information, compare it, share it, and at times, even produce it. We need to find a way to go beyond journalism as information transmission alone, and to think about ways of addressing its ritual dimensions that I mentioned earlier when citing James Carey. And all this while somehow maintaining the reference values that quality journalism represents. No small challenge, but we've figured out the quality news and transmission bit, so the next step is to upgrade significantly the role of user in our calculus.

News organizations and documentary producers struggle with the phenomenon of user-generated content. So-called "citizen journalists" are often pit against professional news-gatherers and there's concerns that grassroots media may not meet the same standards of accuracy and ethics as that produced by professional journalists. Are there good ways for news organizations to collaborate with the public in order to expand their capacities without necessarily sacrificing older standards about quality reporting?

This picks up from the previous question, and it's the key issue in a change from monologue to dialogue. What do we do with the conversation partner, especially when there are so few productive behavioral precedents available and even fewer ways to guarantee the quality of the conversation? Transitions are always vexed: how much of the old to retain? What of the new will actually stick? And meanwhile, how are we supposed to navigate the uncertain mix of signals?

Recognizable standards and the ability to distinguish fact from fiction are more important than ever, particularly given the ever-growing cacophony of sources and voices enabled by our communication technologies. This is in part a literacy problem, in a world where diversity brings with it multiple and competing truths; and in part a curation problem, where reputation turns on appropriate and timely selection in a very chaotic information environment.

But the stakes are enormous in an environment that offers countless invitations for the public to share, and in sharing, opportunities to build communities of interest and affiliation. These energies can be directed towards civic engagement and informed debate, or they can be siphoned off to support the narrow interests of closed communities. Journalism, at least in my view, should be a social binder.

This is a fast moving area, and there are several approaches to journalistic collaboration with the public to keep an eye on. For starters, there are precedents that we can learn from such as collaborative news networks. A few years back, Anita Chan, wrote her CMS thesis¹⁷ about networks such as Slashdot and Kuro5hin that developed various

user-based systems to rank and filter participant-generated stories. Or we might look at the very different curation systems in play with Reddit, The Guardian, the New York Times and other organizations that have sought to embrace user comments and leads. Anika Gupta, another CMS student, recently submitted her thesis on comments, moderators, and news communities in journalism.

Or we might look to a growing number of automated verification tools out there like Scoopshot¹⁸ and CrowdVoice¹⁹, many developed thanks to the Knight News Challenge. And then there are working partnerships between the public and journalists in the form of The Guardian's "The Counted" that I mentioned earlier, in which The Guardian's reporters do the work of verification on information supplied in part by the public.

While the verdict is still out, there's no denying the role of the public in uploading information on events as they happen, and in commenting on, supplementing and contesting journalistic reports whether in the press or not. In really simplistic terms, on one hand, the public's contributions can be likened to sensory input, the raw data that something is happening that will quickly make its way to the brain for the dots to be connected. It's the nervous system at work, with a division of function that makes good use of both nerve ends and cognitive processing.

But on the other hand, public responses to published journalism (I learn a lot by reading The Guardian's comments sections!) invoke a slightly different analogy. In this case, it's all at the processing level and similar to the internal debates we can have with ourselves. We reach a conclusion, but then consider the situation from different angles, or factor in different data points. These comments, if a civil tone can reign, go a long way towards improving journalism by offering contrasting views, linking to sources not mentioned in the original, and demonstrating the potentials of an incredibly productive partnership.

How does this report fit within the longer term vision of the Open Doc Lab? What else might people expect from you in the future?

When I founded the Open Doc Lab, I did so with the idea that the conditions for representation are changing and changing profoundly, and that documentary can benefit immensely from the particular constellation of changes facing us. Near ubiquitous cameras, good networking and software availability, an increasingly media-making public...the elements are in place for a fundamental reworking of the long established balance of power in representation.

But on the other hand, as many of your questions have indicated, there are plenty of tensions with our inherited traditions, plenty of threats to established ways of doing things, and potentially plenty of dangers especially in the shift from the known to the unknown. What do we do about notions of authorship, authorial responsibility, expertise and point of view? What's the calculus of ethics in participatory documentaries (free labor, libel, privacy incursions, and the rest) and also in interactive ones (where we can potentially confirm world

¹⁷ Collaborative News Networks: Distributed Editing, Collective Action, and the Construction of Online News on Slashdot.org: cmswm.it/anita-chan

¹⁸ scoopshot.com

¹⁹ crowdvoice.org

views, not expand them)? How will these new approaches and the technologies fit with established notions of storytelling, engagement and even something as basic as shared textual experiences?

These are not necessarily new questions — games have already posed some of them — but the stakes are different when taking up the representational claims held as defining for documentary. This is not to say that the concept of documentary is any more stable than the inherited notion of journalism; rather, just like journalism, it is fraught with tensions and contradictions at a moment of change.

So that's where we come in.

The Open Doc Lab is research-centric, and these tensions and possibilities define our research agenda. An important component of this research takes the form of our masters students' theses, where we've had some terrific work on data-driven storytelling (Heather Craig), impact assessment (Sean Flynn), and live documentary (Julie Fisher). We're also interested in extending our findings, of intervening in the development of documentary as both production and institutional practices, something that Sarah Wolozin, who is the lab's director, has found endlessly creative ways to achieve.

And by doing this, I'd say that our bottom line intervention targets the larger issue of civic discourse.

Our ongoing work with journalism is a good example of how this works. Initially, we thought that digital journalism would offer documentary an incredibly important distribution platform and audience, especially as documentary's theatrical and broadcast venues continue to melt away. And it does. But actually, it turned out that (digital) journalism could also benefit considerably from the relationship. This turned into conversations with both communities and ultimately the report that Sarah Wolozin, the ODL team, and I prepared with the MacArthur Foundation's support and that we've been talking about in this interview.

We also work with documentarians, journalists, and organizations on a more individual level. Take Frontline, an organization at the pinnacle of American broadcast documentary. David Fanning recognized the changing dynamics of the media landscape and brought in Raney Aronson, Frontline's executive producer, to help the series stay ahead of the curve. Raney is a fellow in our lab, and that's led to some extremely productive conversations between our two organizations.

Or take another example: the widespread participation that is one of the most exciting affordances of the new documentary. We've been fortunate to be able to approach this through the work of visiting artists such as Kat Cizek, whom I mentioned earlier in the context of the NFB's Highrise series (Kat's work embodies the co-creation methodology, and she is wonderfully articulate about it) and through the projects of MIT colleagues such as Sasha Constanza-Chock, Vivek Bald and Christine Walley — all members of the lab — as well as with our colleagues from MIT's Center for Civic Media.

Our fellows program has attracted a small and remarkable group of international makers, critics, technologists, and artists. It has provided a space to share expertise and even basic things like vocabulary, to explore new technologies, and to brainstorm and incubate projects. Sarah and I would love to be able to share our work with a greater and more diverse array of people, and as well to get it out to communities

where it can make a difference, and that means getting some financial legs under the fellows program, which is the task at hand.

One of the great advantages of working at a university is that we have a relatively neutral platform at our disposal (our job is to open up, not monetize). We can bring members of the industry, technologists, artists, festival organizers, advocates and policy makers together to move the field as a whole ahead. Naturally, we take advantage of this setting for convenings large and small. But we also try to move the field and the debate along by building resources.

Sarah Wolozin has been the driving spirit behind Docubase²⁰, a curated collection of hundreds of interactive projects. It includes playlists by makers, curators, and technologists; a lab with project documentation and interviews; tools and resources; and we are building up a beta-testing function for makers to get feedback on work in progress. It's a tremendous resource, and the kind of thing that we will definitely keep doing as part of our commitment to field-building.

Knowledge transmission is also part of our remit — courses, workshops, lectures and the rest. I'm just back from a string of lectures across Eastern Europe as well as England, France, Germany and the Netherlands where these developments are generating ever-more interest. We're planning to connect the dots between some of our online projects such as Docubase and Moments of Innovation and the interviews that we've been recording in order to offer the international public a structured learning environment, or in the language of the day, a MOOC. As I noted earlier in response to your question about the "open" in the Open Doc Lab, sharing knowledge and resources is central to the lab's vision. But we also do our best to facilitate this new order of things through a robust set of collaborations and joint projects with Sundance, Tribeca, SXSW, i-Docs and the International Documentary Festival Amsterdam's DocLab.

To give one example, Sundance's New Frontier's Program, Indiewire and our lab joined together for the Creating Critics program to train new critics to write about emerging digital forms in the context of a festival and to show how they relate to cinematic storytelling. It's been great for our students, the sponsoring partners and the field, so we look forward to ramping this up in the future. We regularly partner with IDFA's DocLab, whether for projects like Moments of Innovation or for some event or other during their festival in November.

With our base at MIT, technology is another no-brainer. We're always on the prowl to see how various technologies can be put to the work of representation, how they might open access to a greater array of users. So for example, later this spring, we'll be holding an event on VR that in part attempts to disambiguate the different technologies behind VR, tease out their implications...and get a sense of what new approaches are just beginning to take shape in MIT's labs.

Finally — good news — the John T. and Catherine D. MacArthur Foundation has given us a significant grant, allowing us to focus more on our work (and less on fundraising!) for the next few years. And it has the added value of allowing us to continue working with Kathy Im at the Foundation, while redoubling our efforts at all the things I've just mentioned! ●

20 docubase.mit.edu



WORLD GOIN' ONE WAY, PEOPLE ANOTHER

SUBCREATION AND POLITICS IN THE WIRE

Evan Higgins, CMS graduate student, '17

This paper was originally written for the CMS graduate course "Major Media Texts," taught in Fall 2015 by Professor Heather Hendershot.

The creation of fictional universes with carefully crafted economies, histories, and cultures has long been a hallmark of storytellers the world over, from West African griots to Russian novelists to Greek tragedians. But as terms like "transmedia" and "shared-universe" bubble up out of academia and into the zeitgeist, it is easy to think that the technique of worldbuilding is a contemporary phenomenon and not a method of narrative construction as old as storytelling itself. The false perception of this tool as a contemporary development is due in part to the recent academic "study of imaginary worlds which is occurring in a variety of fields" (Wolf 6). Conceiving of fictional world construction as a novel development is dangerous not only because it limits the understanding and history of the technique but also because this mindset focuses on the most obvious and contemporary ways in which worldbuilding is employed despite its history dating back millennia. The result is a perception of fictional world construction that is too often conflated with speculative fiction, needlessly restricting this tool's ability to breath coherence and heft into any story, whether fiction, non-fiction or some liminal combination of the two.

While a fictional work, David Simon's *The Wire* is undeniably grounded in real events, locations, and people, placing the series firmly in this middle ground between fiction and alternative reality. As David Lerner notes in his essay on the show's symbiotic use of Baltimore, *The Wire* "[relies] on actual events and the blending of real people to compose its characters and scenarios," blurring the line between fact and fiction (214). Similarly, Margaret Talbot's profile of David Simon titled "Stealing Life" focuses on his knack for vernacular dialogue, which allows him to know which parts of street life to ap-

propriate in order to create a gripping sense of realism.

This use of non-fiction trappings as inspirational fodder is too often cited as the main reason that the show is so successfully able to craft a believable world when much of the series' logic actually derives from the incorporation of classic worldbuilding techniques. Nowhere is this better on display than in the third season of *The Wire*, where Simon integrates an additional political element into his tightly-

*"As a work of media, *The Wire* has been described as everything from Greek tragedy to science fiction to even a non-interactive video game in an effort to understand the true essence of the series. However, all of these viewpoints put the media format or genre first instead of the world which Simon is crafting."*

constructed, fictional Baltimore city ecosystem, relying on the hallmarks of worldbuilding to create a local electorate that seems like it has always existed right off-camera. The incorporation of this political system into his complex city in the third season allows the series to include two additional plotlines that detail the way in which America's contemporary political system, built on appearance and image, retards the growth and recovery of imperiled cities such as Baltimore. Given the beginning and completion of these plotlines in the third season

and the expansion of Simon's world and worldview through various cinematic worldbuilding techniques including serial plotting, expository character interactions and contrastive cutting techniques, a close reading of the first and last episodes of the season will demonstrate how *The Wire's* multifaceted Baltimore allows Simon to articulate the far reaching consequences of a political system built on grandstanding.

In the seminal worldbuilding text, "On Fairy Stories," J. R. R. Tolkien defines the difference between the "Primary World" — the world which we currently exist in — and "secondary worlds" that are the creation of authors. For Tolkien, in order for a story-teller to be successful, he must "[make] a secondary world which your mind can enter. Inside it, what he relates is 'true': it accords with the laws of that world. You therefore believe it, while you are, as it were, inside" (Tolkien 12). Of utmost importance to Tolkien is making sure that the fictional world has a coherence that inspires "secondary belief" in the "subcreation" or constructed world. Secondary belief is not a willful suspension of belief but is instead a state that the reader enters when the secondary world adheres to an "inner consistency of reality" (Tolkien 5). This thread of subcreation of secondary worlds first characterized by Tolkien has been picked up and expanded upon by Wolf in his primer on worldbuilding, *Building Imaginary Worlds: The Theory and History of Subcreation*. In this book, Wolf expands on what actions are needed to inspire secondary belief in the logicity of created worlds. The three principles of worldbuilding to Wolf are invention, the process by which "the Primary World has been changed" (34); completeness, the way in which the world contains "explanations and details...which suggest a feasible practical world" (38); and consistency, how "details are plausible, feasible and without contradiction" (43). Of course, the incorporation of one of these techniques is not simple as "completeness demands more invention as more of the world is revealed. The more invention the world contains, the more difficult it is to keep everything in the world consistent" (Wolf 34). However, the successful combination of these three methods is key to creating a functional and logical world for a creator to fully flesh out his or her ideas.

As a work of media, *The Wire* has been described as everything from Greek tragedy (Sheehan and Sweeny) to science fiction (Lerner)

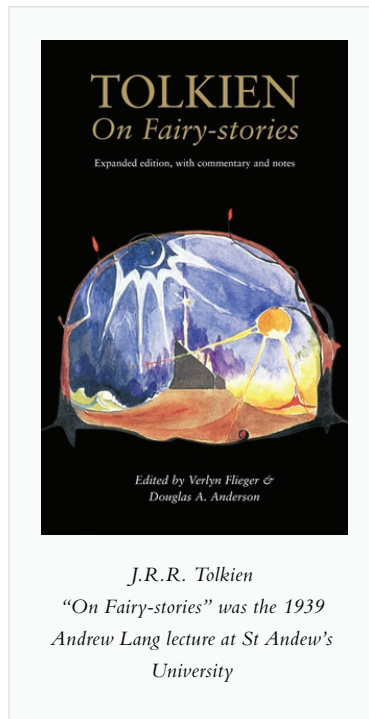
to even a non-interactive video game (Mittell) in an effort to understand the true essence of the series. However, all of these viewpoints put the media format or genre first instead of the world which Simon is crafting. The most useful way to understand *The Wire* is not as a procedural cop show (Mittell) or even as HBO's antithetical "not TV" but instead as a secondary world that Simon is allowing us a glimpse into via the medium of television. If we begin to think of Simon as a "subcreator" instead of an author, we can then see how he strategically "[provides] background richness and verisimilitude to the story" (Wolf 2) in an effort to demonstrate the terrible effect of capitalism on society.

Each season, Simon broadens this secondary world he is constructing in an effort to display the complicated institutions and economic forces that control and inform the lives of his creations. Rather than simply telling a narrative built on facts he is striving towards completeness through invention while maintaining consistency. This method of viewing his work allows us to interpret the third season of *The Wire*, which "moves in the direction of a properly political plot (networks, personal relations either of services rendered or of personal animosity, taking credit, passing the buck, ducking blame, etc.)," (Jameson 363) as an attempt to map a political system on top, between and below the drug gang-law enforcement symbiosis that Simon has detailed in previous seasons. Throughout this season, the viewer becomes privy to the inner workings of Simon's local political system and its previously unexplored interactions with these two urban spheres. Through the incorporation of this additional institution, Simon focuses on the need for politicians to "appear" as if they are doing the credible thing rather than actually do it.

This primacy of appearance means that the candidates must politically grandstand, forcing them to do what appears best to impress prospective voters rather than what would be best for the city itself. The terrible truth of this situation becomes evident throughout the third season in two competing plotlines that take up the majority of this season's narrative and touch nearly every character in some way, large or small.

The first of the two season spanning plotlines begins with the dismally under planned destruction of the Franklin Terrace Towers, a cluster of in-universe public housing high-rises where much of Baltimore's Westside drug trafficking took place. This plotline, inspired by the "historical demolition of the housing projects in Baltimore in the mid-1990s" (Lerner 219), starts with a speech from the incumbent Mayor promising renewal and revitalization and ends with a disastrous gang war resulting in numerous deaths and the dominance of a new, much more brutal drug regime. Rather than a terrible situation that begins with political grandstanding, the second season-long narrative arch is the utopian success of *Hamsterdam*, a drug enforcement free zone that slowly emerges as a ray of light in Simon's Baltimore until a nascent Mayoral candidate sees an opportunity to crosscheck the current regime.

These two events, one a blight which arises due to improper political planning, and the other, a success which is demolished due to political machinations, are both bookmarked by the first and last episode of the third season of *The Wire*. As such, a close reading of





Drug Lieutenants Poot (left) and Bodie (right) attend a meeting to discuss the fallout of the Franklin Terrace Towers demolition.

these two episodes will reveal the ways in which Simon uses world-building techniques to intertwine the political sphere into his sub-creation, allowing him further room to detail the repercussions of an electoral system that privileges style over substance.

The first episode of the third season of *The Wire*, “Time After Time” opens with a scene that shifts back and forth from one focalizer to another. Three drug “soldiers,” two of which are the familiar Bodie and Poot from previous seasons, approach the political rally of a previously unseen, sitting Mayor Clarence Royce. This rally is a ceremony to celebrate the impending demolition of the Franklin Terrace Towers, previously a hub of drug activity that served as the base of power for the series’ main criminal association and Poot and Bodie’s employer, the Barksdale Organization. At the same time that Royce is declaring that the demolition of the Towers will remove some of the city’s “most entrenched problems,” Bodie, a young drug lieutenant known for speaking truth to power, is countering to Poot and their friend that the destruction of these buildings has nothing to do with the desire to start anew, for as Bodie knows, “they don’t care about people.” To Bodie, Royce is just another politician purporting to care even as he articulates that “reform is not just a watchword with my administration, unh-huh, no, it’s a philosophy.” By juxtaposing these two conversations, Simon is not only showing the interaction between the two represented social spheres, the criminal and political, but is also hinting at the performative aspect of Royce’s demolition. As the focus shifts back and forth between an unknown Royce espousing the benefits of the demolition and a trusted Bodie’s declaration that this is all an act to “snatch up the best territory in the

city,” the viewer is forced to question who truly benefits from the demolition. Here Simon is relying on the audience to determine who to believe: an unknown politician with trite declarations or a drug trafficker who has endeared himself to the audience.

Later in the scene, as the actual destruction of the Towers occurs, the dust from the ill-conceived demolition blows through the audience, choking the Baltimore residents as the resulting gang war will over the course of the third season.

This fallout, caused by a lack of proper planning, foreshadows the consequences that will occur throughout the third season as a result. Much like the demolition of the high-rises was improperly planned to prevent actual fallout, the destruction of a major trafficking area was improperly planned to prevent gang fallout. This is attested to in Simon’s choice to not include a single member of Baltimore Police Department (BPD) on the podium. This fundamental lack of coordination between these two public offices will play out over the remainder of the season as the body count stacks up while the dislocated Barksdale Organization forcefully tries to push other gangs out of their own territory, including the Stanfield Organization which they eventually come to war with. The first scene in the third season interblends existing characters representing the drug trade along with the new political players to be explored throughout the season showing that although often seen as worlds apart these two organizations are intricately linked. This scene serves to briefly articulate the way in which different societal spheres interact with one another. Up until now *The Wire* had dealt with criminal organizations interacting with law enforcement agencies, but immediately the third season



“By juxtaposing these two conversations, Simon is not only showing the interaction between the two represented social spheres, the criminal and political, but is also hinting at the performative aspect of Royce’s demolition.”

demonstrates a break from this tradition where Simon the world-builder instead incorporates an additional element of the city in an effort to give the audience a more complete view of how his Baltimore functions.

Whereas Royce’s introduction cements his character as both a major political actor and unbeknownst progenitor of the Barksdale-Stanfield War, *Hamsterdam* is at first decoupled from the politician who would eventually destroy it as a means of political appropriation. The “safe-zone,” however, does likewise have the roots of its origin in “Time After Time,” as its progenitor Major “Bunny” Colvin is similarly to Royce introduced through the viewpoint of existing characters. After Bunny berates two young policemen for not knowing their location, a recognizable police officer, Herc comments that “Bunny Colvin’s been giving that speech as long as you guys been sucking air.” Simon is here using invention as a means of completion showing Bunny as a character who not only has existed in this universe for years but also as someone who has deep roots into the local community and the police force. Later in the scene, when Bunny directly inquires why Herc and Carver, another known BPD officer, assaulted a young “drug runner,” he repeatedly asks “what did we learn?” When Herc responds with a stock chest-thumping answer, the Major walks away in disgust. In contrast to how Royce was immediately denigrated by Bodie upon introduction, Bunny is set up as having complete credibility through his interactions with Herc and Carver. This scene introduces Bunny as a character fed up with the status quo of the BPD and whose storied legacy within the department gives him the type of pull necessary to instigate change. In this scene, as much he did in the opening scene of the season, Simon is integrating new characters in a way that feels logical within the complex narrative he is trying to articulate. This effort towards completion of his world duly serves to make Bunny’s creation of *Hamsterdam* all the more believable, subtly sucking the audience deeper into Simon’s diegetic musings on criminality.



City Councilman Tommy Carcetti

One final character is introduced in the first episode of the third season of *The Wire* whose presence fills out Simon’s new political plotlines. Again, as with Bunny, and Royce, the viewers are introduced to City Councilman Thomas Carcetti while he is interacting with characters that the audience has already grown used to, Police Commissioner Burrell and Deputy Commissioner of Operations Rawls. Not only is Carcetti seamlessly incorporated, but, much like Bunny, he is first shown interrogating the two existing police officers on their low law enforcement efficacy. This scene serves to display Carcetti as both idealistic and opportunistic, two traits that will continually be at odds for the character as he exists in Simon’s cynical subcreation.

Apart from the character development accomplished in this scene, Carcetti’s introduction mirrors that of Royce’s in a number of interesting ways.

Whereas Royce is a political envoy interacting — albeit obliquely — with a criminal organization, Carcetti is a political emissary interacting with law enforcement. In both situations, a crucial element of the three sided dynamic is left unexplored — at no time in Carcetti’s questioning does he delve deeper into what may be causing the spike in criminal actions. In this scene, Simon is setting up Carcetti as a member of a preexisting political class that commands great influence over the police sphere with little actual knowledge of the criminal underworld. Later in the episode when Carcetti meets directly with Burrell, they even further marginalize the criminal element, never at any point discussing the actual criminal organizations that they are trying to restrain but only the link between the political sphere and law enforcement. This complete lack interaction between the three spheres causes much of the harm to the city. The introduction of each of these three characters into the neat logical ecosystem of Baltimore presages the way in which their relationship will form the background of the third season, giving Simon the ability to demonstrate the terrible consequences of political grandstanding.

Their relationships also elucidate the strange stratification of the

three major societal spheres that are focused on in the third season. And as the season continues and an ensuing turf war erupts between the Barksdale and Stanfield organizations, the audience is continually berated with the simple fact that at no point during the demolition of the towers were the cops aware that the destruction would cause a major drug war. This lack of information flow from the cops who should be aware of what is going on at the street level to the politicians who should be aware of what is going on at the police level is further evidenced at numerous occasions throughout the third season. For instance, at one point, Bunny must trot through several branches of the BPD, until he happens to stumble upon the only law enforcement department that has any actual information on the drug dealers (“Straight and True”). Later, Bunny tells his protégé, Carver, that he “ain’t shit when it come to policing” (“Reformation”) because Carver has no idea what is going on at the street level, no knowledge of the community. Of course, what may be most disheartening is that even when the politicians are fully aware of what is going on at the street level, as Carcetti is after his stroll through *Hamsterdam*, they still choose to act in the interest of their appearance.

The last episode of the third season of *The Wire*, “Mission Accomplished,” is rife with the repercussions of the Barksdale–Stanfield War. It opens on the scene of the murder of “Stringer” Bell, the number two in the Barksdale Organization, who has continually tried throughout the season to broker peace between the two warring drug organizations. The first establishing shot of the episode lingers on a billboard advertising “B&B Enterprises,” Stringer’s attempt at a legitimate company. The shot demonstrates the death of the dream of the character who tried to civilize the drug trade, implement a tribunal organization for settling “beefs,” and avert the Barksdale–Stanfield war. In a later scene of pure posthumous character building, Detective Jimmy McNulty, who at this point has been hunting Stringer for several years, enters Stringer’s apartment replete with book-lined walls and bourgeois furniture and is forced to ask himself “who the fuck was I chasing?”

Of course, one might argue that the Barksdale–Stanfield war did not directly cause Stringer’s death, but it did force him to counter-attack his future murderer under duress from the war and it likewise caused the eponymous head of the Barksdale organization to betray Stringer out of fear of having to fight a war on three fronts. Some may argue that his death is not a straightforward through line from the Towers falling, but in a world as minutely crafted as Simon’s, it does not need to be, for the effects of one action are easily visible. Royce never pays for tearing down the Towers without consulting the BPD, but the ramifications of his need to be seen as an effectual Mayor permeate throughout the season and the rest of the series as the terror that is Marlo Stanfield looms over Baltimore.

The second main plotline wrapped up in “Mission Accomplished” is the experiment of *Hamsterdam* that Simon created within his replica of Baltimore.

Hamsterdam is an attempt by Bunny to make sense of a fundamental flaw in the rhetoric of the “War on Crime” — that criminals are enemy combatants rather than American citizens. As his experiment to present citizens with an area in which drugs are legal develops in its

own intricate way, it is tested over and over again by the outside forces that exist in Simon’s world. Armed robbers, journalist, social workers, sex workers and religious organizations all test the plausibility of this thought experiment but the safe drug zone is able to stay afloat until the ultimate pernicious malefactors discover it: politicians. Once the political class becomes aware of the social experiment, it is only a matter of time until *Hamsterdam* collapses in order to be churned into fuel for political maneuvering. This is first shown when Carcetti calls the media after he is made aware of the success of *Hamsterdam*. During this scene, the mayoral candidate is shown stating that the BPD “surrendered portions of the police district to the drug trade and the Council was not informed.” This lie, as Carcetti was made aware, is meant to downplay his own knowledge of the situation. The focus of the multifaceted world created by Simon then switches from Carcetti discussing the event with newscasters to Royce viewing the same newscast. This technique allows the viewer to see how the media’s reception directly causes Royce to recant his dream of using *Hamsterdam* for political gain. For Royce, who has for days been debating whether the merits of the situation offset the political costs, the dream of *Hamsterdam* becomes untenable when he realizes that it will be perceived negatively.

Later in the episode, in front of the same police committee that served to introduce us to the character, we see Carcetti deploring Baltimore as a whole, fully exploiting the fall of *Hamsterdam* that he so greedily manufactured. Here, through deft plotting, Simon employs dramatic irony, allowing the audience full view of Carcetti’s duplicitousness as he grandstands while purporting to disavow the “politics” of the situation. During this speech he states, “this is more important than who knew what when or who falls on his sword or whether someone can use this disaster to make a political point or two.”

Of course, thanks to Simon’s methodical construction of this character and intricate plotting leading up to this moment, the audience knows that this speech has everything to do with image, from Carcetti being coached to sound more inclusive, to his manager, Theresa D’Agostino, telling him to use his “winning hand” to destroy *Hamsterdam*. Simon has left a series of clues hinting at the fall of an idealistic man who has finally decided to trade in his idealism for political points. This moment is Simon’s own perverse eulogy for *Hamsterdam*, espoused through a character who was simultaneously the architect and main benefactor of its downfall.

Like every other season finale of *The Wire*, “Mission Accomplished” features a montage that wraps up the major themes and plotlines of the third season in a way that captures the repercussions that the introduction of the political class into his subcreation has wrought. The ramifications of both *Hamsterdam* and the fall of the Franklin Terrace Towers are keenly felt throughout this wrap-up. Better than any other moment in the season, this scene articulates the way in which Simon’s secondary world has allowed for him to show the harmful effects of such pernicious shoot-from-the-hip political grandstanding. Only in a world as consistent and complete as the one created by Simon, exists the ability to show the fallout that the ending of these two narrative arcs has on the larger universe. Cops continue to arrest criminals that



Avon Barkdale and members of the Barksdale Organization in the episode "Mission Accomplished"

they do not understand or care to know, drugs continue to get sold to imperiled addicts, the far crueler Stanfield gang now dominates Baltimore, and all the while Carcetti begins his official stumping on the campaign trail: in short, the "game" continues. The montage ends with a final scene of Bunny looking out over the destroyed promise of his utopian dream. Later in the scene, Bubbles, a character from the first season who has never met Bunny despite his intimate relationship with the BPD, discusses Hamsterdam. During this brief conversation, Bubbles laments the loss of Bunny's elegant solution to the intolerable reality of living under the thumb of the drug trade stating, "You probably don't know, but it's rough out there, baby." Again, Simon uses his subcreation to make use of dramatic irony, poignantly showing an unaware Bubbles giving Bunny some sort of affirmation that his experiment was not in vain. In a show with so few moments of comfort, Simon chooses to end the season on this bittersweet note, causing the viewer to reflect on what could have been.

If academia has anything to do with the staying power of a media text (and for my own sake, I hope it does), *The Wire* will undoubtedly live on as a cultural touchstone for years to come. Indeed, as Drake Bennett writing for *Slate* in 2010 noted "barely two years after the show's final episode aired...there have already been academic conferences, essay anthologies, and special issues of journals dedicated to the series."

However, within academia, it is important that *The Wire* is viewed in the correct way, as a world unto itself invented by a skilled subcreator. The artful, meticulous detail of this world can be glimpsed in the first and last episode of the third season, which serve to bookend an introduction to how the local political class effects their city. That the destruction of a housing project would cause a major drug war is believable but the appearance of a drug enforcement free zone for several months in the middle of a major American city is more speculative fiction than nearly anything else in the show (fifth season serial murder plot I'm looking at you). But what is explicitly clear is that it feels believable because this world is so logically created that it seems hard to disbelieve any plot element that Simon introduces. As the audience is granted secondary belief in the situation, Simon is in turn granted further space to test out radical ideas with complete credulity.

Thus, the destruction of Hamsterdam by Carcetti, an informed party who knows that it is one of the lone successful parts of the city comes off as all the more sinister. And likewise, it is not until the viewers realize that the destruction of the Towers caused the Barksdale-Stanfield War, that they similarly understand the true pernicious effects of political showboating without thinking of the consequences. But whereas the destruction of Hamsterdam was cause by an informed party pretending not to be, the destruction of the Franklin Terrace Towers was performed by an uneducated party barely aware of the repercussions of his actions, highlighting that a political system built on appearance will of necessity betray underclass. The brilliance of Simon the subcreator is to show us through an attempt at completeness that in a world built on capitalism, one can only ever have a political system built on appearance.

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LOSS, MOURNING, AND CLIMATE CHANGE

Lily Bui, S.M. CMS, '16



This paper was presented at the University of Massachusetts, Amherst, on April 2, 2016, as part of the English Graduate Organization's "Forms of Feeling" Conference. Above: Aerial views of the damage caused by Hurricane Sandy to the New Jersey coast taken during a search and rescue mission by 1-150 Assault Helicopter Battalion, New Jersey Army National Guard, Oct. 30, 2012. Photo by Mark C. Olsen.

Weather is as much a metaphor for affect as it is the stimulus of affective response. There are “sunny dispositions” and “mental fogs” just as one can suffer from “seasonal depression” and “stormy moods.” We become frustrated when flights get canceled due to storms; concerned for our livelihoods during droughts; fearful of the impact of natural disaster on our cities.

The way humans relate to and react to weather has been documented in literature, scientific record, and everyday conversation.

For example, in April 1815, a volcano called Tambora located on Sumbawa Island in the East Indies violently erupted. Three years later, the impact of the volcano could be seen and felt all over the world. The volcanic ash had been blasted so high into the stratosphere that it created an aerosol layer around the Earth, deflecting solar rays back into space instead of radiating it downward. In New England, 1816 was nicknamed “Year Without a Summer.” Germans called 1817 the “Year of the Beggar.” Agriculture suffered and outright failed while villagers in Vermont survived on boiled nettles and peasants in rural China sucked on white clay. The atmosphere of these dismal times became inscribed in the works Mary Shelley in *Frankenstein* (1818) or Charles Dickens’ grim depictions of poverty in Victorian London. One night in 1816, after having exchanged ghost stories with both Mary and Percy Shelley, Lord Byron writes, observing the weather:

“How might a shared understanding of grief, at first a private emotion, eventually create spaces for public expression of vulnerability, cultural change, and even political action in the context of climate change? What is the difference between retrospective grief and anticipatory grief of losses? What might mourning due to climate change reveal about the relationship between human and non-human life in the environment?”

The sky is changed — and such a change! Oh night,
And storm, and darkness, ye are wondrous strong [...]
And now again 'tis black, — and now, the glee
Of the loud hills shakes with its mountain-mirth,
As if they did rejoice o'er a young earthquake's birth.

The singular event of Tambora's eruption has been indefinitely inscribed in the human record through these observations and interpretations.

Climate change, one of the most globally important political, socioeconomic, and cultural issues in present day, revolves around shifts in weather, and by extension, shifts in emotions.

Like Byron, Emily Dickinson was also a keen observer of the weather and takes things one step further, connecting seasonal change explicitly to a form of loss. She writes:

As imperceptibly as grief
The summer lapsed away, —
Too imperceptible, at last,
To seem like perfidy.

Dickinson alludes to the notion that the discourse of weather change — and thus climate change — is predominantly one of loss and transformation — of coastlines, of ice shelves, of species, of traditions, of human life, of permanence.

In order to deal with loss, one also inevitably encounters the work of grief and mourning. I use “grief” and “mourning” to refer to the expression or sorrow that usually follows death. Perhaps, as Ashlee Cunsolo Willox (2012) writes, “Re-casting climate change as the work of mourning means that we can share our losses, and encounter them as opportunities for productive and important work to be given primacy and taken seriously.”

After a close reading of climate change discourse in news, literature, political speech, and other media forms, I propose a brief discussion based on three questions:

First, how might a shared understanding of grief, at first a private emotion, eventually create spaces for public expression of vulnerability, cultural change, and even political action in the context of climate change?

Second, what is the difference between a retrospective grief of things long gone, and an anticipatory grief of losses yet to come?

Finally, what might mourning loss due to climate change reveal about the deeper relationship between human and non-human life in the environment?

As an aside, I do not discount that scientific research plays an important role in giving form to the climate change discussion. However, for the purposes of this talk, I have chosen to focus on more interpretive elements of climate change discourse: human narratives, and particular experiences that highlight the complex forms of meaning constructed and co-constructed by humans about non-human life.

To the first point, Willox suggests, “Reconciling the private responses of environmentally-based loss with the relative absence of this grief in public...is of the utmost importance.” She asserts, “We need...mechanisms that can extend grievability to non-human bodies and recognize them as mournable objects.” This idea is rooted in Judith Butler’s concept of “derealized bodies” — at once alive but discounted, always already lost or rather never were. In other words, Willox proposes a revaluing of non-human bodies — animal, vegetal, mineral — in climate change discourse to generate new forms of grieving, publicly — through art, testimonial, protest, news, and other forms.

In the 1960s, Rachel Carson’s *Silent Spring* eulogized, among other things, the loss of bird song in an environmentally-polluted, post-industrial America. Published before the creation of much environ-

mental regulation in the U.S., Carson’s book generated mass public awareness of the use of pesticides and its adverse effects on the environment. At first dismissed by chemical companies and institutions, the book ultimately contributed to a social movement in support of environmental remediation and against pesticides. This laid the groundwork for more formalized environmental policy — in the form of the Clean Water and Clean Air Acts of the 1970s. The treatment of bird song as a “mournable object” created a space for public discourse about a changing ecology directly correspondent to human activity and intervention.

Grieving also takes place with variance in temporality. It is both possible to retrospectively mourn things already gone and to mourn a loss that has not yet occurred. For instance, the ongoing loss of glacial masses gives rise — literally — to global sea levels. In this case, news outlets actively report on the loss of one thing due to climate change and concomitantly pre-empt the loss of another.

This is consistent with Derrida’s position that even before death, we understand the possibility of mourning, and thus the labor of mourning is one that, once it begins, is never quite completed. It then becomes, as Willox writes, “an opportunity to continually engage with death, with loss, and with those who have come before while we are still alive.”

Possibly, what this reveals about the relationship between human and non-human life is the common thread that connects the two: vulnerability and impermanence. The ongoing labor of mourning is self-reflexive and cognizant of this shared impermanence. The literature of political ecology offers a related argument that natural environments are not merely the stage upon which human actors battle epistemological or material domination; rather, environments and human societies are co-constructed. Willox writes, “Thinking of climate change as the work of mourning provides the opportunity to learn from the deaths, or the potential deaths, of bodies beyond our own, and beyond our species to unite in individual and global action and response.”

And it is this responsibility to respond — through ethical, political choices and actions — that Derrida deems to be a necessity of life. “Speaking is impossible,” he writes after a friend’s death, “but so too would be silence or absence or a refusal to share one’s sadness.” By performing acts of mourning, one continues to construct meaning around the deceased.

iSeeChange is a journalistic project partnered with NASA Jet Propulsion Laboratory that encourages participants to contribute observations of changing weather and climate. The platform is modeled after the *Farmers Almanac*, a traditional mode of documenting weather patterns to observe the changing seasons. Participants like this one post questions that anticipate change or transformation and in doing so memorialize extant forms of life in advance. In effect, this mode of storytelling is a form of writing future eulogies for the natural environment and the implications those changes have on human life, traditions, economies, and more. It returns some agency to the individual, and specific publics, who share anxieties about climate change impacts and offers a space to respond, to take action, and to enter into a dialogue — not unlike artists’ observations of weather patterns after

Tambora in the 19th century.

This agency becomes important in the context of navigating political discourse about climate change. During this year's election season in particular, presidential candidates' views on the subject are invariably polarized. The Guardian reports that 2015 was the "warmest year on record, with parts of the country in their worst drought in 1,200 years and millions of people at risk of being swamped by ballooning sea level increases." Still, the current candidates' views span a multitude of belief and value systems. For some, climate change is connected to terrorism or infrastructure. For others, it is unrelated to human activity and far from a human responsibility.

"My philosophy is that we are here to take care of the environment but not to worship the environment." — Kasich, NHPR (34:00), 11/12/15. cmswm.it/kasich2016forum.

"[Climate change] could not have come from the burning of fossil fuels." — Cruz, Senate Commerce Committee, 12/8/15; LexisNexis, 12/8/15

"The biggest risk to the world, to me — I know President Obama thought it was climate change — to me the biggest risk is nuclear weapons. That's — that is climate change." — Trump, Washington Post, 3/21/16. cmswm.it/trumpclimatechange.

"Climate change is already taking a toll on the nation's infrastructure, leaving taxpayers to pick up the tab." — Clinton, Hillary Clinton Campaign Website, 11/30/15. cmswm.it/clintoninfrastructure

"[Climate change] is directly related to the growth of terrorism. And if we do not get our act together and listen to what the scientists say you're gonna see countries all over the world." — Sanders, CBS News, 11/14/15. cmswm.it/sandersclimate.

It is in this context that mourning environmental losses can usher in new modes of participation in this discourse — in not quite apolitical but less politicized means. Acknowledging loss is a human reaction and carves out a space to express anxiety, vulnerability, devastation, hopefulness, or cherishing.

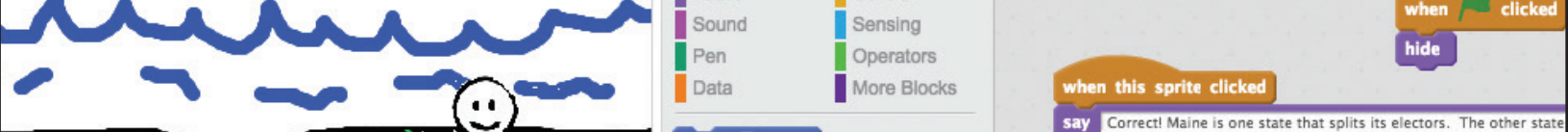
In closing, I refer to an excerpt from Patti Smith's *M Train*, in which she shares the experience of visiting her house in the Rockaways after Hurricane Sandy devastated the area.

"I sat on the makeshift step of what would be my refurbished porch and envisioned a yard with wildflowers. Anxious for some permanency, I guess I needed to be reminded how temporal permanency is."

Extreme changes in weather and climate can augur great loss, because loss itself is socially and culturally constructed, and that loss can include both human and non-human life. The act of mourning these losses publicly is at once a responsibility that we have to engage with the bereaved and an effort to reconstruct meaning around it afterward. At the core, mourning is a recognition of impermanence and mortality — of the forms of life around us and of our own.

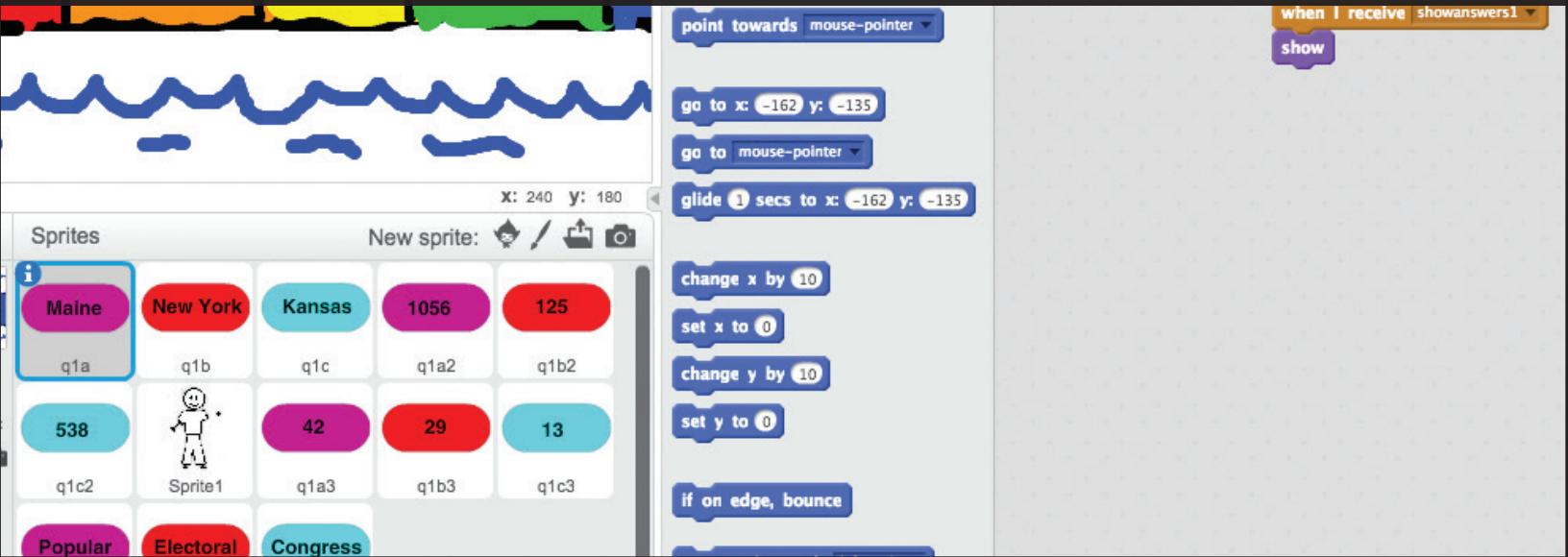
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CHILDREN'S CIVIC ENGAGEMENT IN THE SCRATCH ONLINE COMMUNITY

Ricarose Roque, Sayamindu Dasgupta and Sasha Costanza-Chock



Above: image of an "Electoral Voting Journey" project in Scratch by user nschonfeld21.

1. INTRODUCTION

A young girl learns about animal testing from her favorite TV show. To express her shock about the way that animals are being treated, and to raise awareness, she creates an interactive media project and shares it in a large online community of other young creators. In her project, she includes graphic photos of animal testing laboratories to show how horrific it can be. Some children love her project, but others have strong negative feelings about the use of such graphic images. A debate ensues in the comments section of the project between the two groups, and soon, the moderators intervene. While the moderators appreciate the goals of the project creator, they worry that the graphic images may upset younger members of the community. As a compromise, the moderators decide to label it as "not for everyone," which makes it less prominent on the website and harder to find, rather than censoring the project all together.

This vignette, drawn from our own experience, provides an entry point to the key themes we will develop in this paper: youth agency and civic engagement in online communities. A growing number of young people across the United States (and around the world) spend increasing amounts of time online. There, they engage in a wide variety of activities, from information search, to social media use, to participation in virtual worlds. According to a 2015 report by the Pew Research Center's Internet and American Life Project, 92%

of American teenagers report going online daily.¹ However, in spite of widespread use, teen computing experiences vary widely, as does relative freedom of access (for example, access from home vs. from a public library) and form of participation (for example, watching videos vs. creating videos).² Children's participation online is giving rise to, among other things, new forms of civic engagement. Henry Jenkins describes the emergence of "participatory culture," which he defines as cultural forms "with relatively low barriers to artistic expression

"How do children engage in civic discourse and expression with their peers within the Scratch Online Community? How do such expressions affect this community? What lessons can we distill for educators and designers who want to encourage children to engage in civic life, rather than dissuade them?"

and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship."³ Members of participatory cultures feel strong social connections with other members, and feel that their contributions matter. Online platforms have become key spaces for civic action, and there is a growing body of scholarship that attempts to characterize the evolving nature of digitally-mediated youth activism. danah boyd⁴ has extensively documented the ways that teens use social network sites as "digital publics" in an age of

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Ricarose Roque, Department of Information Science, University of Colorado Boulder
Sayamindu Dasgupta, MIT Media Lab
Sasha Costanza-Chock, MIT Comparative Media Studies/Writing

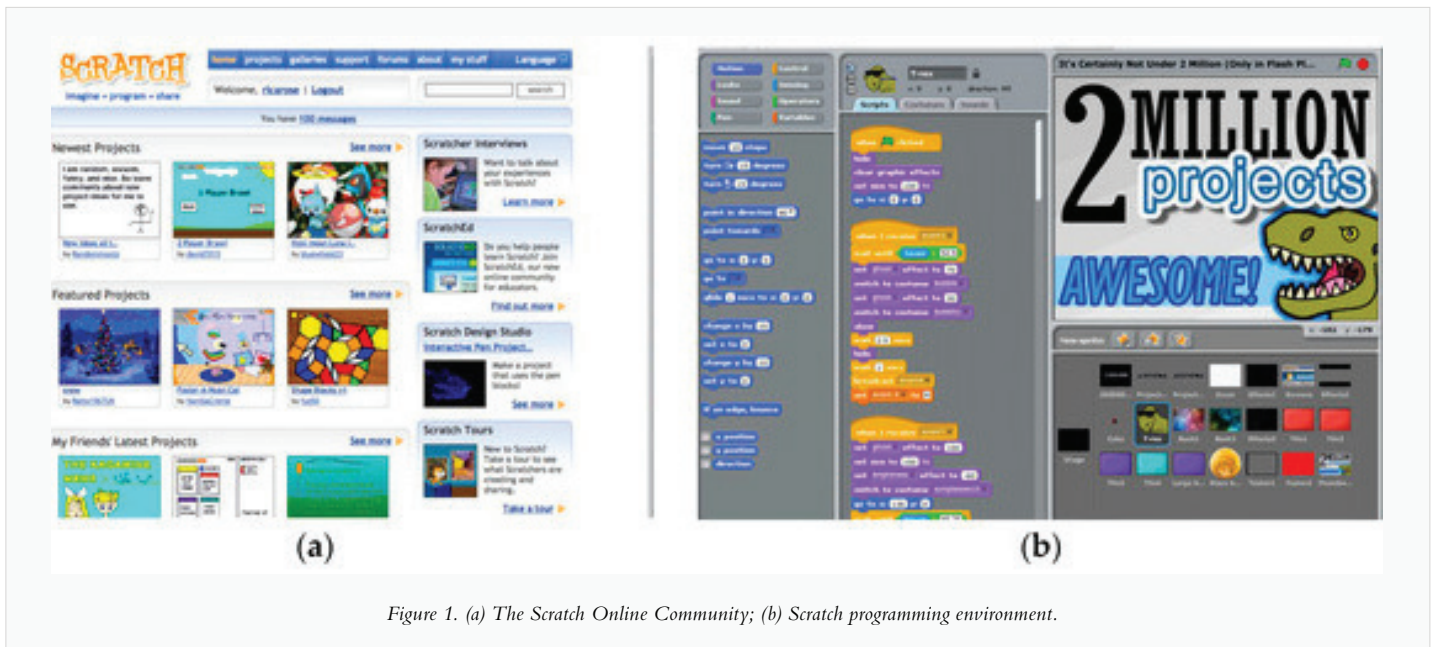


Figure 1. (a) The Scratch Online Community; (b) Scratch programming environment.

increasingly privatized public space; boyd ultimately argues for approaches that privilege youth agency over those that attempt to overly control and regulate youth voices online. Jenkins et al.⁵ examine a wide range of youth-led social movements, from immigrant rights to fan activists, and find that young people take action across platforms, amplifying their voices “by any media necessary.” Bennett, Wells, and Freelon⁶ describe an actualizing model to capture emergent youth-driven civic practices, in contrast to dutiful models of citizenship that connect to more traditional forms of civic action. In the actualizing model, people participate through social technologies that enable individual expression, and prefer loosely connected peer networks for information and engagement. Citizens under the actualizing model feel a diminished sense of duty, but a higher sense of individual purpose. By contrast, in the dutiful model, people engage in their communities through formal political organizations or parties, and remain informed about their communities through the news. Overall, citizens under the dutiful model feel a strong sense of duty to participate in civic life.

In their analysis of 90 websites created by political and community organizations attempting to engage young people, Bennett and colleagues⁶ found that these online spaces primarily replicated traditional, dutiful models online, without connecting to the more actualizing practices of young people. They argue that these spaces must bridge the two models of citizenship, since in the actualizing model, there is a danger that individual action becomes delinked from broader community concerns, while in the dutiful model, there is a danger of too much distance from emergent youth practices. However, they argue, by creating bridges between the two models, systems designers can engage youth in ways that are aligned closely with their existing practices, and connect them to dutiful forms of citizenship (such as voting and news consumption) that remain important components of civic engagement.

In addition, Bennett⁶ explains the weaknesses of today’s civic

education, which, if offered at all, has remained primarily textbook based — a medium far removed from digital technologies and online communities. According to Bennett, the curriculum is often “stripped of independent opportunities for young people to embrace and communicate about politics on their own terms.”⁶ To address this shortcoming, he argues that civic education should accommodate youth practices and spaces. He also invites educators and other stakeholders to rethink “politics and the political” as youth continue to push the boundaries of participation with digital and social technologies.⁵ While there have been online digital media environments designed for youth civic engagement, Bennett et al.⁶ argue that their goals are often too narrow, and the structure too top-down, for broad, independent forms of engagement. Instead, they urge designers, educators, and others who interact with youth to focus their efforts on sites that young people already participate in and that offer creative and social spaces for engagement, such as Facebook and YouTube.

In this paper, we explore the forms of civic engagement that can occur in creative and social online spaces, focusing specifically at the Scratch Online Community. We define civic engagement as working to improve one’s community.⁷ Members of the Scratch Online Community work to improve their community in a variety of ways, depending on how they appropriate the site’s functionalities. We focus on three research questions:

How do children engage in civic discourse and expression with their peers within the Scratch Online Community?

How do such expressions affect this community?

What lessons can we distill for educators and designers who want to encourage children to engage in civic life, rather than dissuade them?

2. RESEARCH SETTING

Launched in 2007, the Scratch Online Community (see Figure 1a) enables children, primarily between the ages of 8 and 16, to share

interactive media such as games, stories, and animations created with the Scratch programming environment (see Figure 1b).⁸ As of September 2016, Scratch members had shared more than 16.3 million projects, and had exchanged over 87.4 million project comments (see endnotes). Apart from uploading projects and commenting on them, members of the Scratch Online Community can also build upon, or remix, each other's projects. Members can download another member's project, modify it, and share it again on the Scratch website as a remix. Community members can also collect and curate projects in a "project gallery" page, and participate in community-wide discussions through an online forum. Like other content sharing sites with social networking features, these creative and discursive spaces have emerged as "digital publics"⁹ where youth connect, discuss, and mobilize. What is interesting about the Scratch Online Community in the context of broader conversations about social media and political mobilization is the very young age of the Scratch population: primarily ages 8–16. A majority of the members of the community are well below the legal voting age, and many are preteens.

The Scratch Team at MIT designed and continues to maintain the website. A subset of the Scratch Team moderates the online community, answers questions, responds to reported content, and explains community values to members. In general, the Scratch Team moderators work closely with the site members to maintain a friendly and respectful environment. The Scratch Online Community Guidelines (see endnotes) articulate how members can also help maintain this environment, from offering constructive feedback to giving credit.

3. CASE STUDY SELECTION AND ANALYSIS

To address our research questions, we developed qualitative case studies of a several acts of civic engagement in the Scratch Online Community. Case studies enable us to deeply explore a particular act and its development over time. We have been involved in the design and support of the Scratch community for more than two years, and have facilitated numerous user workshops and conducted several studies of community dynamics. Throughout this time, we have noted a number of civic acts within the community; we drew on this steadily growing archive of examples for case studies. We ourselves, as researchers, did not intervene in these activities; nor did we engage with the concerned members — however, in some cases, the moderation team (with whom we interact) intervened. We describe these actions by the moderation team in the relevant case studies that follow. We also interviewed the Scratch Community Coordinator, who oversees the moderation of the Scratch Online Community, to gather additional insight and suggestions for case studies.

We were aware of the fact that our work was potentially ethically sensitive, given that children were involved. Our research protocol was approved by our Institutional Review Board (IRB), and we took additional steps to ensure the anonymity of our research participants, to the fullest extent possible. All the content that we describe and analyze in this paper is public, and anyone with access to the Internet



Figure 2. A gallery created by a Scratch member to collect Scratch projects expressing support and condolences for the people of Japan.

can potentially access it. In such a scenario, to ensure that the subjects of our case studies are not trivially traceable (through, for instance, a simple Google search), we slightly altered (without substantively changing) the text of any content that we reproduced verbatim. Additionally, we blurred all usernames in our screenshots. Finally, in line with the protocol submitted to our IRB, we changed usernames when we referred to specific members.

We sought case studies of various civic engagement activities from the two years between Fall 2010 and Spring 2012, and analyzed them for answers to the following questions: (1) What motivated Scratch members to act in the community? (2) How did they leverage the features of the Scratch website for their goals? (3) How did the rest of the Scratch Online Community respond to their actions? (4) How did the Scratch Team intervene or respond to the civic actions? We selected five case studies to demonstrate a wide range of civic activity that occurred on the site during this time period. We studied each event closely, and documented comments, projects, galleries, and other artifacts created by participating Scratch members. We also collected any relevant Scratch Team moderation notifications to Scratch members, as well as Scratch Team emails or meeting notes about these events. We used open coding to identify motivations, website uses, community reactions, and Scratch Team interactions. As we developed the five case studies, we conducted a cross-case analysis to explore similarities and differences in the data.

4. RESULTS: CASE STUDIES OF CIVIC ENGAGEMENT

We found a wide range of approaches to civic action in the Scratch Online Community. For example, our first two case studies, about the Japanese earthquake and animal testing, focus on issues in the world at large, while the remaining three case studies involve Scratch members trying to improve the Scratch Online Community itself. We explored civic practices that reveal young Scratch members' desires to raise awareness, to encourage particular actions, and to participate in community governance. In each case study, we describe how Scratch

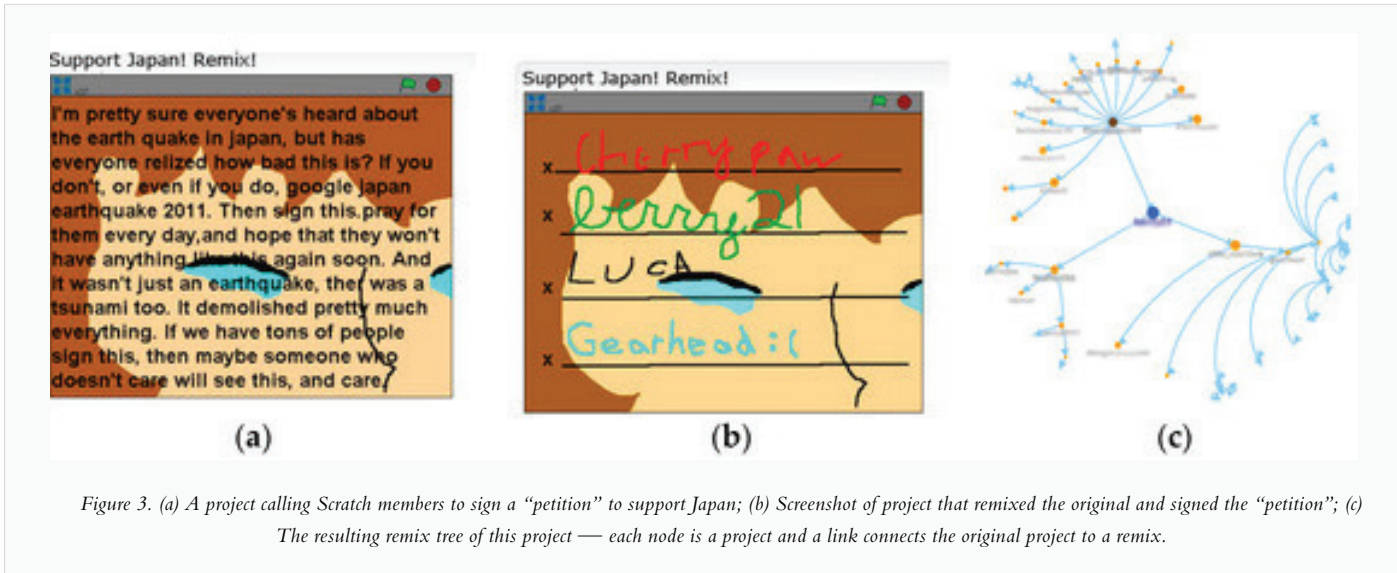


Figure 3. (a) A project calling Scratch members to sign a “petition” to support Japan; (b) Screenshot of project that remixed the original and signed the “petition”; (c) The resulting remix tree of this project — each node is a project and a link connects the original project to a remix.

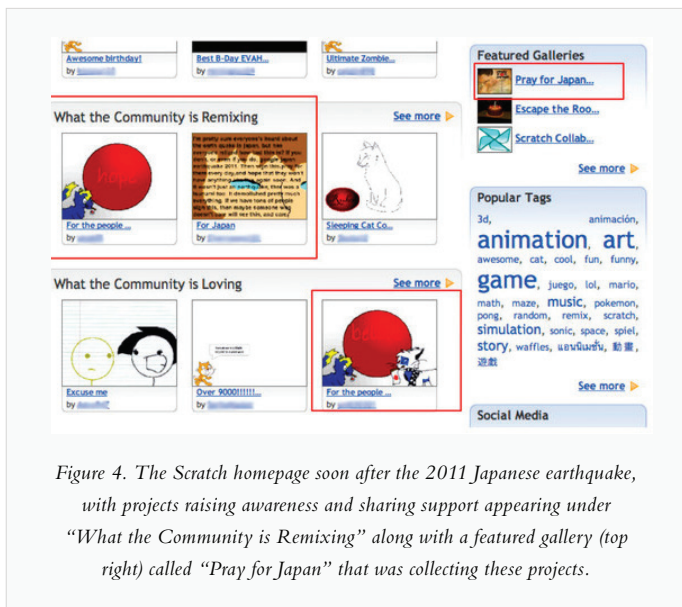


Figure 4. The Scratch homepage soon after the 2011 Japanese earthquake, with projects raising awareness and sharing support appearing under “What the Community is Remixing” along with a featured gallery (top right) called “Pray for Japan” that was collecting these projects.

members expressed themselves and engaged with their peers, and how the community reacted as a result.

4.1. Connecting in a Time of Crisis

When a 9.0 scale earthquake just off the coast of Japan devastated the country¹⁰, members of the Scratch Online Community responded by creating and sharing projects. These ranged from those that expressed sadness and shock, to those trying to spread optimism and hope. A Scratch member from Japan created a project gallery and added over a hundred projects created by other Scratch members, as shown in Figure 2.

In addition to creating original projects in response to the earthquake, another member called on her friends to remix her Scratch project, and to sign her “petition” to spread hope for the people of

Japan. She hoped that with enough signatures and Scratch members remixing her project, her project could raise awareness about how devastating the earthquake was. Figure 3a shows her original project and the petition that asked for Scratch members’ signatures. As her friends remixed her project, other members began to notice and remix as well. Figure 3b shows a screenshot from a remix by another Scratch member, and Figure 3c shows the resulting remix tree, with her project in the middle and links pointing to other remixed projects. Each node in the tree represents a project, and every time a project in that tree is remixed, a directed link connects the original to the remix:

Soon, her project became the top remixed project that week, and appeared on the Scratch website homepage, a central page that is highly visible to all Scratch users. Once it was on the homepage, the rest of the community was able to see her project. Figure 4 shows her project on the homepage, alongside other popular projects created in support of Japan:

The project comments also became a medium through which Scratch members tried to make sense of the disaster. Some members first learned about the disaster through these Scratch projects, and posted project comments to ask for more information. Other members shared what they were doing in real-life to support relief efforts, from making family donations to participating in community fundraisers. Still others tried to encourage members to go beyond making and remixing projects and commenting, and to donate to various relief organizations such as the Red Cross.

As the number of projects continued to grow, Scratch Team moderators decided to feature the gallery on the Scratch homepage (see Figure 4). These projects and the gallery, along with the discussions they produced, became vehicles for members to connect during this crisis. They also became a way for members, especially those interested in Japanese culture, to collectively make sense of a disaster that affected the entire country and reverberated transnationally. This example highlights how Scratch members use the site’s creative features to build digital publics with their peers, and connect over

Animal Testing~The truth uncovered~



Figure 5. Scratch project raising awareness on animal testing.

issues they feel strongly about.

In this case study, we see an example of how children in an online social community, through their own agency, engage with a significant and tragic event in the wider world. Through this process of engagement, they raise awareness about the event and amplify their message by appropriating and utilizing the affordances provided by the technical system that powers the social community. They also produce discourse with their peers, collectively make sense of what has happened, and identify how they can help.

4.2. Raising Awareness of Injustices

Scratch members often create projects to protest against practices and policies that they disagree with, or consider to be unfair, such as animal testing. In addition to creating projects, Scratch members also amplify their messages by inviting their peers to remix their projects. For example, one project started off with the message “Animal testing, the truth uncovered: Please read on to know what animal testing really is and why it is really unnecessary.” Then, the project displayed a set of graphic, gory images of animals being used for testing. One of the images showed a picture of a rabbit with parts of its skin removed, revealing its ribs and flesh (Figure 5). The project ended with a longer explanation of why animal testing is wrong, immoral, and inappropriate:

For the moderators of the site, dealing with this type of project is challenging. As the Scratch Community Coordinator we interviewed put it:

On one hand, we want Scratch to be a way for kids to protest things in their world that they think are objectionable or otherwise wrong, and so we want to encourage that sort of activism on Scratch. We like that it is a medium that can be used in that way. On the other hand, we have certain standards that we have to maintain because the site is viewed by kids who are often very young, and we don't think it's appropriate to show images



RE:CONSTRUCTIONS 15 YEARS LATER

The old timers in our midst may remember the re:constructions project (cmsw.mit.edu/reconstructions), from 2001. Comparative Media Studies, then in its second year of operation, pulled the larger community together and reflected on what happened on 9/11, what it meant, and in the process demonstrated some of the potentials both of CMS and its notion of applied humanities.

Looking back on the project, with its 2001 aesthetic and now partially broken links, it's still remarkable to see how much we were able to do within a few days (although the project continued to simmer for a year or two more). It's something of a time capsule, with responses to the events more or less as they happened and before they codified into a well-rehearsed narrative. It's hard to give a sense today of what this meant for the larger CMS family at the time, but just looking at the range of voices and perspectives joined in common cause might give a hint. CMS was and remains an incredible community, and the work emerging from this group continues to distinguish itself by facing the public and making a difference.

— William Uricchio, Professor of Comparative Media Studies

of animals that have limbs missing or are being vivisected in various ways. We don't think kids [as young as 7 or 8] have the level of maturity that it takes to understand the issue — more likely, they would be traumatized.¹¹

For most projects with graphic images, the general reaction from the moderation team is to remove them, and send the creator a notification message that articulates these concerns. A sample notification message:

We support your right to speak out about important issues like animal testing. However, we felt the images used in your recent project were too violent and scary for younger Scratchers. (Keep in mind that the Scratch website is viewed by children as young as 5 years old.) Please feel free to share projects about this issue that do not contain violent images. Use the contact us link to discuss this if you have any questions. Scratch On! — Scratch Team.¹²

In this notification, the moderation team tried to clarify that there is nothing wrong with expressing an opinion about an issue, but there are limits on what is appropriate for a website that is visited by a very young age demographic.

Reactions to these notifications varied. Sometimes authors pushed back, especially those who were emotionally attached to these issues. One author complained to the Scratch Team, saying that censoring such projects was unfair and that she should not be stopped. In other cases, the authors re-uploaded newer versions of the project, with some of the graphic elements removed.

From the perspective of the community, reactions varied as well. Some members supported the removal of what they saw as imagery that was too graphic for the Scratch website, while others disagreed. In general, there was overwhelming support for the message of such projects — with comments like: “That’s so wrong!!!!!!!!!!!!!! I’m remixing!” As with the previous case study, some members also shared information about what they were doing in the offline world about the issue, with comments like: “Me and my friend sold lemonade and earned \$150 in a day, and donated it to a place that’s fighting animal cruelty!” Others, however, expressed concern that they might get banned for remixing the project because of the graphic content’s possible inappropriateness (“[...] I would remix, but I might get flagged and banned...”).¹³ In one case, a parent contacted the Scratch Team, describing how her child became deeply upset after seeing a graphic animal testing project.

Raising awareness and rallying support against animal testing is another example of how Scratch members use the medium of Scratch projects, comments, and forum discussions to highlight injustices they feel strongly about. Pippa Norris describes this category of activism as “cause-oriented,” where activists “pursue specific issues and policy concerns among diverse targets, both within and also well beyond the electoral arena.”¹⁴ For many of these projects and discussions, moderators (and members) have to walk a thin line between freedom of expression and ensuring a safe environment for Scratch members of all ages.

4.3. Lobbying for Community Improvements

Members of the Scratch Team manage the design of the Scratch programming language and its online community, and part of this work is to generate and discuss new ideas to enhance or extend Scratch, which may become implemented as new features. We found many examples of Scratch community members sharing their own ideas and arguments for community improvements, using a variety of practices to lobby for changes in how the online community functions. Their lobbying practices varied considerably, ranging from emails to the Scratch Team to forum threads that demonstrate community mobilization.

In some cases, Scratch members created and remixed Scratch projects to help illustrate their points, especially for “feature requests” for the Scratch website. These projects typically consisted of elaborate mock-ups of interface and interaction designs, demonstrating how the new feature might look and function. Figure 6 shows a Scratch project that is an interactive mock-up illustrating a design for an improved

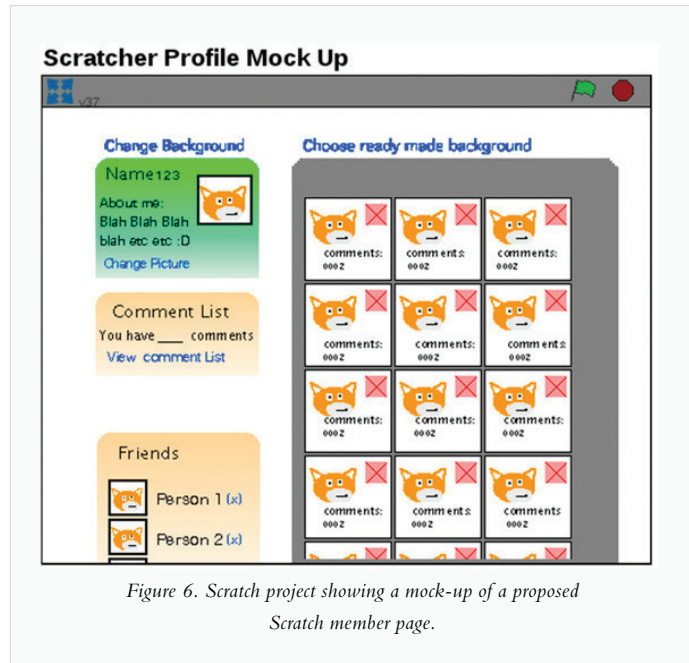


Figure 6. Scratch project showing a mock-up of a proposed Scratch member page.

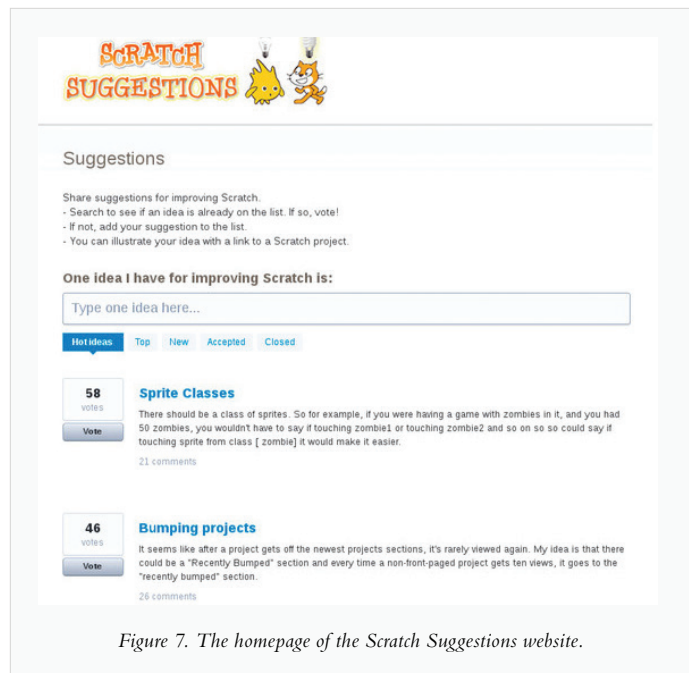


Figure 7. The homepage of the Scratch Suggestions website.

and customizable Scratch member page.

To explicitly support this kind of engagement, and to have a dedicated space for discussing ideas, the Scratch Team launched an additional website in 2010 called Scratch Suggestions (see Figure 7), where Scratch members could submit ideas and others could vote and comment. Soon, this site became one of the primary avenues for Scratch members to voice their demands. However, a significant amount of activity continued to take place on the main Scratch website, where members with suggestions campaign for votes for their

While the website supports automatic attribution when a project is remixed (see Figure 8), studies suggest that this feature is not enough for members, and that manual credit given by the remixer is more valued.¹⁷

Some community members have protested this remixing policy, through creating projects or posting comments about the topic. Despite strong disapproval of remixing from some community members, the Scratch Team continues to uphold remixing in the Scratch community. In addition to maintaining the policy, the Scratch Team added a section on the homepage (the most visible page on the Scratch website) to show the top remixed projects, as a way to promote remixing. The Scratch Team also engages in discussion about remixing in project comments and forum discussions, where they often describe the value of building on top of the work of others and point to how Scratch members' work already builds on the work of other creators. This engagement with the community also involves facilitating the efforts of Scratch members who do support remixing. For example, one member created a project "petition" to encourage other members to show their support, as shown in Figure 9. A Scratch Team member remixed her project, which then amplified her petition even further.

While the Scratch Team does draw a line between remixes and exact copies, and notifies project creators of exact copies in order to promote giving credit to the appropriate Scratch members, these efforts are not enough for some. Scratch members have gathered together to form vigilante groups to identify and rally against "copiers" and "stealers." One such group, called the Scratch Security Services (SSS) was founded by a 12 year old member; the group at the time of the study consisted of over 20 members. To communicate and coordinate, members appropriated a project gallery (as shown in Figure 10) and used the gallery comments to discuss remixes and

offenders. Members also created Scratch projects to come up with "Copy Cat Cop badges" to associate themselves with the SSS. Across the community, members examined remixes to determine if projects were copies before reporting the project to the Scratch Team. The group also helped members settle conflicts over projects, and asked members who copied projects to provide credit to the original creator. Other vigilante groups formed to attack members who were accused of copying. These groups flooded the accused project with aggressive comments, and even created Scratch projects to rally more members against "copiers."

In response to vigilante groups, Scratch Team moderators intervened in ways that ranged from facilitation to account bans of vigilante members. For the Scratch Security Services, who practiced moderation in their efforts, with a motto to "prove before you accuse, ask before you tell [the Scratch Team]," Scratch Team moderators helped in their efforts to encourage creators to give credit appropriately. For the more aggressive groups who attacked members, moderators temporarily banned the accounts until the attacker apologized and recognized that their actions violated community rules. Banned accounts lost access to their account privileges, such as uploading projects and leaving comments, essentially losing all social connection to the online community.

Remixing continues to be a feature of the Scratch website. However, it also continues to be a contentious issue, and members have strong and divergent feelings about remixing and ownership. This case study illustrates how young Scratch members are willing to defy community policies to voice their opinions, and at times even to risk their own account access to act according to their beliefs. The "vigilante" groups also highlight how members can self-organize within the website to form their own counterpublics.¹⁸ In the project galleries, members can develop their own group identity, space for discourse, and organizational structure to mobilize and take collective action.

4.5. Participating in Community Governance

While Scratch Team members moderate the community, Scratch members can also join the moderation team by becoming Community Moderators. Other online communities such as Wikipedia have set up both formal¹⁹ and informal²⁰ means for members to participate in policy decisions and community governance. Such forms of engagement promote not only a healthier community, but also deeper participation among members. Community Moderators answer questions, give feedback, help explain community values, and clean up the forums by removing off-topic posts or inappropriate content.

The Community Moderator program initially began as a way to promote Scratch members who were actively involved in helping the community by answering questions about Scratch, directing members to useful resources on the website, and reporting inappropriate content and behavior to the Scratch Team. A private discussion forum was created for moderators to discuss issues, especially how to address complex community topics. Moderators now regularly use this private forum to discuss issues with other moderators and Scratch Team members. Because community moderators are also



Figure 10. Gallery of one of the vigilante groups.

active Scratch participants, they have perspectives that Scratch Team members may not have. These discussions then inform actions and policies for broader implementation.

Originally, Community Moderators were hand-picked by the Scratch Team. However, as the role continued to evolve, the Scratch Team decided to implement community elections. Scratch members can nominate themselves to become Moderators. The Scratch Team then picks from the pool of nominees to determine a final set of candidates that the community votes on. The Scratch member with the most votes becomes a member of the moderation team. The Moderator elections have become a community event, especially in the website discussion forums, where most of the election occurs. Nominees post long messages in the forums to explain why they want to become Moderators. Some nominees create their own web pages or media to campaign and gain support from community members. Figure 11 shows a sample image created by a Scratch member to promote his community moderator nomination.

Recently, Scratch Team members have discussed expanding the role of community moderators beyond the website discussion forums and into the larger online community. For example, a recent initiative



led by the Scratch Community Coordinator in collaboration with a community moderator aims to create a “Welcoming Committee” of Scratch members to connect with new members and help them get situated in the rapidly growing Scratch Online Community.

Since its inception in 2008, and with the subsequent implementation of elections, the community moderator role has become a way for members to become more deeply involved in the online community, in a way that is more formally structured than the case studies

Case Study	Expression	Engagement	Reactions
Connecting in a Time of Crisis	Showing support and sympathy for victims of Japanese earthquake and tsunami	Raise awareness through projects and remixing; Collectively make sense of the disaster via comments	Amplified message as projects gain popularity; Facilitation by Scratch Team
Raising Awareness of Injustices	Protesting against animal testing	Raise awareness by creating projects; Demonstrate support within the community through comments	Amplification by remixing; Push-back from Scratch Team for certain projects
Lobbying for Community Improvements	Improving community infrastructure	Submitting ideas to the Scratch Team through projects, Suggestions website, and email; Campaigning for support on ideas through forum threads; Voting for ideas through the Suggestions website; Discussion on forum threads	Support in the form of votes, comments, forum threads; Implementation from the Scratch team in some cases
Protesting against Community Policy	Protecting intellectual property from unwanted remixing by other creators	Creating projects and remixes; Commenting; Forming vigilante groups	Facilitation of pro-remixing, pro-credit groups by Scratch Team; Banning members who aggressively attack others who remix
Participating in Community Governance	Wanting to do more for the community	Becoming a community moderator by participating in elections	Involvement of Scratch members in maintaining a friendly community; Scratch Team expanding the role to the entire community from the website discussion forums

Table 1. A summary of our five case studies across the expressions, engagement, and reactions from the Scratch community.

described earlier. Through this participatory governance mechanism, the Scratch Team and the community moderators have created a way for members to take on more responsibility, and to develop a greater sense of community ownership as they work together to maintain a respectful and friendly online space.

5. DISCUSSION

The Scratch website was not specifically designed to encourage children to participate in civic action. It was targeted towards members of a young demographic who wanted to easily share creations that were personally meaningful to them with other creators from all over the world. This design was influenced by Seymour Papert's concept of Constructionism²¹, where Papert argues that learning happens best when people are actively building things that are personally relevant to them, especially when they are building with or for others.²² When members do decide to participate in civic engagement within the Scratch community, they do so on their own terms, creatively using the features and affordances of the Scratch platform.

As we investigated our research questions, we found Scratch members creatively expressing issues that were meaningful to them, and engaging with other members of the community around these issues in various ways. Together with these forms of expression and engagement, we also saw that the reaction from the community spanned from amplifying a Scratch member's message by remixing and promoting to the front page, to the Scratch Team intervening when such actions violated community guidelines. We summarize these case studies across the forms of expression, engagement, and reactions from the community in Table 1.

Each of these case studies showcase individualized forms of civic engagement, with young people expressing their beliefs and engaging in civic action on their own terms. Under Bennett's actualizing vs. dutiful citizenship model, where actualizing supports personalized citizenship and dutiful supports more traditional forms of engagement, all of these case studies can be considered examples of actualizing citizenship. However, instances of dutiful forms of citizenship can be seen across these case studies as well, especially in those where members are engaged in internal Scratch community issues. In the case of "lobbying for community improvements," members vote and campaign across the community to educate and gain support for their suggestions. In protesting remixing policies, members form their own counterpublics and encourage their peers to join. These efforts illustrate the strong sense of duty that some Scratch members have when they participate in this community.

While instances of actualizing citizenship in the community tend to emerge organically, actions more aligned with the dutiful citizenship model were explicitly supported by the Scratch Team, either in the form of the affordances of the tools available to community members (the Scratch Suggestions website), or through active scaffolding of dutiful activities (community moderator elections). As a caveat, it should be noted here that even if explicit structures, affordances and support are not available, there is a significant tendency for members of the community to appropriate existing system compo-

nents and use them to fulfill their own purposes. For example, while the Scratch Team created the Scratch Suggestions website, members continued to use the website discussion forums and email to lobby the Scratch Team for change.

In answering our third research question, "What lessons can we distill from these narratives for educators and designers to engage children in civic life?" we reflected on the two problems presented by Bennett: the declining relevance of civic education, and how to bridge between actualizing and dutiful citizenship models. In light of the five case studies, we provide the following recommendations for designers and educators interested in enhancing their environments and learning experiences to engage youth in civic life.

5.1. Connect to Where the Learners Are and What They Are Already Doing

Bennett argues that civic education needs to connect with the emerging creative and social practices of young people. Unfortunately, much of civic education today has tended to be far from the "digital publics" that young people have created for themselves. Instead, civic education tends to be textbook-based and regimented. As these case studies illustrate, Scratch members express their views on issues that are personally meaningful to them and share these expressions through their social connections. By encouraging young people to connect to personally meaningful topics, and by enabling them to express their opinions and actions through tools and practices that they are comfortable with, designers and educators can create an environment that is conducive to civic engagement.

5.2. Facilitate Rather than Dictate

In a study of online youth engagement projects in Britain, Coleman developed two models to describe the ways in which organizations foster youth citizenship. In a managed model, youth are seen as citizens to be trained and cultivated to participate in traditional forms of engagement. By contrast, in an autonomous model, youth are seen as citizens to be empowered and encouraged. In our case studies, the Scratch Team can be seen as an organization that manages the website, but does not dictate the expressions and forms of engagement that young people can create and participate in. However, the Scratch community is not a completely autonomous model, since members must observe the community guidelines or face account bans. In the "protesting community policies" case study, a number of vigilante groups formed to prevent the copying of Scratch projects. Some vigilante groups targeted and verbally attacked members they thought were "stealing." Because being respectful is a community guideline, the Scratch Team responded by banning the members of these vigilante groups. However, other vigilante groups formed that reported potential project copies to the Scratch Team to take care of, rather than taking it upon themselves to act against other members. In response, the Scratch Team engaged with these groups to facilitate their collective efforts, rather than to shut them down. It is not enough to adopt one model or the other to support youth citizenship; instead, it is key to develop a model where youth efforts are facilitated rather than either dictated or ignored.

5.3. Encourage a Sense of Ownership over the Community

Citizens whose practices fall under the dutiful model have a strong sense of civic obligation to engagement in their communities. While the case studies all illustrate members pursuing issues and activities that are personally meaningful to them, there are also examples of dutiful engagement, particularly in the case studies that revolve around Scratch community related topics. In these cases, we found that the Scratch members had a sense of ownership over the community. Being able to influence, even in part, the community's governance mechanisms and infrastructure leads to more engaged and genuine civic action. This can be established both by policy (encouraging feedback and input from members), and by design (affordances for suggestions and ideas). The community governance model can also be modified so that members can participate in roles with increased responsibility and influence (elections for moderators).

5.4. Support Channels for Dutiful Citizenship

Explicit channels for dutiful citizenship are useful to scaffold traditional civic engagement processes, such as voting. On the other hand, systems that support actualizing citizenship by enabling individual expression can foster more personalized civic engagement. These spaces of personal expression can also be opportunities to connect young people to dutiful practices. In the case study of lobbying for community improvements, members who had ideas for the Scratch Online Community could share their idea on the Suggestions website and have a digital space specifically carved out for other members to discuss and vote on their suggestion. Seeing other ideas within the Suggestions website can also be an encouraging experience for members to voice their opinions. Having structures in place for members to engage in traditional civic practices, while supporting their engagement in personally relevant topics, can help bridge the two citizenship models.

6. CONCLUSIONS

At the time we began this research project, the world was commemorating the tenth year since the September 11 attacks on the United States. Echoes of this commemoration could be seen on the Scratch Online Community as well, with projects, forum threads, and comments expressing support and empathy for those who had been affected by the events. Given that the average age of a Scratch member is 13, many of the discussants were very young, some not even born yet, when the attacks took place. In addition to expressing recognition of the anniversary, Scratch members took this as an opportunity to make sense of the events, explore personal feelings, and share stories they had heard from family and friends. These interactions in the Scratch community, like the five case studies we described above, highlight how this creative and social platform enables children, many otherwise too young to participate in traditional forms of civic action, to express themselves and engage in the wider world they are growing up in. In addition, their civic practices, from debate, to protesting, to community electoral politics, to collective action, showcase how this medium for personal expression and social connection can be a critical

space to support forms of actualizing and dutiful citizenship. For a young audience whose views of citizenship and engagement are just taking shape, Scratch Online provides opportunities to take action, to connect, and to impact their communities through civic practices that may be otherwise unavailable to them.

Designers and educators can learn from the experiences and practices that young people are crafting for themselves when they engage in their online and real-life communities. Instead of dictating the topics for discussion and the ways in which young people engage with those topics, designers can encourage youth to connect with personally relevant issues and facilitate multiple forms of expression and engagement.

Finally, to help connect these personal and individualized forms of engagement (actualizing citizenship) to more traditional forms (dutiful citizenship), designers and educators can help foster a sense of community ownership. By supporting channels for dutiful citizenship by way of policy, design decisions, or changing governance models, designers can create channels that foster dutiful citizenship while connecting with youth interests. As young people leverage the affordances of digital media to push the boundaries of civic engagement, it is imperative that designers and educators keep up with, and respond to, these new and evolving forms of youth-generated digital expression and action.

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AUTHOR CONTRIBUTIONS

Ricarose Roque and Sayamindu Dasgupta contributed equally to study design, data collection, analysis, and writing. Sasha Costanza-Chock contributed to literature review, analysis, and writing.

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NOTES

This particular study was conducted from Fall 2010 to Spring 2012; at the time Scratch had more than 2.7 million projects and more than 10 million comments.

See Scratch Community Guidelines.⁹

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FUSION: JOINING THE QUEST FOR THE RENEWABLE ENERGY'S "HOLY GRAIL"

Milo Knowles, '19

Edited by lecturers Jared Berezin and Cynthia Taft, CMS/W publishes Angles, an annual collection of the best writing from MIT introductory writing subjects. In various forms over the decades, MIT has required undergraduates to take communications-intensive subjects, and one of those is "Science Writing and New Media: Writing and the Environment," from which this piece by Milo Knowles comes. His assignment was to "imagine that the editors of Scientific American have contacted you and asked you to bring their readers up to date on research on a major environmental issue. The magazine published an article on this topic some time ago, but a lot has happened in the intervening years. The editors are hoping for an article that is both engaging and enlightening."

Support for Angles comes in part from the Umaer Basha Fund in Writing and Humanistic Studies, and we encourage you to learn more about the fund and contribute at cmsw.mit.edu/support-angles.

Imagine a world without fossil fuels, where humans can produce an emission-less, inexhaustible, and completely renewable source of energy. This is the utopian world of fusion energy. Not only does fusion have the potential to end the threat of global warming, but it can be supplied by earth's most plentiful fuel source: water. It produces no toxic byproducts, only helium, which as TIME writer Lev Grossman puts it, "we can use to inflate the balloons for the massive party we're going to have if it ever works."

Fusion energy has long been known as the "holy grail of renewable energy," but like the Holy Grail, it is elusive. The long-standing joke about fusion is that it is thirty years away, and always will be. Although the underlying concept of generating energy through nuclear fusion has been around since the 1930s, scientists have yet to achieve a fusion reactor that can produce more power than it requires to run.

The historical difficulties in attaining a viable fusion reactor are due

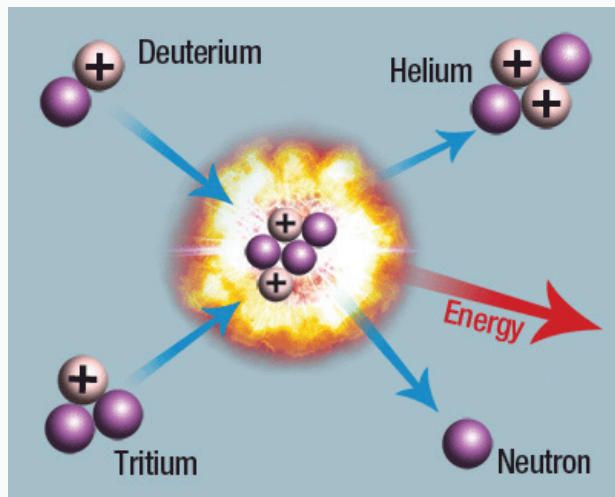
to the immense logistical challenges associated with fusion reactions. In his 1995 Scientific American article on fusion, Harold Furth summarizes the challenges of fusion energy. In essence, fusion reactors attempt to recreate the reaction that occurs in our sun: a superheated, extremely dense ball of plasma, inside of which hydrogen atoms fuse to become helium, releasing vast quantities of energy. Making plasma in the first place is difficult; although 99% of the matter in our universe is plasma, according to Curt Supplee in *The Plasma Universe*, it's difficult

"The joke about fusion is that it is thirty years away, and always will be."

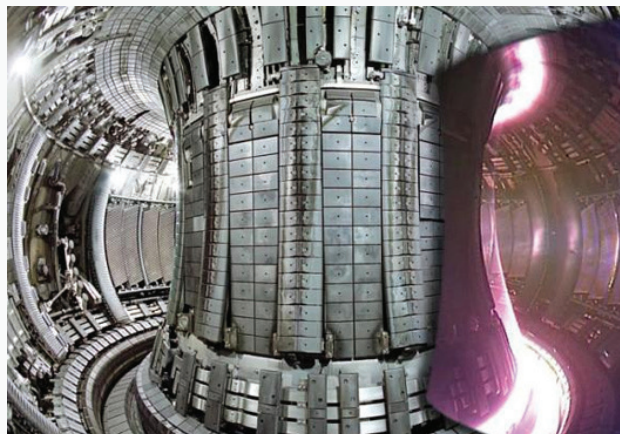
to make on earth. Getting it to the point where it can undergo fusion is more difficult by an order of magnitude.

The nature of fusion reactions creates three overwhelming challenges for scientists: generating plasma that is hot and dense enough to undergo fusion, containing the wildly energetic plasma, and efficiently collecting the energy that is released during fusion. So far, the lack of a robust solution to all three of these problems has prevented fusion reactors from producing net energy.

How have scientists attempted to solve these three problems in the past? Traditional fusion energy research has been centered on the tokamak. In his paper on tokamak design optimization, Tom Luce describes their operation. Tokamaks use a doughnut-shaped chamber (more formally known as a toroid) covered in powerful electromagnets to confine the plasma. The strong magnetic field inside of the toroid accelerates the plasma through a helical path, generating the heat and pressure necessary for fusion to take place. The thermal energy that is



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The inside of the Joint European Torus (JET), which is currently the largest tokamak in operation. Image: EFDA-JET

released creates steam, which powers turbines to generate electricity.

In a report on the history of tokamaks, Alan Azizov writes that by the 1990s, fusion research in tokamaks was widespread: the T-15 tokamak in the USSR, the J-60 in Japan, TFTR in the U.S, and the JET (Joint European Torus) in Europe. In 1997, the JET Fusion Reactor returned about 65% of its total input energy through fusion, the highest efficiency recorded at the time. However, Azizov concluded that tokamaks still needed a lot of improvement if they were to reach the break-even point, let alone produce a net gain of energy.

Five years before JET achieved its record-breaking performance, in an effort to create the world's first tokamak fusion power plant, a joint force involving the U.S, Russia, Japan, China, South Korea, India, and the European Union began designing what would be the world's largest tokamak reactor, called ITER (International Thermonuclear Experimental Reactor) in 1992. While ITER has potential to be the first fusion reactor to produce net energy — in fact, its designers claim that it will produce ten times the power it consumes — its progress has been slow. In his TIME article on the future of fusion energy, Lev Gross argues that the magnitude of the project, combined with the bureaucracy associated with the dozen or so participating countries, is responsible for pushing back its expected operational date from 2016 to sometime in 2027. He even regards this 2027 deadline with skepticism.

It turns out that missed deadlines are a recurring theme. Another U.S. government fusion project, Lawrence Livermore Lab's National Ignition Facility, which uses high-powered lasers to initiate fusion reactions, was delayed by five years. The construction began in 1997, was supposed to be finished by 2004, but was delayed until late 2009. It wasn't until 2012, fifteen years after the project's start, that the facility was fully operational for testing.

The exorbitant cost of these government fusion projects is even more disheartening. The National Ignition Facility cost \$5 billion,



The construction site of ITER in southern France. Image: ITER.

twice its original proposed budget. To put things in perspective, that's more than the \$4.4 billion construction cost of the Large Hadron Collider. ITER's cost is even more appalling. According to Grossman, ITER's budget has risen from \$5 billion to \$20 billion since 1992. The National Ignition Facility and ITER aren't the only examples; these kinds of huge costs and missed deadlines have become characteristic of nearly all large-scale government fusion research.

Today, however, the whole paradigm of fusion reactors is shifting, as startups are taking fusion research into their own hands.

In 2011, Lockheed Martin's "Skunk Works" released plans for a revolutionary Compact Fusion Reactor called "T4." Dr. Thomas McGuire, who holds a Ph.D. in Aeronautical Engineering from MIT, leads the fusion reactor's team. In an interview with Guy Norris of

Aviation Week, McGuire explains that “I studied [fusion] in graduate school where, under a NASA study, I was charged with how we could get to Mars quickly.” While conducting his research as a graduate student, McGuire realized that there was very little literature on the use of fusion energy in space missions, so he decided to change that. Today, his research efforts have grown into the T4 reactor at Skunk Works.

In contrast to ITER, which will be over one hundred feet tall, and cost at least \$20 billion, McGuire and his team aim to produce a 23’x43’ unit that will be transportable, cheap, and fully operational in less than 10 years. Like ITER, the T4 reactor is designed to achieve a ten-fold energy return, but at a fraction of ITER’s size and cost.

The T4 team claims that their reactor will be viable due to its novel design: it moves beyond the design constraints of traditional tokamaks and has a radically different approach to magnetic confinement of the plasma. The reaction chamber is a sphere, inside of which superconducting coils generate a magnetic field that compresses the plasma in the chamber’s center. This method of confinement eliminates the problem of most tokamaks, instability, which is caused by rapid spinning and oscillation as plasma whirls around in a helix. The Compact Fusion Reactor exploits the plasma’s own turbulent motion in order to contain it; as plasma shifts and tries to escape confinement, its own motion causes the magnetic force exerted on it to increase. This self-stabilizing phenomenon, which is largely due to the special configuration of electromagnets around T4’s reaction chamber, drastically improves the ability of the reactor to initiate and maintain a fusion reaction.

The T4 team also claims that their fusion reactor is so energy efficient that it can run on a mere 25 kilograms of hydrogen fuel per year. Someday, it might be used to power aircraft, ships, and even spacecraft, just as McGuire envisioned when he began the project.

Some companies haven’t completely left behind the familiar doughnut shape of the tokamak, however. In the U.K., a company called Tokamak Energy has been innovating a spherical tokamak design since the early 2000s. While the reactor is technically still a toroid, the inner core is so small that the reactor is practically spherical. Growing out of Culham Laboratory, where the JET Reactor recorded its impressive 65% energy return in 1997, Tokamak Energy has been researching and building small spherical tokamaks. According to Lee Hibbert, who published a review on spherical tokamak design, these tokamaks have a higher theoretical efficiency than their traditional toroidal counterparts.

In 2015, Tokamak Energy demonstrated that their latest spherical tokamak, called ST25, could sustain continuous plasma in the reactor for 29 hours, breaking the previous world record of 5 hours by an unprecedented margin. According to Alan Sykes, the leader of Tokamak Energy’s team, what enables their reactor to perform so efficiently for an extended period of time are high-temperature superconducting magnets, which can handle much higher electric currents than standard electromagnets. This nascent technology has allowed

Tokamak Energy to reduce the size of their reactors, simply because fewer electromagnets are needed for containment. Achieving a more compact design has not only allowed Tokamak Energy’s reactor to maintain plasma for a longer period of time, but also made energy collection more efficient.

While tokamak research remains promising, some companies have chosen to abandon the concept of the tokamak altogether, exploring novel designs for fusion reactors.

One such company, Tri Alpha Energy, has been secretly developing a type of fusion reactor called the “Colliding Beam Fusion Reactor.” In 1997, its founders, Norman Rostoker, Michl W. Binderbauer, and Hendrik J. Monkhorst, released a research report on the principles behind the reactor. By 2010, they had begun testing their first reactor, called C-2. Despite earning over \$10 million in funding for their project, the company kept its work hidden to protect proprietary information. Until recently, they did not even have a website. However, in 2012, Tri Alpha began to release information about their fusion research over the previous decade.

By 2015, their next generation C-2U reactor could sustain plasma

“I knew I couldn’t fight with the big labs; they had much more resources than me. I had to find a solution that was cheaper and faster. Magnetic and laser fusion reactors have shown that fusion can be done. As a power plant, I don’t think they are very good...collecting the energy was just an afterthought.”

at an unfathomable 10 million degrees Celsius for 5 milliseconds (for fusion reactors, this is actually considered a large timespan). For reference, our sun’s surface temperature is a mere 5,505 degrees Celsius. The only way the C-2U reactor can withstand plasma at such mind-boggling temperatures is by suspending the plasma inside of a magnetic field, so that it never comes into contact with the reactor’s walls.

There are several interesting ways in which Tri Alpha’s C-2U reactor departs from the traditional designs for fusion reactors. Rostoker and his team at Tri Alpha describe in a paper on their Colliding Beam Fusion Reactor that, while almost every other fusion reactor uses a mixture of deuterium and radioactive tritium (two isotopes of hydrogen), Tri Alpha fuels their reactor with deuterium and Boron-11. Reactions between deuterium and tritium eject tons of neutrons as a byproduct, which have a troublesome tendency to degrade materials and make them radioactive. This is why Tri Alpha uses Boron-11 instead — it is inherently more stable, and does not produce neutrons during fusion. The caveat is that Boron-11 requires

higher temperatures to undergo fusion. This is why Tri Alpha had to design a reactor that could heat plasma up to 10 million degrees.

Secondly, the way the C-2U initiates fusion is radically different from the familiar tokamak. C-2U is a Colliding Beam Fusion Reactor, which creates two small rings of plasma, called plasmoids, at each end of a long chamber, then slams them together at high speeds in the middle. Interestingly, the little plasmoids don't require giant, energy-thirsty electromagnets to keep them contained. The plasmoids naturally rotate, producing their own magnetic fields. These magnetic fields contain the plasma, mitigating some of the instability in plasma that plagues tokamaks.

Finally, the C-2U captures fusion energy much differently than its predecessors. In addition to capturing thermal energy with steam turbines, the C-2U has a unique energy-collection device called an inverse cyclotron. Fast-moving alpha particles that are produced by the fusion reaction spin through the cyclotron, inducing an electric current that can be captured and stored as power.

Tri Alpha isn't the only company that's been trying to smash plasma together to create fusion. In Redmond, Washington, a company called Helion Energy is building a reactor that is conceptually similar to the C-2U. Their reactor, simply known as the "Fusion Engine," has a long linear chamber like that of the C-2U, and it also produces fusion by slamming together little plasmoids at high speeds. However, it has an interesting twist: it's designed to run continuously, functioning like a power plant.

Chief Science Officer John Slough, who is also a professor at the University of Washington in the Plasma Dynamics Lab, describes the theory behind the Fusion Engine in a paper published in April of 2011. In the Fusion Engine, strong electromagnets pulse once per second, accelerating two helium-deuterium plasmoids to well over one million miles per hour by the time they collide in the center of the chamber. Once the plasmoids join in the center of the reactor, electromagnets compress them another time to a temperature above one-hundred million degrees Celsius. At this point fusion occurs, and deuterium atoms from the plasmoids fuse into helium atoms. Some of the energy that is released, along with the helium atoms that are produced in the reaction, is fed back into the next cycle of the reactor a second later. Once the Fusion Engine has started up, it no longer needs an external power supply to keep it running. Helion claims that their reactor is capable of returning eight times its input power.

The team at Helion is currently seeking \$35 million in funding to build a break-even prototype of their Fusion Engine in 2016. So far they've raised \$10.9 million. If all goes to plan, after demonstrating their break-even reactor in 2016, they will begin work on a commercial reactor capable of producing 50 Megawatts of power by 2022.

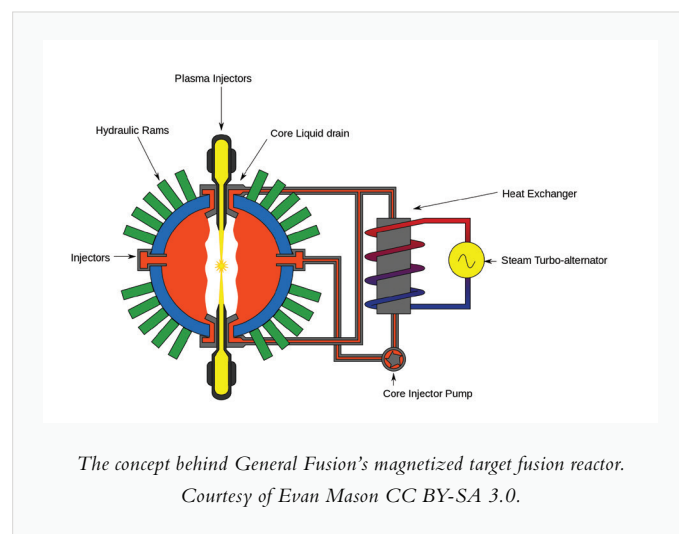
Another novel fusion-reactor concept comes from Canada-based General Fusion, which was founded in 2002 by Michel Laberge. In a

TED Talk, Laberge comments that:

When I started [General Fusion] in 2002, I knew I couldn't fight with the big labs; they had much more resources than me. I had to find a solution that was cheaper and faster. Magnetic and laser fusion reactors have shown that fusion can be done. However, as a power plant, I don't think they are very good... The people who made these reactors focused only on the fusion reaction, and collecting the energy was just an afterthought.

Laberge and his team have built their design so that it can function as a power plant, running continuously and collecting the energy that is produced as efficiently as possible. They call their reactor a Magnetized Target Reactor. In an article analyzing the performance of Magnetized Target Reactions, Michael Lindstrom, a Ph.D. in Applied Mathematics, explains how these kinds of reactors achieve fusion. Inside of General Fusion's Magnetized Target Reactor, plasma is injected into a spinning vortex of molten lead and lithium, and rapidly compressed by an array of pistons surrounding the spherical reaction chamber.

220 of these pneumatically controlled pistons ram the surface of the sphere at 200 miles per hour, sending an acoustic shockwave through the mix of molten metal and plasma. Due to the rapid succession of piston punches, and their powerful shockwaves, the molten lead and plasma mixture reaches fusion conditions. As an added bonus, the molten lead absorbs a lot of the heat from the fusion reaction, protecting the steel reaction chamber and making the reactor more robust.



There are no complex electromagnets involved; the fusion is driven entirely by the mechanical operation of the pistons.

There are several key advantages of General Fusion's Magnetized Target Reactor. The high-speed movement of the pistons is powered by compressed air, which is safe, reliable, and cheap compared to the massive electric pulses needed to power the electromagnets in most tokamaks. Because the piston array in General Fusion's reactor is driven by compressed air, the reactor can be operated at 1% the cost

of competing fusion reactors, almost all of which rely on costly electromagnetic systems. Should General Fusion's reactor work, it will be the most cost-effective fusion reactor to operate, and will make traditional tokamaks irrelevant.

Ironically, fusion reactors have seen slow progress over the last eighty years but have the potential to change the future of our planet almost instantaneously. It is this tantalizing possibility of a breakthrough that has kept fusion research going for decade after decade.

Ironically, fusion reactors have seen frustratingly slow progress over the last eighty years but have the potential to change the future of our planet almost instantaneously. It is this tantalizing possibility of a breakthrough that has kept fusion research going for decade after decade.

Now, however, the quest for fusion is largely powered by necessity. Faced with the threat of global warming, and the painfully slow progress of projects like ITER, entrepreneurs are taking on the challenges of fusion themselves, with their sights set on a future of sustainable energy.

With so many startups getting involved in fusion energy, and tackling the historical problems of fusion energy from every imaginable angle, the prospect of achieving a net energy gain from fusion reactors in the next decade has gone from doubtful to plausible. Now, the question isn't whether or not we will attain fusion energy, but who will be the first to do it? Fusion companies claim that their reactors can do the incredible — reaching temperatures a thousand times hotter than our sun, crashing balls of plasma together at millions of miles per hour — but can they translate their claims into reality?

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THE ABYSS

Marissa Stephens, S.B. Electrical Engineering and Computer Science, 2016

The Ilona Karmel Writing Prizes are awarded every May by CMS/W. The competition was named in honor of the late Ilona Karmel, a novelist, poet, and Senior Lecturer in MIT's writing program. Throughout her teaching career, Karmel's outstanding contributions to creative writing at MIT were her inspirational teachings and relationships with students.

There are ten sets of prizes, for everything from poetry and fiction to engineering writing and writing on the arts. The piece published here, by recent MIT graduate Marissa Stephens, was her prize-winning submission in the science fiction category. You can read more selections — and see a list of all winners — at cmswm.it/karmelprizes.

The biggest thing I got from this internship was that I definitely don't want to go into research. I mean, don't get me wrong, I'm still in love with academia and still bothered by the deep underlying mysteries of the universe like, *Why are we all here?* and *Where did it all come from?* It's just that after spending the summer at the ALMA Observatory in the middle of the Atacama desert, I decided that I was better suited to answer questions like *Will this be on the quiz?* and *Can there be extra credit?* At least those all have predictable answers.

I suppose I should start at the beginning, when I decided to travel abroad the summer before I finished up my Ph.D. in Astrophysics. Sure, I probably should've been working on my thesis, but I was burnt out and needed a change of scenery. My lab, which had the very descriptive title of "The Center of Sensing Science and Technology" had a joint research position with a lab in Chile that was working on a project called *The Abyss*. When it comes to names, most academic research I've found falls into two camps.

The first is named to sound as long and complicated as possible because in essence it is doing very little, such as my first research paper as an undergraduate *Exploring Methods of Characterizing Dynamic Complexity and Intermittent Turbulence*. Most of it was complete and utter bullshit because while I was supposed to actually be doing spectral analysis, my professor failed to actually provide me with access to the lab's data. I spent a whole semester trying to track him down so I could do something but to no avail. I think he put me down as a fifth author on that paper more out of pity than any real contribution on my part.

The other type of research you have is named to sound really cool, but is not really well-defined. *Project X*, *Black Hole Horizon*, and *Anti-matter Generator* just to name a few. Usually the professor in charge of them is more in love with the idea of the research than actually getting anything done. He's most likely tenured and couldn't give two shits about his papers getting published and is always at least a little bit off his rocker. I should've known that with a project title like *The Abyss*, I was due for something strange from the start. Perhaps I should've

taken the nice, safe, boring internship that basically involved running statistics on gamma ray emissions of neutron stars for hours on end.

But this project had a cool title, and after giving it a quick skim decided that it was vaguely related my thesis: *Quantum Cosmology and the Origin of the Universe*. So I packed a single, beaten up suitcase (I'm a grad student; everything I have is worse for wear), sublet my room in the small, cramped four-bedroom house I shared with three other grad students (seriously, I think "closets" is a more accurate word than "bedrooms"), emptied my savings account for a round trip ticket to Chile (because my advisor won't pay for shit), and was ready to have an adventure.

It was there, in the middle of the Atacama desert (or as I grew to lovingly call it, the middle of fucking nowhere) that I learned to be careful of what I wished for. You may think that with 200,000 square kilometers of nothing but dry, sand, and no one else around but the handful of scientists, that nothing exciting could possibly happen. You would be 100% wrong.

At first, I was disappointed that the internet connection wasn't fast enough to stream Netflix. For being the most expensive and technologically advanced telescopic array, the computer situation was surprisingly old-fashioned. A few computers in the lab even had dialup.

The comical boings and bings and beeps and whirrs as it slowly connected brought me back to my childhood. It took me a full half hour before I could send a quick email and update my professor back in Indiana that I had gotten to the lab, and in that time I decided that

"After taking a quick glance around to check that no one else was looking, he used his cane to flick the power switch of her computer and walked away with this huge smirk on his face. She was furious. I decided right then and there that the German scientists have the best insults."

nostalgia for how things used to be was highly over-rated. How on earth was I supposed to survive without normal internet access and pictures of cats to distract me from the old bumbling academics trying to wax unpoetically on about how things were better in the good old days?

Thankfully, on my first day there, I found out that watching the greatest minds in the field bicker about whose turn it is to use the Large Millimeter Array and try and seeing them sabotage each other's work is way more entertaining than any *Real Housewives* episode. (Yes,

I'll admit, I have a thing for trashy TV). You'd be surprised how catty researchers are.

I was wandering around trying to find my advisor for The Abyss project, to no avail.

Everyone I had talked to was particularly unhelpful and either didn't speak English or pretended not to, even though they magically learned how to after I had turned away to talk to someone else. I was becoming increasingly unenthused about this scientific community. Back in Indiana, everyone was nice to your face and made an attempt to be helpful, even if after they left they talked about how much they hated your guts. Here, everyone was just cold.

Anyways, as I walked out to the main room, I noticed there was this feeble looking old man, he must've been at least eighty, with wispy white hair, wrinkles, and the type of pale skin you only can get from spending all night looking at the stars, and all day hunched over running analysis. I think I vaguely recognized him from one of my text books or papers I had read. He was hobbling past a researcher who was busy collecting her data readouts from the telescope array's main compute, leaning on his cane looking all decrepit and old. After taking a quick glance around to check that no one else was looking, he used his cane to flick the power switch of her computer and walked away with this huge smirk on his face. She was furious. I decided right then and there that the German scientists have the best insults. Most German sounds angry, but their cure words sound like pure poison.

"*Du hurensohn!*," She screamed at him. "That was my last bit of research you *miststück*."

I was almost done and now I have to start all over you...you...*Hosscheisser*." He giggled, claimed he was old and must've accidentally slipped, and tried to walk away. She grabbed him by the scruff of his white collared shirt that was too small for him, and pulled him back.

"You pull this shit all the damn time *du verdammter Arschficker*. Stop fucking with my research. Just because you haven't published a paper in over a decade doesn't mean the rest of us can't."

By this time, the rest of the researchers had floated over to the commotion and formed a casual semicircle around them. A man with a scruffy black beard who I think was from some university in Canada asked me if I wanted to place bets on who would throw the first punch. I was so dumbfounded at what was going on, I forgot to answer him, but it didn't matter. The old man had poked her in the side with his cane, hard enough to make her let go. She retaliated and kicked his cane out from under him, sending him sprawling across the floor. At this point, the man I recognized as the director of the facility, sighing and handing a 50,000 peso bill (they were high rollers here at ALMA) to the smuglooking Japanese woman next to him step, told them that they'd had enough and should get back to work. The crowd dispersed, and the old man stuck out his tongue after the director had turned his back before walking up to me.

"Ah, well that old bastard was always a killjoy. You must be Ben. I'm Professor Gerhard but you can just call me Jack. Welcome to ALMA." He stuck out his hand. I was floored. *This* was the guy I was supposed to be working with all summer? Still, my midwestern politeness instincts kicking in, I extended my hand to shake his. He pulled his away and smacked my outstretched hand hard with his cane.

"You gotta be faster than that to work on my research team. Richard told me you were intelligent when he sent you down here. Hah, I told him, brains ain't what they were when we were in school. Back in our day you actually had to know stuff and think about it. Now these newfangled computers try and do it all for us. Well I don't trust em..."

He rambled on as he teetered down the wide hallway, his cane clicking off the marble floors on every other step. Most of the people we passed rolled their eyes as he walked by and didn't give him a second glance. Jack didn't seem to notice or if he did, he didn't mind. His eyes swept around the corridor and he opened a small door, and motioned to me to follow him. We walked down a set of concrete stairs into the basement, down through a twisting maze of corridors and tunnels. Down another set of stairs, then through what I assumed to be a steam tunnel, through a crumbled hole in the wall, through a machine room. He kept whispering to himself "Round and round and down and down back to the rabbit hole we go." I was only 75% certain he was going to murder me down here and no one was ever going to find my body and was about to ask where on earth we were going but then he stopped in front of an ancient wooden door with a red "KEEP OUT: High Voltage" sign on it. "Now in here," he said pulling a large, old fashion metal key from a gold chain he had around his neck, "is where we do work. We can't trust those other scientists. They're all crazy. Every last one of them. I don't know about you yet. Richard said you would be okay and I trust him, but you never know."

I was beginning to feel sick. I'm not sure if it was the altitude (going up to 16,000 feet in a day will do that to you) or if I was just coming to terms with how screwed I was for the summer. Despite what Jack was insisting, I was pretty sure that *he* was the crazy one. I really wished my advisor had warned me that he was sending me off to work with someone who belonged in an old folks home instead of in a lab. Jack rambled on, unaware I had drifted off in my own thoughts.

"And here," he said throwing open the door with a loud *CLANG* "Is where we do all our real work." He stepped aside to show me, what looked like a machine room. I was beginning to wonder if this was all just a joke, that Jack was just pulling my leg, when he squeezed in between the roaring metal furnace and the big black boiler, into a small space that led to a chamber barely big enough for the two of us to stand. Most of the space was taken up by a large desk, piled high with papers. A small, green desk lamp emitted the only light and cast strange shadows on the walls around us. Stacked on top of the pipes were hundreds of logbooks, each one labeled with a month and a year. They were dusty, and looked as though they had been there for years. The closest one read May 1953. As I looked at them, I could've sworn I heard a faint hum emanating from them, though it was probably just the furnace. Jack followed my gaze, and moved to stand in front of the books, blocking them from my view.

"Those are just old notes," he said nonchalantly. "I don't want you working with those. Otherwise you'll realize what a fool I was back then. Anyways, welcome to my lab."

I finally found my voice. "You...you work *here*?"

"Of course, my boy, where else would I?"

"But this place has the some of the largest astronomy labs in the world. Richard told me you had a huge lab with several other re-

“He kept whispering ‘Round and round and down and down back to the rabbit hole we go.’ I was only 75% certain he was going to murder me down here and no one was ever going to find my body and was about to ask where on earth we were going but then he stopped in front of an ancient wooden door with a red ‘KEEP OUT: High Voltage’ sign on it. ‘Now in here.’”

searchers. Why aren't we in there?"

"I do" he said flatly. "But here is better. It's more peaceful. Less chance of getting interrupted by those nasty nasty people"

"What do you mean?"

"Nothing. Nothing at all, my boy," his tone suddenly cheerful. "Now, all I need you to do is to bring me snacks and coffee and fetch me new pens and such. You can do that right?"

I was taken aback. I was a grad student, I mean sure, maybe an undergrad would have to do silly errands, but I nearly had a doctorate, I could at least be productive rather than just snivel over not knowing how to read an xray response like one of the undergrads that tried working in my lab back home. How dare he expect me to just bring him coffee. I opened my mouth to protest, but he just waved me away.

"Go bring me my lunch now, kid. Knock on the door when you get back and I'll let you in." I turned, squeezed back through the passageway, and fetched his lunch like an obedient little puppy.

It was rather lonely at ALMA. For my first few weeks, all the other researched hated my guts. They were here running around like chickens with their heads cut off, trying to make the most of the time they had on the array, and at the same time watch out for other malicious research groups, while I was lounging around in the cafeteria most of the time, drinking coffee, drawing the beautiful desert formations (seriously, the mountains were right out of natural geographic magazine) and for the first time in a while, just enjoying spending time doing nothing. Of course, I was sure to make it to every lab squabble. I wouldn't miss those for the world. Soon I began to understand the loose alliances and rivalries between the various teams although those changed almost daily. The German team, in general, hated the Spanish team that was there because, from what I gathered from the all-too-frequent shout outs, they had "accidentally" deleted several months of data from the main computer that hadn't been saved elsewhere yet. The Japanese and the other American team seemed to have a loose unspoken agreement that they wouldn't do anything more than the occasional prank such as replacing all the pens in the lab with ones that had ink that evaporated a few hours after writing them down. Unfortunately for me, all the teams seemed to have it out for me. I was the weird new outsider, and they made sure I didn't forget

that. I got the silent treatment, the occasional rough elbow in passing, and the frequent glare over the shoulder as they ran by. Being from the midwest, I just responded with a jovial wave, or "good morning" and got a nice sense of self righteousness from it. It was like the time I went to the east coast for a conference in Boston. Everyone was all grumpy and impolite and looked at me like I was an alien when I held open the door for them and said "hello" or "excuse me." I don't mind people being jerks, so long as I can make them realize it.

I tried to talk to the staff — local Chileans who lived in the facility with the rest of us — but mostly they kept to themselves, didn't speak English, or just didn't want to talk to an outsider like me (like I said, I was real popular with everyone). Only the chef, who I affectionately called Abuelita, would talk to me. She was a deeply religious old woman with grey hair she always wore in a long braid and tanned skin that wrinkled around her eyes and loved telling me stories, so long as I was helping out in the kitchen.

"Did I ever tell you, child," she began, peeling a pile of potatoes swiftly and skillfully with a paring knife, as I fumbled with mine, "of the man who saw the Alicanto?" I shook my head no, and she continued. "A long time ago, there was a tribe of Atacameños people living here in this desert. They told stories of the Alicanto, a large bird that guided them through to the next life. It was said that the Alicanto's wings would shine during the darkest desert nights, and their eyes emit strange lights. The presence of the Alicanto meant great fortune for the tribe, but to see one, to look one in the eyes was considered terrible luck. The only ones who ever saw the Alicanto were driven mad. They say, that if you ever look up into darkest part of the skies, you'll see the fiery lights of the Alicanto's gaze and you'll be doomed to a fate worse than death. For to look into the eyes of the Alicanto is to discover the meaning of everything, to comprehend the universe in its entirety in a single moment." She ended, staring sternly at me as though daring me to contradict her. While I personally didn't believe such mythological nonsense, I enjoyed hearing Abuelita's stories. It made the time pass faster. She told me the legends of Lola, el Yastay, the Achaches, the Umpillay, and the Quilpaná, and I listened with rapt attention, peeling vegetables, chopping up fruit, unloading shipments or anything else she needed me to do. (Abuelita made me *earn* those stories).

Finally, after about a month of being there, the other researchers started talking to me. Of course, none of them were nearly as friendly as Abuelita though perhaps it was because I wasn't nearly as useful to them.

"Some research you're doing, Ben" the German woman I saw on my first day chided at me. "Not even crazy Jack wants to work with you. You must be really stupid." I smiled, and told her I was perfectly happy with what I was doing and wished her a nice day. She sulked off. If I'm completely honest it did bother me that I didn't get to do any real research, but I sure as hell wasn't going to let them know that. The comments, like the dirty looks they shot me, bounced off me. I didn't care what a bunch of old geezers said. Though one really got to me. I was sitting in my chair in the cafe having just finished lunch, my nose stuck in a book of Chilean myths Abuelita had leant me. It was in Spanish, and I was struggling to decode it word by word.

“You know what happened to all of Jack’s other research assistants, don’t ya?” The director said conspiratorially as he slid into the empty chair beside me, placing his heavy work boots on the table and leaning back, “They all went mad. One by one.” He looked over at me, and casually swiped the salt I had spilled earlier into his hand and tossed it over his shoulder.

“Oh, really?” I said unamused, trying not to think too much about what he was saying. “Yeah, I mean a few years ago there were what, at least six of em all working here.

Jack’s big project to see what was out there before the big bang. Working on a way to see past this big line in the history of this universe, you know. Well, he claimed to have figured out how to find what came before the CMB, you know, all those nearly dead photons from the beginning of the universe.” Of course I knew about the

“But the books, the books were calling for me. I could hear them screaming in my head, begging to be read. They couldn’t just burn. Someone had to know. Besides, what could words do? It wasn’t as though they were dangerous. I pulled the desk chair, grabbed the first book, and began reading.”

earliest light in the universe. That was my whole thesis. If the guy had even bothered to read my profile, he would’ve known that. But I just nodded and smiled and he went on.

“Well anyways, there was this patch of sky that Jack was obsessed with. Kept imaging it over and over any time his team had the array. He said it held the answer to what he was looking for. I mean, we all thought he was a bit mad, even back then. One day, he came into lunch all excited, said one of his assistants had found something that was further away that 15 billion light years and even older than the CMB’s. Well, I mean, we were all curious of course, and to be honest, a bit jealous. Everyone wants to be behind the next huge discovery. He was going in to verify it when he found the body. The poor kid, he was a fourth grad student just like you. I don’t know how he got the gun, but well, it took the cleaning team a while to mop it all up. Of course, we would’ve just chalked it up as stress and depression if the next day another member of the team simply walked out into the desert with nothing but the clothes on her back. We didn’t realize she had left until it was too late. She nearly died of exposure out there overnight. When we finally found her, her face was one I wasn’t going to forget in a hurry. She was wide-eyed and looked like she had seen a ghost or was possessed or something. It was freaky. Kept muttering about something being impossible”

“Over the next few weeks the rest of the team...”

“Excuse me,” I said standing up, my stomach in a tight knot. “I need to go check on Jack.”

“All I’m saying, kid, is you don’t know what you’re getting into,” he shouted after me. “None of them did. Whatever they discovered changed them and not for the better. You make sure stay away from whatever research he tries to rope you into.”

I strode swiftly away from the director, my mind whirling dizzily, trying to make sense of what I had just heard. It was a prank, I decided. They’re just trying to scare me. But the look on the director’s face was that of a haunted man. It couldn’t hurt to ask Jack, I decided. Just to put my mind at rest. I knocked on the boiler room door and Jack opened it up for me, ushering me inside.

“You’re not usually in here til noon. What brings you in here?” He asked peering suspiciously towards me.

“I was talking with the director,” I said in what I hoped was a nonchalant tone. “He was telling me what happened to your team.”

“Lies. All of it. See they’re trying to tell me I’m crazy. Well I think if I were I’d be the first to know it.” Jack mumbled looking miffed. “That’s just the stories they tell to scare the new folk. Don’t worry. Anything else I can do for you, old boy?”

I wasn’t really convinced, but decided on a different approach. “Look, can I do some real research? I mean I’ve been sitting around most of the day and it’s kinda getting boring. I’m sure there’s something I could be helping out with. Like digitizing your lab books.” I reached out to take one of the books off the shelf, but I had barely laid my hand on the leather bound cover when Jack’s stick smacked it away.

“OUT!” He screamed at me, a maniacal look in his eye. I jumped at his violent reaction, my hand smarting from where he had hit me.

“NEVER TOUCH THOSE, YOU HEAR ME?,” Jack shouted, grabbing me by the collar and pushing me out of the room with a surprising amount of force for such an old man. I was shocked at this abrupt change in demeanor but barely had time to process it before I was tossed into the hallway right before the door slammed behind me.

I didn’t see Jack for the next three days. I tried knocking on the door several times before finally giving up. I left a tray of food outside, but he didn’t touch it. When I told Abuelita about his absence, she sighed, shook her head and said it was probably the Anches, the mythical beasts that roamed the Atacama feeding on the old and weak and speaking of mythical beasts and stories, she had more of them back in the kitchen along with a mountain of chickens that needed to be deboned should I care to join her.

When I did see him again, he looked even paler than he had when I met him. His skin was sallow and drooping. He looked as though he hadn’t slept in days and patches of his wispy white hair were missing in places, but he acted like nothing had happened. I knew better than to bring it up. The next few weeks passed without much incident, though I found Jack answering the door less and less. The contents of the lab books intrigued me, though every time I even glanced at them when I in his office, Jack quickly made an excuse for why I had to leave. What was in them that could make him so crazy? Well, I mean beyond his usual crazy. The whole messing up other people’s experiments and picking fights was fairly normal here, though I noticed he was doing it with much less enthusiasm and frequency. I tried asking him what was wrong, but he shrugged it off, saying it was just old age catching up to him. Everyone else I tried to talk to just ignored me

or made some comment about how he was always that old and crazy. Something was off, and if he wasn't going to tell me, I was going to find out.

I asked the janitors if they had a key to the door.

"*Lo siento, sólo hablo español, señor,*" he told me. I tried again, my Spanish a bit rusty from the one semester I took it in college. I had hoped being in Chile would give me a chance to practice it, but we were thousands of miles from anyone else, and because it was an international facility, most people here conversed in English.

"*No lo tengo, se perdió,*" he said, which either meant I had butchered my question and he didn't tango, or that the key was lost and he didn't have it anymore. I thanked him or said he was funny.

"This was no catseye supernova. It was unmistakably the eye of the creator. I had never seen anything like it. It spoke to me, told me to listen and discover my purpose and I knew that if I just stared into them everything would be alright. So I did."

My legal means of entering blocked, I took a more illicit approach. I tried picking the lock on the door after I knew he had gone to bed, but the old metal door's lock was rusted and far too intricate for the two paper clips, which broke almost immediately after I had tried to push them in.

The same fate met the hairpin I borrowed from Abuelita. "Now I know what you're going to do with it, but I don't wanna know why," she warned me when I asked her for one while we were slicing tomatoes. "Now I know you won't listen to me because you children never do, but you'd do good to remember that some things aren't worth messing around in. Take my son, Matias for instance..." A thirty minute story about her son breaking into a military base just to play pool with his friend and a half bushel of tomatoes later, I had my shiny new hairpin that split in two after thirty seconds of ramming it into the lock.

After that, I tried sneaking into his room (the dormitory doors being much easier to pick), but he woke up to go to the bathroom as soon as I had entered, and I had to dive behind the couch to avoid being seen. I bashed my shin on the oak coffee table, and it took all the willpower in the world not to scream out. My heart was already racing at a thousand beats per minute. I was sure Jack would hear it as he tottered back from the toilet. It's a good thing hearing goes with age I guess.

The near miss in Jack's dormitory made me back off. I was getting in over my head. It was just some silly books after all, not worth getting put on academic probation or expelled.

While my time here wouldn't exactly improve my academic career, it could certainly destroy it. I resolved myself to put the lab books out of my mind, and work on writing up my thesis draft, so I found it

odd, when I found my fingers taping the backplate of the boiler room's lock so it would stay open even after I closed the door. I knew that I shouldn't try and open it, especially not when Jack was there. That it would be morally wrong. But the mystery of these books bore through my mind like a drill, pounding away my last bit of self control.

So at 1am that day, when I saw Jack leave his office and head toward the dormitories, I simply opened up the door and walked in. One of the books lay open on the desk. I walked over to it and read the entry. It was dated for today, June 26th.

I have seen what lies at the end. I accept my fate in the universe and will stop fighting it and come quietly. Ben, I know you're reading this, you nosy bastard, so do yourself and the world a favor and burn everything in this place. I just wish I had the strength to do so myself, but I'm a sentimental old fool and it's my life's work.

—Jackson Gerhard

I stared at the note, trying to make sense of it. But the books, the books were calling for me. I could hear them screaming in my head, begging to be read. They couldn't just burn. Someone had to know. Besides, what could words do? It wasn't as though they were dangerous. I pulled the desk chair, grabbed the first book, and began reading.

At first it was very dull, all about the theory behind obtaining older and older pictures of the universe, how one could theoretically observe what existed beyond the barrier that was the beginning of everything we knew. Theoretical quantum mechanics was never really my thing, mostly because it made my head hurt whenever I thought too long about it. I skimmed most of the volumes, the ones that didn't cry out to be read. I slowed down once I started the ones from two years ago. I looked through thousands of images of empty sky, with calculations and analysis scratched next to them in blue or green ink and remembered what the director had told me: *there was this patch of sky that Jack was obsessed with. Kept imaging it over and over.* A loud pounding brought me out of the books, though they begged and pleaded for my attention.

"BEN! Are you in there? Open up!," the director's voice called out, punctuated by pounding on mental. I looked up, debating if I should go out. At least in here I was safe. Here I was with the books and the books needed me. They called out to me. They had to be read. It was my duty. I turned the page. The RA and DEC next to the image showed it was the same patch of sky. But this time, there was something there. Something indistinguishable. I bent closer trying to see what it was, but I couldn't make anything else out other than a note in the margin written in wobbly, loopy cursive: "EYE?" I could feel that the answers to everything were in reach, the words were calling to me, that I had to keep going. The books around me were humming, cheering me on, pleading with me to keep going. Intrigued, I flipped to the next page, and saw...but it couldn't be. It wasn't possible. But in my heart I knew it was. Not only in my heart, but in my spine, in my nerves, in my skin. Every fiber of my being resonated with the truth that lay before me so clearly on the paper that I wondered how I had not known it before. I bent down to examine it, and heard a far

off bang, like a gunshot from miles away. But that didn't matter. I just needed to look into the eyes of the creator that glowed billions of years ago, ice blue and fiery hot, for there was no mistaking the shape that seem to lift out of the book itself.

This was no catseye supernova. It was unmistakably the eye of the creator. I had never seen anything like it. It spoke to me, told me to listen and discover my purpose and I knew that if I just stared into them everything would be alright. So I did.

"Stop...No," the words sounded far off, and garbled as though I was underwater or half-asleep. I blinked, and saw the book slam in front of me. Looking up, I saw the director, a look of panic on his face. I tried to open the book again, but the director snatched it off the table and threw it in the boiler fire. Desperate to retrieve it, I got up trying to try and dig it out of the flames, but the director caught me and pinned me to the ground, his knee pressing into my stomach.

"What do you think you're doing, kid? You'll burn yourself," the director said incredulously. But, I thought to myself, in the grand scheme of the universe, is a bit of scorched flesh important? The voice of the remaining books chorused a resounding "NO!" I tried to shake off the director, but he had a firm grip I could not shake. So I had to watch him as he ordered the janitor to toss every last book into the fire. As each one sizzled into ash, I felt my soul be ripped apart. The answers to the universe were in there. I struggled, kicking, biting, screaming, trying to break free of the director's grip, but he held fast, his whole body weight pinning me against the hard concrete. I couldn't move. I could barely breathe. I heard a loud POP! And felt a flash of pain spasm down my arm. Remotely I realized I had broken a bone or something, but in the entire universe, it was only a small number of neurons firing. The only thing that mattered was saving the books.

"I'm sorry, kid," I remember the director saying, and then I fell into darkness. As the light faded away, I could hear the books curse me for failing them.

I woke up on a cold metal table and tried to sit up, but a piercing pain shot down my arm. "Easy there, kid," the director said. "You broke your arm. I wouldn't have marked you as a fighter, but damn son, you've got a mean bit of struggle in ya. I bandaged it up as best I could but the medics are still about thirty minutes out." He looked down at me and muttered, "I tried to warn ya, kid? Didn't I? Tried to tell you what happened to the rest of them. But you had to try and read the damn things yourself.

"Wh...wha...what happened?" I stammered. The pain in my arm was growing and making it hard to concentrate.

"I don't really know. Well, scientifically speaking at least. And if I were truly a scientist at heart I guess I would've tried to keep the books and study them. Figure out what was really causing it. But well, there are legends you know, about the eye of the creator. That it's powerful enough to grant a man understanding over the entire universe."

"You don't believe that sort of thing do you?" I asked incredulously. Coming from an old Chilean woman, I could understand, but the

director was a man of science. A man of logic.

"I'm not sure. I mean, words have power. You must have felt that down in the boiler.

And as for stories, well, what's to say they don't hold some truth. All I know is that after the rest of his team left, Jack tried to explain to me how he couldn't explain what he had seen in the lab. How the fact what they saw contradicted everything they'd ever known drove them insane. He then swore to me he had destroyed his research and I foolishly believed him. I never would've dreamed he'd keep it down in the old boiler room."

"Where is Jack?" I asked nervously glancing around the room, though in my gut I already knew the answer. The director chose to ignore me and continued on as though I had not said a word.

"Anyways, I let him stay here. Mostly so I could keep an eye on him, make sure he didn't go mad like the rest of his team. He was different, for sure, but I convinced myself that it was just the emotional guilt and pain of losing his team. When you applied to intern here, well, I thought it might cheer him up and make him return a bit to reality. You know, come to terms with the past and put it behind him, but I think it just made it worse. Reminded him of the team he had lost...This is all my fault." The director buried his hands in his face.

"Where is Jack?" I asked again, this time a bit of panic had entered my voice.

"Gone."

"What do you mean, gone? Gone where?," I looked up panicked. The director lifted his head. Tears were glistening around the edges of his bright blue eyes.

"He's...dead. Climbed to the top of one of the telescopes and jumped...I couldn't save him. He's dead...and it's all my fault." The director broke into huge sobs. It was uncomfortable watching this fully grown behemoth of a man be broken down by the words he had just uttered. I didn't know what to say, or if I even trusted myself to say anything. I was glad when the medics finally arrived and lifted me on the stretcher and drove me to the nearest hospital over an hour away. I was diagnosed with a broken arm, internal bruising, and a mild concussion. While I was recovering in the hospital, my things were sent over from ALMA along with a return ticket home.

I'm still trying to wrap my head around the whole thing even though it's been months since I left Chile. Whenever my advisor brings it up, I answer as vaguely as possible. To be honest, sometimes I think I dreamt the whole thing, it seemed so surreal. Some nights I still dream about the books scratching on the walls of the furnace, trying to escape. Other nights, I don't sleep at all, and lie awake wondering if some mysteries of the universe are better left unknown. On the nights like those, I go up on my roof and look up into the all encompassing darkness, and only then can I find a small bit of solace.

I've been halfheartedly finishing up my thesis, but even as I stare at my screen hoping for inspiration and motivation to strike me, my mind drifts back to Jack and what he discovered. How everything would've just been better if he had never looked into that patch of sky. I'll never know what Jack expected to see when he gazed out beyond the edge of the universe into the great abyss, but I bet you it never involved something looking back. ●

THE GRADUATE CLASSES OF 2018

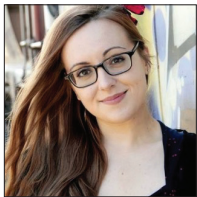
Meet our new CMS and Science Writing master's students

COMPARATIVE MEDIA STUDIES

Sonia Banaszczyk is fascinated by the civic impact of and on emerging social media. Some of these evolving fascinations have to do with how marginalized groups use media technologies to build community, infiltrate dominant public spheres, and harness political power. She is interested in the narrative strategies used by contemporary feminists and activists working on intercultural/transnational issues.

Sonia earned a combined B.A. in Communication and Sociology from Northeastern University, with a focus on social movement communication. Her work as a student organizer provided space for praxis, especially around media strategy and messaging. She also spent time in Northern Ireland working on a community art initiative that explores migration, identity, and inclusion through audio/visual narrative. Prior to joining the CMS '18 cohort, Sonia spent a transformative year working as a research assistant to Drs. Sarah J. Jackson, Brooke Foucault Welles, and Moya Bailey, who are PIs on an interdisciplinary project studying hashtag activism.

At MIT, Sonia is excited to study and create digital media that examine questions about power, privilege, and identity in a rapidly changing media landscape. She also hopes to collaborate with trans-media changemakers in home country, Poland, and the CEE region.



Laurel Carney is a writer from California. She earned her bachelor's degree in English from the University of California, Davis, where she studied early modern execution laws. Her undergraduate thesis looked at the role story-telling played in early modern debates over pregnant women's criminal culpability.

She is interested in communities formed around rule-breaking in virtual worlds and the ways developers push back against "deviant" play via punitive systems and environmental design. Her variously concomitant interests include '80s-'90s adventure games, MMOs, television, animal rights/welfare, theme parks and dark rides, folk ballads, and Bong Joon-ho movies.



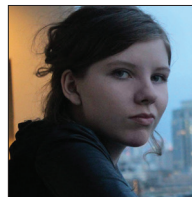
Aashka Dave graduated from the University of Georgia with degrees in journalism and Romance languages, having studied participatory media platforms and their effects on community engagement and interaction. These interests led her to The Associated Press, where she worked on projects including digital

marketing, book publishing and social media.

Her present interests lie at the nexus of media in transition, in-

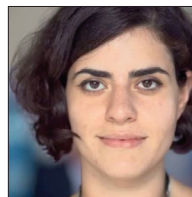
creasing applications of communications technologies and resulting changes in audience interpretation.

The Pottermore website once gave her a choice between Hufflepuff and Slytherin. Feeling affronted, she chose the latter.



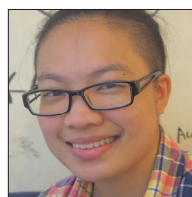
Kaelan Doyle Myerscough is a writer and academic formerly based in Montreal, Canada. She graduated in June 2016 with a Bachelor of Arts with honors in East Asian Studies at McGill University, and wrote her thesis on competitive online gaming communities of the popular franchise Pokémon. Her research interests

include transnational new media industries, fan cultures, and emergent forms of academic creation and expression. Her published work includes an essay on intertextuality between online communities, social activism and Jia Zhangke's 2013 film *A Touch of Sin*; a comic/manga adaptation of excerpts from Kathleen Stewart's *Ordinary Affects*; and an essay on resonances between Homer's *Iliad* and the 2013 TV series *Hannibal*. In her free time, Kaelan enjoys writing, drawing, video games, and spur-of-the-moment crafting projects.



Mariel García-Montes, joins the CMS program and the Center of Civic Media to ponder the questions she asked herself throughout her work in tech capacity building in civil society in Mexico and Latin America — especially those around youth, media, civic/moral education and digital literacies.

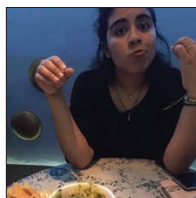
She has worked doing communications, instructional design, and research around open data, privacy and security, strategic communications and other digital literacies for SocialTIC (Mexico), Unicef (HQ); as a consultant for School of Data, the Open Knowledge Foundation, the engine room and Internews; and as an intern for the Youth and Media Lab at the Berkman Klein Center for Internet and Society at Harvard University. She is a philosophy graduate from the National Autonomous University of Mexico, and a Berkman Klein Center affiliate.



Born and raised in Hong Kong, **Claudia Lo** graduated from Swarthmore College with a major in Gender and Digital Media, focusing on queer and feminist theory as it applies to video-games. Her current research interests include control schemes and controllers in games, the social functions they serve in wider gaming communities, and the potential ability for videogames to present

minority viewpoints in ways that are not reliant on on-screen representation. At MIT, Claudia works at the Game Lab. In her off time, she enjoys calligraphy, tea, and trying in vain to work through her gaming backlog.

Sara Rafsky joins CMS and the Open Documentary Lab after working in Mexico City as Researcher on Central America at Amnesty International. Before that she was the Americas Research Associate for the Committee to Protect Journalists in New York, where she reported on press freedom in Latin American and the United States. Previously, she wrote about culture and politics as a freelance journalist in New York, South America, and Southeast Asia, interned at the Associated Press in Bogotá and was the editorial assistant for ARTnews magazine in New York. Sara also lived in Argentina, where she worked with the Ford Foundation and interned with Human Rights Watch and the Center for Studies on Freedom of Expression and Access to Information. In 2008, she received a Fulbright Grant to research photojournalism and the Colombian armed conflict. She has a bachelor's degree from Georgetown University and is from Brooklyn. At MIT, she hopes to research how new technologies and documentary practices can be used to advance the cause of freedom of expression.



Aziria D. Rodríguez Arce, a lover of tacos, memes, and all things funny, earned a bachelor's degree in Political Science from the University of Puerto Rico. She is also a community organizer and web developer. Aziria has worked at various non-profits in Puerto Rico, designing and developing participatory tech solutions to

deal with government transparency, technology accessibility, capacity building, and economic development issues on the island.

All of Aziria's endeavors stem from a political and philosophical point of view based on advancing equality and inclusion. It was only natural she directed her bachelor's degree into the completion of a thesis that studied how power identity relations and symbolic violence are attuned with cultural and memetic content creation in the web, which she later titled *Make Me a Sandwich*.

At MIT, Aziria is interested in understanding how collective narratives and identities transform content creation, production, and distribution in new media to promote social change. She wants to work on practical technological applications of collective and participatory content and media tool creation.

Aziria has Chandler Bing's approach to handling uncomfortable situations and an obsession with meme sharing in Facebook.



Vicky Zeamer graduated from Wellesley College, where she studied Media Arts and Sciences (think HCI + design) & American Studies. She was also a cross-registered student at MIT, where she took courses and participated in research centered around media technology and interaction design.

Her past work has been largely in user experience design and

research, in areas such as advertising and museums. As a design researcher, she is happiest when in the field conducting ethnographies and user interviews. She also gets a rush from synthesizing these findings and extracting design implications of users' needs, values, and perspectives.

Vicky's current research interests circle around personal and cultural relationships with food. More specifically, she is interested in exploring how computing and digital media are changing the way in which users experience food, and therefore exploring how computing is changing the way in which we use food as a tool to form connections and establish deeper understandings of events, people, and places.

SCIENCE WRITING



Greta Friar grew up in Newton, Mass., where she spent much of her time walking nature trails and volunteering at local wildlife sanctuaries. She earned her B.A. in history of science at Harvard University. After college she worked for several years as an editor and writer for Scholastic Book Clubs in New York. There she created

kids' science books, including *The Explorer's Guide to the Universe and Real Life Zombies: Creatures That Can't Be Killed*, as well as more explosive/slimy/glow-in-the-dark experiment kits than she can recall. She returned to Cambridge to write cases for Harvard Business School on topics ranging from biomimicry to crowdsourcing. Greta's second favorite thing about science writing is that it allows her to study a variety of research questions that fascinate her, without requiring that she spend years working in a laboratory. Her favorite thing about science writing is when she can convince readers to care about a scientific discovery, environmental policy problem or cool new technology as much as she does.



Born in Foggia, a sweltering town between the spur and the heel of the Italian boot, **Giorgia Guglielmi** invested a significant part of her life trying to understand how life works. She holds a bachelor's degree in Biotechnology and a M.S. in Molecular and Cell Biology, both obtained with distinction from the University of Rome "Tor Vergata".

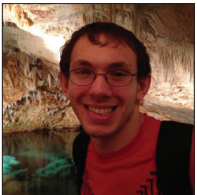
After a research stay in Cambridge, UK, where she dealt with some nasty, die-hard bacteria, she spent the last five years at the European Molecular Biology Laboratory (EMBL) in Heidelberg, finding out how embryos are shaped. Giorgia's efforts to control contraction in individual *Drosophila*'s cells using lasers have earned her the nickname "fly zapper" and a Ph.D. in Biology *summa cum laude*. In the rare moments away from the lab, Giorgia enjoyed writing for the EMBL magazine, organizing science outreach events, and sharing cool facts about biology with students across Europe. When not at MIT (guglielm@mit.edu), she can be found on Twitter @GiorgiaWithAnI or on a bike somewhere in Massachusetts.



Robin Kazmier grew up in Alpharetta, Georgia, with a bedroom full of maps and a dream of living in the jungle. Her curiosity about the human relationship with nature led her to pursue a B.A. in anthropology and geography at Northwestern University. After a stint in the education-abroad field, Robin took a trip to Costa

Rica and stayed there for almost nine years. She spent the first few years working on a cocoa farm in a remote village, and later became a medical Spanish instructor, moving to Costa Rica's urban center to lead Spanish immersion programs for U.S. health professionals.

Robin's transition to science writing began when she took a job as editor and project manager of natural history books at Zona Tropical Press. There, she put together field guides to the birds of Botswana and several Central American countries as well as nature photography and children's books. In 2015, Robin joined Costa Rica's leading English-language newspaper, where she launched a publishing division and served as general manager. Her work on the wildlife and biodiversity of Costa Rica appears in *The Tico Times* and she is the author of *National Parks of Costa Rica* (Cornell University Press, 2015). You can find her at rkazmier@mit.edu or on Twitter at [@rokazmier](https://twitter.com/rokazmier).



Brandon Levy was born in Boston but raised down the street from the National Institutes of Health (NIH) in Chevy Chase, Maryland. The combination of an early interest in biology and his family's many eccentricities made him intensely curious about why people act the way they do. Brandon earned a B.S. in neuroscience

from Duke University, where he volunteered in a neuroimaging lab and wrote a senior thesis on the influence of emotional facial expressions on social decision making. He returned to Maryland to work in the Laboratory of Brain and Cognition at the NIH's National Institute of Mental Health. He began writing about NIH-funded research for several of the institution's publications. When he's not writing or reading Stephen King novels, Brandon enjoys singing, cooking, and cheering on Duke's basketball team.



Raleigh McElvery was raised on the adage "Never let the facts get in the way of a good story." However, as a neuroscience major at Bowdoin College, she realized that facts can make for an even better story. A self-proclaimed brain zealot, Raleigh once had the chance to see her own brain via MRI scans. But the black and

white images left something to be desired. What kind of wiring associates Wednesdays with the smell of freshly baked bread? Or yields a penchant for ice cream but a strong antipathy towards the cold? In an effort to unravel the intricacies of the human brain, Raleigh chose to begin with a smaller, less complex system: the goldfish. At Bowdoin, she researched the fast-acting effects of steroid hormones as they stick to certain areas of the fish brain.



Bennett McIntosh entered the lab at an early age, serving as the pilot subject for his father's psychology experiments at the University of Denver; Googling "facial mimicry" still brings up a portrait of a smiling young Bennett with a face-full of electrodes from one such study. But rather than the perhaps-too-familiar world of

psychology, he was drawn to chemistry. Bennett spent four years studying the subject at Princeton, and was only slightly disappointed to receive a bachelor's degree in "chemia" (from the Latin word) rather than "alchemy" (from the Arabic). In the course of his research in labs from Princeton to Brighton, England, and Nove Hradky, Czech Republic, Bennett noticed he would spend more time writing — poetry, op-ed rants about university policy, or omphaloskeptic essays — than in the lab. So he decided to channel some of that writing into scientific topics, reporting on the origin of consciousness, the ethics of CRISPR, and the mechanics of gerrymandering for class and student publications; he quickly discovered that science writers are second only to physicists in their freedom to explore and pontificate upon interesting and important topics they have no formal training in.



Kate Telma began pursuing her education after she dropped out of a small high school in Almaty, Kazakhstan.

Though she spent considerable time at Brown University perfecting the angles of hexane chair conformers until they became machine-knitable prints, Kate still managed to drink lots of coffee, sew lots of theater costumes, and push enough electrons to make out with an Sc.B. in Chemical Biology.

Most recently, Kate has worked at Bolt Threads, a startup poised at the intersection of her two favorite things — genetic engineering and textile design. Growing spider silk in yeast has its tactile limitations, however, and it became apparent that Kate needed to explore alpaca husbandry and fiber creation in New Zealand. When not playing Scrabble or deconstructing the patriarchy, Kate can be found blowing glass or scuba diving in cold water.



As physics and English major at Elon University, **Maria Temming** realized that science writing appealed both her inner STEM fangirl, who loved learning about the weird and wonderful phenomena in our universe, and the creative writer, who just wanted to spend her time telling stories. Maria cut her teeth in science journalism

by writing for *Sky & Telescope* in the summer of 2014, and she worked as an AAAS Mass Media Fellow at *Scientific American* the following summer. During the school year, Maria got her science writing fix by contributing to the university tech blog and working on her thesis project: composing three chapters of a popular science book about the attendees of the Green Bank Meeting of 1961, the seminal SETI conference. ●

2016 THESES

COMPARATIVE MEDIA STUDIES

Beyza Boyacioglu, *Zeki Müren: A Prince from Space*. Following the traces of Müren's transformation from his radio days, to cinema, *gazino*, and television performances, while situating these textual analyses within Turkey's political, media, and LGBTQ histories.

Lily Bui, *Sense and the City: A Critical Look at Representations of Air Quality Data in the "Smart City"*. How might sensor data be used in the context of urban planning and design to reveal new frameworks for environmental data collection and representation that promote collaboration between government and citizen stakeholders?

Kyrie Caldwell, *That Momentary Glow: Gender and Systems of Warm Interaction in Digital Games*. Even warm interactions in games carry negative, even potentially violent and oppressive, representations and that there is thusly a need for design interventions.

Anika Gupta, *Towards A Better Inclusivity: Online Comments and Community at News Organizations*. Situating the most visible form of online news participation — comments — within a broader and evolving debate over how news organizations create relationships.

Lilia Kilburn, *The Ghost in the (Answering) Machine: Vocality, Technology, Temporality*. Probing the distinct claims that specific sound technologies allow us to hold on to one another — claims about mourning and loss, about calling and the promise of response, about the identification of individuals (or oneself) via the voice.

Lacey Lord, *Panels from Digits to Digital: The Evolution of Touch in Comics*. The idea that comics are a solely visual medium is not only incomplete but does not align with what the sciences of perception and embodied cognition tell us.

Gordon Mangum, *DeepStream.tv: Designing Informative and Engaging Live Streaming Video Experiences*. Can live streaming video from public events — civic livestreams — be more engaging and informative if relevant contextual information is added to the viewing experience?

Andrew Stuhl, *Making Software with Sound: Process and Politics in Interactive Musical Works*. "Open mediational music" invites listeners to rehearse a conscientious engagement with the sites and conditions of computationally mediated cultural encounter.

Deniz Tortum, *Real-time 3D Documentary: Representation Through Reality Capture and Game Engines*. Analyzing the 3D capture and interaction design process by drawing on theoretical research from film and media theory, surveying existing virtual reality work, and discussing the process of creating an original virtual reality work.

SCIENCE WRITING

Eben Eliot Bolte Bein, *Climate Nudges: Psychological Tools to Fix a Warming Planet*. What if, during your next long shower, a small device on the showerhead catches your eye? It counts gallons like a stopwatch. Small psychological nudges have profoundly shaped people's choices in countless fields, from medicine to economics to policy. But can these tiny nudges help us take on the largest problems? Before the Goliath climate change, here stand the pioneers in psychology, economics, and energy management, with a behavioral slingshot in hand.

Catherine Caruso, *Subconcussive Blows in High School Football: Putting Young Brains at Risk*. Even as public awareness of concussions and chronic traumatic encephalopathy reaches new heights, subconcussive blows continue to fly under the radar.

Conor Gearing, *Evolution in the Cornbelt: How a Few Special Species are Adapting to Industrial Agriculture*. What was once the prairie is now the Corn Belt—row crops planted from fencerow to fencerow. What does this mean for the native wildlife, which evolved for millions of years to live only on the prairie? Here are the stories of three species that natural selection has reshaped to thrive in the new agricultural landscape.

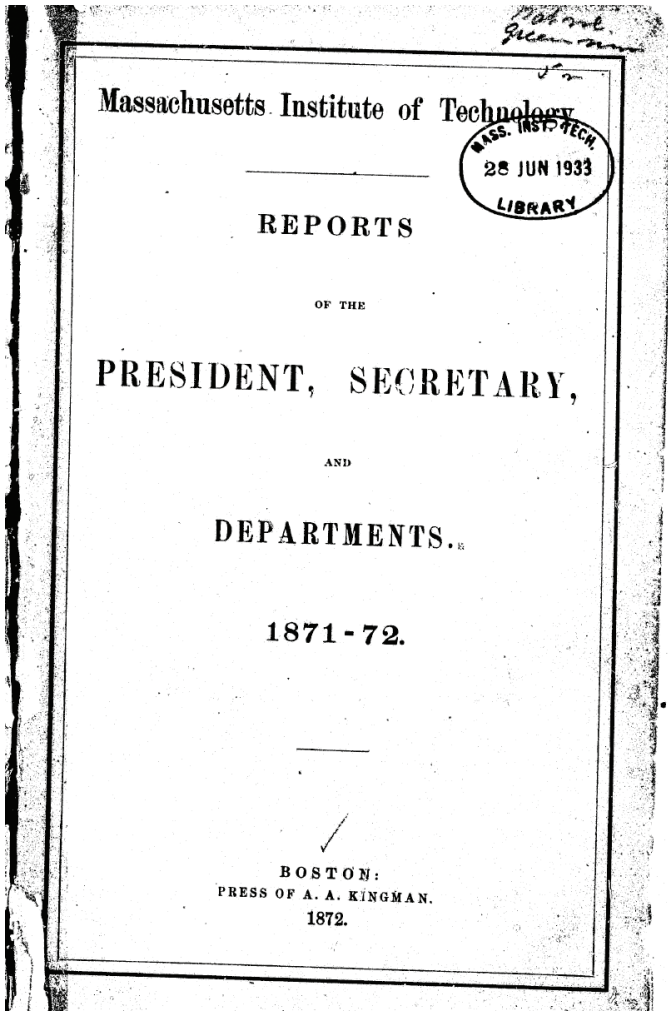
Claudia Geib, *Swimming Sentinels: Climate Clues from Stranded Marine Mammals*. By paying attention to whales and dolphins, seals and sea otters, we may be able to learn something about our planet, and how its changes will impact its most abundant mammal: us.

Kendra Pierre-Louis, *Geographies of Nowhere: Smelertown and the Rising Wave of Environmental Refugees*. We don't often think of modern American communities as places that disappear. But lead pollution erased the Texas community of Smelertown. Pollution has made places unfit for human habitation. It turned the residents of these communities into environmental refugees. That there are billions of climate change refugees poised to join these environmental refugees is terrifying. What can we do to stop this tide? What can lessons can we learn from the towns that have already disappeared?

Madeline Margaux Shares, *Your Brain on 9 Volts: The Specter and Hype of Electrical Brain Stimulation*. Over hundreds of years, we have tried everything from shocking away headaches with live torpedo fish, to bombarding patients' brains with so much current that their bodies convulse. A more innocuous technology has since emerged: tDCS, or transcranial direct current stimulation. All it takes to build is a small battery, a couple of wires, some electrodes, and salt water. And it's showing up in more places than you think—homemade laboratories, ski slopes, even the halls of Harvard Medical School. But, does it deliver?

SEARCHABLE MIT PRESIDENTS REPORTS, 1872-2014

Andrew Whitacre, CMS/W Communications Director



BACKGROUND

Each summer, MIT units are asked to write up their activities from the previous year, what ultimately becomes the “President’s Report”: web.mit.edu/annualreports. I scraped the files from the Annual Reports site and combined the reports into a single document, making a way to search for terms across the entire corpus back to 1872.

Check it out. Reading a unit’s portion in the reports over time gives some fascinating insights into its — and the Institute’s — evolution. You see MIT’s realtime role in World War II, the mounting pressure for gender equality, its modernization of fundraising methods, and — in what was a huge year — the nitty-gritty of its move 100 years ago from Boston to Cambridge. *Viz.*:

1. The word *nuclear* maps to the rise of German nuclear research in the 1930s, but formal funding (and a Ph.D. program) for nuclear research starts in 1942 — the year the Manhattan Project launched.
2. An institutional concern with gender (that word specifically) first appears in 1978, in response to *University of California v. Bakke*¹, the Supreme Court decision upholding affirmative action. Yet it’s not until the ’80s that a department — the MIT Department of Architecture — appears to be the first to go a step further, stating explicitly that lack of gender and racial diversity is hurting the quality of its instruction. (I’m curious to hear if, as one might assume, there’s documentation of this concern prior to the ’80s outside the President’s Reports, perhaps in The Tech’s archives.²)
3. The first endowment fundraising campaign did really, really well: it brought in \$100,116,402 in 2016 dollars. Yet it wasn’t until 1968 that MIT decided to fundraise year-round instead of through occasional campaigns.
4. The 1912 and 1916 reports show that MIT’s move to Cambridge from Boston *almost didn’t happen*, that it depended on securing assistance from the state of Massachusetts in order to receive matching funds from U.S. senator and MIT alum Coleman du Pont to actually purchase the 50 acres from the City of Cambridge. I had to laugh at the line describing the way MIT overcame opposition to the move (emphasis mine): “...numerous petitions [to the City of Cambridge] had been received from prominent business men and organizations in Cambridge, *not especially interested in education*, urging the Institute to go there...”

In what started as an attempt to answer a question put to me by CMS/W head Ed Schiappa — “Who has MIT hosted as writers-in-residence over the years?” (turns out Michael Crichton was one of many great ones) — I ended up creating the first one-stop searchable collection of every MIT President’s Report... 57,000 pages of them, going back to 1872. Though each of these documents has been in *separate* searchable PDFs and HTML files, this is the first time they have been aggregated. That’s especially important for reports after 2003, which had their sections broken out into dozens of separate PDFs. Two 1.5GB files are now available for download:

- A single PDF, with the first page of each report as bookmarks: cmswm.it/MIT-Presidents-Reports-single-PDF
- A .zip file of each year’s individual report: cmswm.it/MIT-Presidents-Reports-1872-2014

It’s a complete rabbit hole, and if you find yourself with a quiet hour or two, jump in. What do you find? ●

¹ wikipedia.org/wiki/Regents_of_the_University_of_California_v._Bakke

² <http://tech.mit.edu/browse.html>

UPDATES FROM THE CMS/W COMMUNITY

RESEARCH GROUPS



The MIT Center for Civic Media has charted a path towards informed, public-spirited innovation around the topic of information and citizen engagement. Over the last eight years, the Center has served as a bridge between the MIT Media Lab, with its history of technology innovation, and the CMS/W program, a leader in the field of new media scholarship. Director Ethan Zuckerman frequently serves as CMS students' thesis advisor/reader, and in recent years one or two graduate students have developed their own tools and research in partnership with Media Lab collaborators.

This past year, these collaborations were best illustrated by CMS graduate student Gordon Mangum's ambitious work on Deepstream, a web platform that simultaneously allows 1) embedding of video — including livestreams — from all major video platforms (YouTube, Facebook Live, etc.) with 2) contextual windows of related content added by hosts and viewers. While some users have used Deepstream for fun things like adding context to "Panda Cams," others have used it to stream, document, and better explain public protests, such as those in Iceland around the Panama Papers and at the Rio Olympics.

civic.mit.edu



The Creative Communities Initiative had an active year working across several domains. With the help of CCI grad students, we organized several events around the Dissolve

Inequality project founded by Professor Ian Condry. With research assistant George Tsiveriotis, Condry is also working on a new ethnographic research project called "Reinventing the Gig Economy: Music, Value and Livelihoods in the 21st Century." On the gaming front, Professor T.L. Taylor and several CCI graduate students continue work with the AnyKey initiative, a partnership between Intel and the Electronic Sports League to foster and support diversity in competitive digital gaming, also known as "esports". Taylor's team leads workshops with top industry leaders, as well as carries out fieldwork at events. Full information can be found at anykey.org.

cmsw.mit.edu/cci

the education arcade

In conjunction with the Office of Digital Learning the Education Arcade has been assisting the Tata Institute for Social Sciences in Mumbai in the CLIX project which is developing innovative, inquiry-based high school curricula for government schools in India. Contributing to MIT's CITE project, the Education Arcade has created a framework to evaluate the use of educational technologies in the developing world. It collaborated with colleagues in the Indian Institute of Technology (Gandhinagar) in this effort.

Ed Arcade continued the development of several tools that enable students to learn programming and system thinking through the creation of their own applications. These tools include StarLogo Nova, a web-served tool for building 3D simulations, TaleBlazer, which facilitates the creation of location based mobile games, and GameBlox, an all-purpose game development tool.

With funding from the Arthur Vining Davis Foundation, and in partnership with the Lynn, Mass., public schools, Ed Arcade explored the use of commercial video games in high school humanities curricula. It has begun work with the Smithsonian Institution on a new game promoting greater understanding of both American history and engi-

neering, focusing on upcoming 150th and 50th anniversaries respectively of the transcontinental railroad (1869) and the first moon walk (1969). Sandbox Summit, a conference hosted annually by Ed Arcade continues to create new avenues of dialogue between academics and developers of children's media, whether print, broadcast, software or toys. This year's event drew 200 participants.

educationarcade.org



As part of the MIT Game Lab's mission to develop new approaches for applied game design and construction, the Lab's efforts this past year have been devoted to providing tools and opportunities to develop games for diverse audiences.

The seven courses offered by the Game Lab, connected with its research and development opportunities, have maintained MIT's standing within the Princeton Review's top ten schools for undergraduate or graduate study of game development for a seventh year running.

With colleagues in the Scheller Teacher Education Program and Education Arcade, the MIT Game Lab has continued operating curriculum for MITx on EdX (11.126x Introduction to Game Design) as well as a summer workshop on Designing Games for Learning for Chinese youth visiting U.S. colleges. The summer workshop is supported by a private company, Excelorators.

In fall 2016, the MIT Game Lab co-hosted the Boston Festival of Indie Games for the fifth year. Over 3,000 people attended the event across multiple locations at MIT to see games developed by 300 invited developers and studios, giving students direct access to practitioners in game development. The event was covered in national media, placing MIT and the MIT Game Lab as a center for independent game development.

New projects have begun at the Game

Lab in collaboration with other labs and institutes. Continuing on from previous work, Research Scientist Philip Tan has been working with the Charles Hayden Planetarium and the Museum of Science to develop games to be played in the planetarium. Richard Eberhardt, Sara Verrilli, and Caitlin Feeley have worked with the Samuel Tak Lee MIT Real Estate Entrepreneurship Lab to develop a game about socially responsible real estate development for Chinese students. Inspired by the 500th anniversary of Martin Luther and the Protestant Reformation, the MIT Game Lab ran a game jam with the Goethe Institute and invited game developers from Boston, Cambridge, and Germany.

gamelab.mit.edu



HyperStudio — MIT’s Laboratory for Digital Humanities — has continued to grow significantly the worldwide user base of its NEH-funded, online educational multimedia annotation project “Annotation Studio” to more than 8,000 educators and students. Annotation Studio has been integrated into more than 650 humanities curricula at universities, community colleges, and high schools. In addition, 26 educational institutions have set up their own site-specific installations of Annotation Studio, including Harvard, Vassar, Barnard, Hofstra, and Humboldt University (Germany). The project, funded through two multi-year NEH Digital Humanities grants, is open source which has allowed other institutions to integrate Annotation Studio into their own projects. The HyperStudio team has continued to expand the functionality of Annotation Studio by developing a new tool, “Idea Space,” that connects the close reading/annotation process to academic writing. Idea Space allows students to select, filter, and organize their annotations and use them as the basis for essays,

class discussions, and presentations.

The international conference “Early Modern Theatre Practices & the Digital Archive — The Comédie-Française Registers Project (1680–1793),” jointly organized by Harvard University and MIT in May 2016, marked the completion and publication of the Comédie-Française Registers project, an eight-year collaboration between HyperStudio, MIT’s History Department, Harvard University, and the Universities of Paris IV (Sorbonne) and Paris X (Nanterre). Scholars now have access to facsimiles and fully extracted data from 113 seasons of daily ticket receipt registers (1680–1793) from the French theater troupe Comédie-Française in Paris. A variety of scholarly research tools and interactive data visualizations enable scholars to research this important period before the French Revolution in unprecedented ways.

Back in September 2015, HyperStudio started a new collaboration with Professor Kenneth Manning to bring his extensive research on Blacks in American Medicine online. Based on more than 23,000 biographies of black doctors along with tens of thousands of personal and institutional documents as well as audio interviews, the project aims to tell the unique history of black medical professionals in America. With Blacks in American Medicine, HyperStudio hopes to engage diverse audiences in the understanding of a marginalized narrative within America’s history by exploring how these professionals interacted and engaged with both the black community and the American public at large.

hyperstudio.mit.edu



Imagination, Computation, and Expression Laboratory

The Imagination, Computation, and Expression Laboratory (ICE Lab), established at MIT in 2010 by Associate Professor D. Fox Harrell, researches and develops artificial intelligence and cognitive science-

based computing systems for creative expression, cultural analysis, and social change.

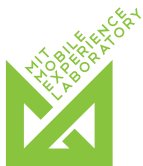
Most prominently, Professor Harrell collaborated on *The Enemy*, a virtual reality project seeking to engender empathy in the face of war by allowing users to experience interviews with real combatants on both sides of major global conflicts. His work on *The Enemy* with Belgian-Tunisian photographer and visiting artist Karim Ben Khelifa was featured in late October in the *New York Times* (cmswm.it/the-enemy-nytimes).

Professor Harrell built upon the results of NSF CAREER Award project “Computing for Advanced Identity Representation,” which concluded in August 2015. He recently received over \$1.35 million to advance his research on virtual identity: (1) the National Science Foundation (NSF) funds his work using avatars to support local middle and high school students from groups typically underrepresented in STEM fields in seeing themselves as learners and doers of computer science, (2) an MIT CSAIL-Qatar Computing Research Institute (QCRI) collaboration funds his research on culturally-specific everyday uses of virtual identities in social media and videogames (with the Persian Gulf region as a case study), and (3) an MIT Center for Art, Science, and Technology (CAST) grant helps fund *The Enemy* project using virtual reality technologies to help engender empathy in the face of global conflict (e.g., in Gaza, Congo, and El Salvador).

Outcomes of ICE Lab projects have taken the form of videogames, interactive narratives, and social media systems that can adapt to the cultural needs of diverse users and help educate diverse learners. Examples include *Mimesis*, an online game that models social and psychological impacts of a subtle form of racism and *MazeStar*, an educational computer game creation platform used with Cambridge and Boston middle and high school students from underrepresented groups. *MazeStar* engages students in learning computer science concepts and seeing themselves as computer scientists.

In addition, the ICE Lab has also developed an AI tool called AIRvatar to analyze and reveal patterns in how people develop and use virtual identities. For example, it has used AIRvatar to empirically discover and demonstrate statistical patterns of racial and gender discrimination in videogames, including a hit that has sold over 9.5 million units (\$60 each) globally.

icelab.mit.edu



In February 2016, MEL held its second “Make Me ++” Hackathon, followed by the Design Driven Innovation conference. The hackathon, in memory of the late dean of MIT’s School of Architecture and Planning Bill Mitchell, was sponsored by PUMA with the theme of Urban Fitness. Nearly 100 hackers of various backgrounds assembled for a weekend to develop new and creative solutions in fitness. Design Driven Innovation, held for the second time, had more than 250 attendees and was an occasion to bring together entrepreneurs, creative thinkers, and designers from all around the world.

In partnership with Italian oil and gas company ENI, which is part of the MIT Energy Initiative, MEL has continued its research into the field of the Internet of Things, applied to wearable technology for safety in the workplace. MEL was able to develop smart vests, jackets, shoes, and gloves equipped with multiple kinds of sensors and haptic feedback to prevent accidents.

In a separate project, in order to understand how people communicate to each other and interact with immersive interfaces, MEL designed and implemented a prototype that allows users to collaboratively design a layout using Oculus Rift, a virtual reality headset.

One of two MEL classes this year, “Smart City Tourism,” aimed to find different solutions to mass-tourism in China. The research focused on creating new mobile

interfaces and new media to improve the touristic experience and provide a better way to access and contribute to cultural heritage.

Finally, in July, the Mobile Experience Lab ran an MIT Professional Education summer course: “Innovation Beyond the Buzzworld”. “We live in an age of exponential change,” the course’s description reads in part, “in which rapid innovation is disrupting and unseating incumbent products and industries, creating new technological frontiers, and challenging nearly everything we think we know about business. But beyond using the ‘buzzword,’ can you really define innovation? In this course, which is centered on the concept of Design Thinking, your answer to that question will come from actually involving yourself in the activity of innovating.”

mobile.mit.edu



The MIT Open Documentary Lab (ODL) brings storytellers, technologists, and scholars together to advance the new arts of documentary. Founded by Professor William Uricchio and directed by Sarah Wolozin, the lab is a center of documentary scholarship and experimentation at MIT. Through courses, workshops, a fellows program, public lectures, experimental projects, and research, the lab educates and actively engages the MIT community and the larger public in a critical discourse about new documentary practices and encourages people to push the boundaries of non-fiction storytelling. The lab currently has two graduate students, four faculty affiliates (Vivek Bald, Sasha Costanza-Chock, Christine Walley, and Hanna Rose Shell) and collaborations with leading institutions including Sundance institute, Tribeca Film Institute, and National Film Board of Canada. It has attracted the interest of major foundations including the MacArthur and Ford foundations.

In November, the lab released its MacAr-

thur-funded report, *Mapping the Intersection of Two Cultures: Interactive Documentary and Digital Journalism*. It is the first to map the growing convergence of interactive documentaries and digital journalism in legacy news organizations. It included case studies of major news organizations such as *The New York Times*, *The Guardian*, and PBS Frontline as they made use of interactive documentary techniques to better present their material digitally. It was well received and anecdotally ODL learned that many journalism teachers are using it in their classrooms.

In January, the lab received a three-year grant from the John D. and Catherine T. MacArthur Foundation for general operational support totaling \$750,000.

In May, the lab hosted a two-day conference, “Virtually There: Documentary Meets Virtual Reality, that brought leading international practitioners, scholars, and funders together to discuss the craft and ethics of virtual reality documentaries. The conference included panels, presentations, workshops, an exhibit, and a roundtable discussion among invited guests. It was a packed event that brought the vanguard of non-fiction storytelling to MIT and became an important event in the field. ODL raised \$70,000 to pay for it.

The lab also partnered with the online news agency, Fusion and are consulting for them in this fall.

ODL continued to develop Docubase, a curated, interactive database of the people, projects, and tools transforming documentary in the digital age.

The lab hired Emmy award-winning documentary maker and former MIT CAST Visiting Artist Katerina Cizek to work with the lab to develop the co-creation incubator which will serve as the production arm of the lab. Her work culminated in curriculum, research, and a successful proposal to MacArthur Foundation for a planning grant that will be executed in the Fall. CMS Alum Beyza Boycioglu joined OpenDocLab as project manager. She is also creating an interactive documentary together with ODL Fellow Jeff Soyk called Zeki Müren Hotline Project about the huge popularity of a transgendered Turkish icon.

ODL launched a Medium publication,

Immerse: Creative Discussion of Emerging Non-Fiction Storytelling, together with Tribeca Film Institute and Fledgling Institute.

The lab's PI William Uricchio and Co-PI Sarah Wolozin continued to speak at premiere festivals and conferences about the work of the lab.

opendoclab.mit.edu

THE TROPE TANK

The Trope Tank, directed by Professor Nick Montfort, is a lab for research, teaching, and creative production. Its mission is to develop new poetic practices and new understandings of digital media by focusing on the material, formal, and historical aspects of computation and language.

Literary translation projects continued to be the central ones this year. Renderings, a project to translate computational literary work from around the globe into English, continued. To add to the 13 published pieces, work continued globally on the translation of about 25 pieces from Spanish, French, Japanese, Russian, Polish, Slovak, and Danish. The Trope Tank initiated a new project, Heftings, to allow online collaboration on and discussion of works that are usually considered impossible to translate. A prototype of the Heftings site was completed by the lab's graduate student researcher in collaboration with others in the lab. The Trope Tank also hosted a writer-in-residence for the first time, as a way to reach beyond the existing MIT community; it plans to continue the program and seek other writers to work with it.

A visiting student from Poland and a visiting postdoc from Finland developed an exhibit of materials from the lab, "Once More, with Feelies," that was presented at MIT's Rotch Library. Trope Tank researchers supplied work for three other exhibits around this time at MIT and in the Boston area (at the Boston Cyberarts Gallery). A previous visiting postdoc from Poland presented on work done at the lab at both the 2015 and the 2016 Digital Humanities conference.

The Trope Tank welcomed a new post-doctoral researcher, Angela Chang, and a

new writer in residence, Milton Läufer. It continues to host the monthly meetings of the local interactive fiction club, the People's Republic of Interactive Fiction, as well as class visits and discussions with visiting researchers and colleagues from MIT.

The lab's equipment and researchers supported a display of Apple II work at the Boston Area demoparty, @party; Commodore 64 work and projections at the first New York City demoparty, Synchrony; Commodore 64 projections at the experimental dance music event Beat Research in Cambridge; and other events including WordHack at Babycastles and the School for Poetic Computation at Westbeth, both in New York City.

Montfort's book *Exploratory Programming for the Arts and Humanities* (MIT Press 2016) was released after being developed in the Trope Tank with learners and researchers there, during a semester-long class at the New School, and in several other contexts. Montfort gave workshops based on the book at the University of Wisconsin-Milwaukee, Rutgers University-Camden, the gallery Babycastles, and the School for Poetic Computation. Montfort also presented creative work that originated on or was partly developed thanks to the Trope Tank in several cities.

trope-tank.mit.edu



wrap@mit.edu

Writing,
Rhetoric,
And
Professional
Communication

Writing, Rhetoric, and Professional Communication collaborates with other MIT faculty and departments to teach written, oral, and visual communication to over 4,000 students a year in more than 100 communication-intensive (CI) subjects. WRAP also teaches the foundational writing subjects (CI-HWs) in CMS/W. WRAP is devoted

to teaching students how to analyze and produce effective communication, and is led by Director Suzanne Lane and Associate Director Andreas Karatsolis.

WRAP guides MIT students from the essay exam that they take online before entering as freshmen, through their four required communication-intensive subjects, and in some cases, into their graduate education, as WRAP also administers the graduate writing exam, teaches the graduate subjects, 21W.800J — Business Writing for Supply Chain Management, and 21W.801J — Thesis Writing for Supply Chain Management, and has been collaborating with Dean Christine Ortiz to develop online communication instruction modules for graduate students. For academic year 2017, WRAP has received funding to provide communication instruction to graduate students in Aerospace Engineering, which it will do through an integrated workshop model augmented by a series of online communication instruction modules.

WRAP's affiliated research lab, ArchiMedia, investigates how digital media is shaping professional communication practices, and how digital tools can be used (and designed) to teach professional communication. With the aid of both a d'Arbeloff grant and an Alumni Funds grant, WRAP/ArchiMedia developed the framework for these online modules for communication instruction in engineering, which have been deployed and assessed in 3.014: Materials Laboratory, and in 10.26/27/29: Chemical/Energy/Biological Engineering Projects Laboratory. This project collaborates with engineering faculty to analyze disciplinary discourse and rhetorical conventions in common engineering genres, such as journal articles, progress reports, slide presentations, and poster presentations, and the modules teach students how to analyze published literature in their field, as well as how to compose professional communication. This project has broken new ground in integrating technical and communication pedagogy; WRAP created "reasoning diagrams" that help students understand the underlying patterns of thought in engineering research, and link these to instruction on how to develop different genres and communicate those ideas to

different audiences. This work was presented at ProComm 2015, the professional communication conference in Limerick, Ireland, and at the American Society for Engineering Education in New Orleans in 2016, and published in their conference proceedings. WRAP also developed extensive assessment for these modules, using an instrument that measures student growth in disciplinary understanding, rhetorical awareness, and habits of mind. Students showed significant increases in all areas, with a remarkable 125% increase in their understanding of disciplinary communication knowledge.

This past year, WRAP received a number of grants for further projects.

After extending its methodology to fields beyond engineering, and developing a reasoning diagram for Comparative Media Studies as well, it received a three-year grant of \$240,000 from the Davis Family Foundation to create a half dozen more reasoning diagrams in STEM fields. WRAP has also received a three-year grant of \$69,520 from the National Science Foundation for a multi-institutional project assessing the effects of incorporating peer review into undergraduate STEM subjects. And, with the aid of an Alumni Funds grant, ArchiMedia is developing Metalogon, an online tool for rhetorically analyzing speeches and oral presentations. This platform will be used in 3.014 and 21W.016 in the fall of 2016.

cmsw.mit.edu/wrap

PERSONAL UPDATES

Senior lecturer **Ed Barrett** published *The Sinatra n*, a book of poems triggered by the 2013 Boston Marathon bombing. He has completed another book, yet to be published, title *Bóithrín an Phroperty/Road of the Property*, poems in Irish and English, which is a collaboration with Irish poet Áine Moynihan for a compendium of ancient field names collected by Séan Ó Cinnéide (with maps by Feargal Mac Amhlaoibh) in Dún Chaoin, the westernmost Irish-speaking village in Ireland. Barrett's half of the book will be published as a standalone collection in the anthology *Let the Bucket Down*.

Science writing professor **Marcia Bartusiak**'s latest book *Black Hole: How an Idea Abandoned by Newtonians, Hated by Einstein, and Gambled on my Hawking Became Loved* was a finalist for the 2016 Phi Beta Kappa Science Writing Prize.

Taylor Beck (S.M., Science Writing, 2012) is a journalist in New York, writing freelance for publications like *The Atlantic*, *The Washington Post*, and *Scientific American MIND*. He is finishing an e-book called *Love On Lithium* about bipolar disorder and how it affects relationships. The piece began last year on a fellowship at the Banff Centre for the Arts in Canada.

Lecturer **Jared Berezin** recently launched the "Helping You, Helping Others" (cmswm.it/seekinghelp) project, an interactive art installation to visualize students' help-seeking behavior on campus. If any staff or faculty in CMS/W want to participate in the project, please email Jared at berezin@mit.edu.

Jim Bizzocchi (S.M., CMS, 2001) returned to CMS and the Open Doc Lab in October. Jim is continuing to develop his generative video sequencing and presentation system. Jim and his wife and creative partner Justine Bizzocchi worked on plans for a revised system with professor William Uricchio and ODL director Sarah Wolozin. Jim is changing his system from an ambient video orientation to a more complex and challenging documentary format. He will be working in the genre of "City Films," and will start by adapting the system to remix an ongoing series of short films drawn from the footage of the classic "Berlin: Symphony of a Great City". The film was the subject of Uricchio's doctoral dissertation, so they have had some great conversations about a generative remix of the film.) Jim and Justine discussed their work at an Open Documentary Lab meeting in October, and received some great feedback. The visit to MIT was also an opportunity for Jim to renew contact and share ideas with many other colleagues from CMS/Writing.

Jim's ambient video work has also been going well. He and his colleagues at the Simon Fraser University Advanced Media

Research Group have exhibited their ambient video generative artwork "Seasons II" at the 2015 Generative Media Conference in Venice and the 2016 Conference of the Electronic Literature Organization in Victoria, British Columbia.

A project by **Beyza Boyacioglu** (S.M., CMS, 2016) called "Zeki Müren Hotline," which was a part of her thesis, was accepted to the International Documentary Festival Amsterdam's DocLab. It is in collaboration with Open Documentary Lab fellow Jeff Soyk. Find more information in their press kit: cmswm.it/murenhotline.

Beyza also got married to Hayrettin Günc on August 13 at MIT's Sailing Pavilion.

Michael Epstein (S.M., CMS, 2004, walkingcinema.org) is in Rome for six months producing location-based audio for Detour.com. His thesis *Moving Fiction* (cmswm.it/movingfiction) laid the groundwork for this new media form, which is now rapidly expanding thanks to apps like Pokemon Go and the bank that Detour founder Andrew Mason made at Groupon. The Rome walkable stories will include investigative reporting, cat comedy, and, of course, cuisine. You'll have to go to Rome to experience them starting June 2017.

Michael is also bringing location-based media to Amazon as the creator and producer of Pen and Place (penandplace.info), a podcast about great books and the places behind them. He recently interviewed Pulitzer winners Viet Thanh Nguyen about double agents in Little Saigon and William Finnegan about surfing as religion in Oahu.

Michael teaches interactive storytelling courses at the California College of Art (cmswm.it/epsteincca). Last year, he and his wife Silvia had their first child, Francesco, who loves to get outside, like his dad.

Clara Fernández-Vara (S.M., CMS, 2004) and **Matt Weise** (S.M., CMS, 2004) welcomed son Mateo — the first "CMS baby," born of two alums — in July, and he's already hearing English and Spanish so he grows to be bilingual.

He likes the brightness of screens too much, on his way to being a media nerd.

Julie Fischer (S.M., CMS, 2014) moved to California to start work as a User Experience Researcher for Google on the Google Play team. She and her partner got engaged in August and will be getting married next summer.

In 2016, **Sam Ford** (S.M., CMS, 2007) has published essays in several academic collections: *Controversies in Media Ethics*; *Seeing Fans*; *Public Relations and Participatory Culture*; *The Rise of Transtexts*; and *Accidental Information Discovery*. He also spoke at MIT's Beyond Comments and Beating the CMS Blues (about content management systems, not Comparative Media Studies), Cartagena Inspira, Western Kentucky University's Thoughts on Pop series, and the national conferences of the Society for Cinema and Media Studies and the Popular Culture Association...and returned home to CMS to lead a colloquium session with colleague Federico Rodriguez Tarditi this fall. Sam's work leading the Fusion Media Group's Center for Innovation and Engagement was featured/mentioned in Nieman Lab, VentureBeat, and Fast Company, among other places. And he was particularly honored to be named an inaugural member of MIT's Graduate Alumni Council.

At the Boston Book Festival in October, lecturer **Erica Funkhouser** held a wonderful conversation with Steph Burt of Harvard on his new anthology of contemporary poetry, *The Poem Is You*. Funkhouser has an essay on swimming in the Essex marshes in the most recent issue of the *Harvard Review* (#49), edited by Paul Harding, with other poems recently in *AGNI*, *Harvard Review*, and *Field*.

Also, last spring, with support from the Kelly-Douglas Fund, she was able to bring an actor and a visual artist to MIT to work with the students in the Advanced Poetry Writing Workshop, 21W.771. They had two amazing classes, one consisting of voice work and another in which the students created artists' books out of their own poems.

Desi Gonzalez (S.M., CMS, 2015) is living in Pittsburgh and leading digital initiatives at The Andy Warhol Museum. She published a few pieces in the last year in *Art*

For the first time in more than a decade, we have the somber job of sharing news of the death of a CMS/W community member. **Margaret Weigel** graduated in 2002 as a part of the second cohort of CMS master's students; for her thesis, she wrote about electric signs in Manhattan in the late 19th and early 20th centuries. Margaret's professional life was incredibly varied: narrative and digital design, youth learning, user experience design, engagement strategy, business development, and more.

In August this year, she shared on Facebook that she had stage four breast cancer and that she "thought I could power through this illness like I do so many challenges, but I may have met my match." She then asked friends to help her "create a little collection of memories or stories that chronicles our existence on this funny blue and green planet together." 169 responses later, one could practically reconstruct her life and friendships.

We send condolences to her husband

in *America* magazine, including "The Public as Producer" (cmswm.it/publicproducer) and "Atlas Lima: the Map and the Typography" (cmswm.it/atlaslima).

Anika Gupta (S.M., CMS, 2016) is working as a product manager for National Geographic, where she is putting her CMS degree in community/comments to good use. She has spoken about her thesis research (and related work) at the Nieman Foundation's Christopher J. Georges Conference at Harvard, at the FACETS conference in New York, at Poynter's 10UP Summit in New York, and the Allied Media Conference in Detroit, where she collaborated with the excellent Monica Guzman. She also had a paper about global journalistic collaborations and hackathons accepted by the Media Fields Journal.

Anika now lives in the Washington, DC, area.

Professor **Heather Hendershot's** new book on William F. Buckley's show *Firing Line* (see page 8) was released in October. "*The*



Margaret Weigel (S.M., Comparative Media Studies, 2002)

Rick and, here, share a link to our last visit with her, a 2015 video as she and other CMS alums spoke of their time at MIT: cmswm.it/2015alumpanel. On Friday, December 9, at the Chevalier Theater in Medford, Mass., Margaret's family is hosting a celebration of her life; those interested in attending can RSVP at evite.me/uMqDJtkzRn.

Wall Street Journal thought it was too liberal," Hendershot says, "but the *National Review* praised it as 'Stakhanovite!'"

Over the summer, she finished watching *Breaking Bad* and then binged through *Better Call Saul*. She has recently started watching *Futurama*, and has invented a new gin-based cocktail that she has named Slurm. "CMS graduate students can testify that it packs a punch!"

The video game CMS graduate student **Evan Higgins** worked on over the summer — "Star Wars: The Old Republic | Knights of the Fallen Empire" — will be released soon: swtor.com/eternal-throne.

Brian Jacobson is a 2016–2017 Faculty Fellow at the University of Rochester Humanities Center, where he is working on projects about the visual culture of energy and the environment.

Recent publications include an article in *Framework* about early infrastructure films in New York City and a *Film Quarterly* article

about Alex Garland's latest film, *Ex Machina*.

Andreas Karatsolis published two major articles. "Rhetorical Patterns in Citations Across Disciplines and Levels of Participation" appeared in the *Journal of Writing Research*, and "Supporting Technical Professionals' Metacognitive Development in Technical Communication through Contrasting Rhetorical Problem Solving" was published in *Technical Communication Quarterly*.

He also published a book chapter with Nicholas Cifuentes-Goodbody: "More Than a Mirage: The Role of Assessment in International Accreditation" in *Assessment of Learning in Higher Education*.

After 21 years, academic administrator **Shannon Larkin** stepped down from singing with the Handel & Haydn society and moved on to smaller choirs. She toured Finland, Latvia, and Estonia with Labyrinth Choir this summer. They plan to continue the success of that tour with concerts in November.

She will also sing her first concert with Capella Clausura, a small chamber chorus that mixes early and contemporary music to great effect.

Associate Professor of Science Writing **Seth Mnookin** started as the science-media Tracker columnist for Undark. He also became the director of the Graduate Program in Science Writing.

Mnookin was re-elected to the National Association of Science Writers' board (his second two-year term), and he published pieces in STAT, including one that also ran on the front page of the *Boston Globe* about opioid prescriptions.

Professor of Digital Media **Nick Montfort** published three books, including *Exploratory Programming for the Arts and Humanities*, which introduces programming to readers with a background in the arts and humanities. The book presents programming as not merely a technical exercise within given constraints but a tool for sketching, brainstorming, and inquiring about important topics.

Montfort's latest book, *Autopia*, is an endless litany of sentences made entirely of the names of cars, such as "Navigators

Venture," "Azure Grand Cherokee Focuses," and "Phantom Amigo Probes Brats". The Python computer program that generates the text is also included.

Prior to joining CMS, graduate student **Sara Rafsky** spent a year in Mexico City and traveling Central America to research and write Amnesty International's newly published report "Home Sweet Home?," which examines the unrelenting violence that is causing the region's invisible refugee crisis. The report delves into the deadly conditions that are causing men, women and children to flee countries like Honduras and EL Salvador — home to the world's highest homicide rates outside a war zone — in record numbers and what happens to them when they are increasingly deported back to the same deadly conditions from which they ran.

Back in March, **Jason Rockwood** (S.M., CMS, 2009) has taken on a new accountability as the Vice President of Mobile Innovation for the Miami Heat and the American Airlines Arena.

"Yes me, working for an NBA team! This role is bigger than anything I have ever done, and I'm ready. Thank you to my amazing husband Dev for his endless coaching and support, and for all my peers at the Team Management and Leadership Program at Landmark, for training me to be responsible for more than I thought possible. Dev and I will be full-time residents of Miami starting now! It's crazy, it's exciting, and it's a dream [I didn't even know I had] come true."

Talieh Rohani (S.M., CMS, 2009) is part of the product management team at Apple. She is expecting her first child in February.

Ed Schiappa received the National Communication Association's Charles H. Woolbert Research Award, given "to a journal article or book chapter that has stood the test of time and has become a stimulus for new conceptualizations of communication phenomena." Schiappa and his co-authors won this for their essay, "The Parasocial Contact Hypothesis," which puts forward a theory of media influence that has been used by scholars all over the world since its publication in 2005.

Karen Schrier continues to serve as director of the Games and Emerging Media program at Marist College, a liberal arts college in Poughkeepsie, NY, where she is on the faculty. Two of her books were published this past year. She edited *Learning, Education & Games Two: Bringing Games into Educational Contexts* (ETC Press/Carnegie Mellon), which delves into the challenges of creating games and implementing them in educational settings, and she wrote *Knowledge Games: How Playing Games Can Help Solve Problems, Create Insight, and Make Change* (Johns Hopkins University Press).

So far, *Knowledge Games* has been covered by Forbes, New Scientist, and Times Higher Education, Radio NZ, and SiriusXM.

Ainsley Sutherland (S.M., CMS, 2015) finished a fellowship at BuzzFeed, where she developed a tool for speech annotation in virtual reality: cmswm.it/vradioannotation.

Lecturer **Michael Trice** published an article in IEEE Transactions on Professional Communication, "Evaluating Multilevel User Skill Expression in a Public, Unsupervised Wiki: A Case Study": <http://ieeexplore.ieee.org/document/7547308>.

William Uricchio gave a keynote on heritage industries in the digital age with the British Museum, Royal Shakespeare Company, BBC, and British Library; one on interactive documentaries and journalism at CEU; and another on VR and its many identities at the *Festival du nouveau cinéma* in Montreal; a lecture and workshop on transnational cultural flows at the University of Michigan; a keynote on "access, participation and the mediatized world" in Manchester; a talk on "the question of stability in the film medium" in Paris; and a discussion with architect Rem Koolhaas on the analog and digital at IDFA.

Research scientist and lecturer **Christopher Weaver** was appointed a Distinguished Scholar in the Lemelson Center for the Study of Invention and Innovation and chosen to co-direct the Smithsonian's new Videogame Pioneers Archive. The archive will be an attempt to examine the creation of an industry in the words of its pioneers. ●

FALL 2016 TALKS

Sep 8 | 3-133

“Innovation” and “Engagement”: Experiments with What Industry Buzzwords Can Mean in Practice

Sam Ford and **Federico Rodriguez Tarditi** discuss Fusion Media Group’s experiments with exploring new ways of telling stories, relationships with key publics, and new types of roles/positions in the company.

Sep 15 | 3-133

Knowledge’s Allure: Surveillance and Uncertainty

Sun-ha Hong on how “big” data and surveillance are not just about privacy and security but also redistribution of authority, credibility and responsibility.

Sep 22 | 3-133

Knowledge’s Allure: Surveillance and Uncertainty

Christine Walley, Professor of Anthropology at MIT, will present an overview of the Exit Zero Project, which “seeks to recapture the stories of a region traumatized by de-industrialization.”

Sep 22 | 3-133

Next Stage Planning for the Digital Humanities at MIT

Douglas O’Reagan will update the audience on his efforts and invite suggestions and ideas concerning the future of digital humanities at MIT.

Oct 6 | 3-133

This Land Is Our Land: Mobile Media, Protest, and Debate in Maasai and Mongolian Land Disputes

Baruch College’s **Allison Hahn** on how academics might engage once-distant communities and better understand the complexity of mobile media and nomadic deliberation.

Oct 13 | 3-133

How Did the Computer Learn to See?

Did computers learn to see by modernity’s most highly evolved technologies of vision, or, as **Alexander Galloway** argues, from sculpture?

Monday Oct 17 6pm | 2-190

Time Traveling with James Gleick

In conversation with Alan Lightman, international best-selling author and science historian **James Gleick** discusses his career, the state of science journalism, and his newest book *Time Travel: A History*.

Oct 20 | 3-270

The Turn to “Tween”: An Age Category and its Cultural Consequences

How are “tweens” represented in popular culture, including music, television, and YA literature? And how does this relatively new age

category intersect with — or elide — issues pertaining to race, class, and gender identity?

Oct 27 | 3-133

Kara Keeling and Wendy Chun speak as part of “Racial Regimes, Digital Economies” symposium

With USC’s **Kara Keeling** on “Black Futures and the Queer Times of Life” and Brown University’s **Wendy Chun** on “Racial Infrastructure”.

Nov 3 | 3-133

Illuminating 2016: Using Social Listening Tools to Understand the Presidential Campaign

Jennifer Stromer-Galley describes the large-scale collection and machine learning techniques used to study how presidential candidates use social media.

Nov 10 **6pm** | 26-100

An Evening with John Hodgman

John Hodgman brings his razor-sharp wit to MIT for a moderated discussion on his career and the state of comedy today.

Nov 17 | 3-133

Fall 2016 Alumni Panel: Andres Lombana-Bermudez, Colleen Kaman, Abe Stein, and Lily Bui

Join us for this year’s alumni panel, when we hear from four alums of the graduate program in Comparative Media Studies as they discuss their experience at MIT and what their careers have looked like in the fields a CMS degree prepared them for.

Dec 1 | 3-133

Black + Twitter: A Cultural Informatics Approach

André Brock, scholar of Black cyberculture, offers that Twitter’s feature set and ubiquity map closely onto Black discursive identity.

Dec 8 | 3-133

#Misogynoir, #SolidarityIsForWhiteWomen, and other forms of Black Digital Feminisms

MLK Visiting Scholar **Kishonna L. Gray** discuss how operating under the oppressive structures of masculinity, heterosexuality, and Whiteness that are sustained in digital spaces, marginalized women persevere and resist such hegemonic realities.

All talks are Thursdays at 5pm unless noted. A full schedule, including conferences and special events, is available at cmsw.mit.edu/events. Miss an event? Catch up at cmsw.mit.edu/media.

RECENT EVENT PODCASTS AND VIDEOS

Virtual Reality Meets Documentary: A Deeper Look

cmswm.it/virtualmeetsdoc

Featuring the leading creators in the virtual reality space, helping us better understand VR's potentials and implications for documentary and journalism.

Reflections on Advanced Identity Representation

cmswm.it/foxharrellpodcast

Fox Harrell presents outcomes from his National Science Foundation-supported Advanced Identity Representation project, which helped reveal social biases in existing systems and implements systems to respond to those biases with greater nuance and expressive power.

What Do People Do All Day?

cmswm.it/nickseaver

CMS alum and Tufts University assistant professor **Nick Seaver** asks, "If we want to make sense of new algorithmic industries, we'll need to understand how they make sense of themselves."

Being Muslim in America (and MIT) in 2016

cmswm.it/musliminamerica

How hateful, discriminatory rhetoric influences public opinion, its impact on the daily lives of Muslim-Americans, and strategies for combating it.

Mooning Texas

cmswm.it/mooningtexas

Michael Taussig's adventure story involving social energy + art + Emile Durkheim's "take" on Mauss + Hubert's "take" on mana + the creativity of gossip.

Media Marathoning and Affective Involvement

cmswm.it/lisaperkspodcast

Lisa Glebatis Perks draws from discourse gathered from over 100 marathons to describe some of marathons' most common emotional experiences, including anger, empathy, parasocial mourning, nostalgia, and regret.

A Conversation with Guy Maddin

cmswm.it/guymaddinpodcast

With William Uricchio, **Guy Maddin** discusses why we should bother digging up filmic and narrative memories from oblivion.

Excellence in Teaching

cmswm.it/excellenceteaching

What separates a good teacher from a great one? Former poet laureate **Robert Pinsky**, Weisskopf Professor of Physics **Alan Guth**, and MIT biology professor **Hazel Sive** — all honored teachers — will explore these issues with Literature professor and Communications Forum director emeritus **David Thorburn**.

Designing Histories of Slavery for the Database Age

cmswm.it/vincentbrown

Wrestling creatively with archival problems of the social history of slavery, **Vincent Brown** charts pathways for pondering history's most painful subjects.

How Facts Survive in Public Service Media

cmswm.it/carolinejack

When the Ad Council bombarded television viewers with messages on economic literacy, asks **Caroline Jack**, was it information or propaganda? One way to answer that question is to look at corporate managers and executives as consequential social actors.

Is There a Future for In-Depth Science Journalism?

cmswm.it/sciencejournalism

The leadership and reporting team of STAT — a new publication that focuses on health, medicine and scientific discovery — will discuss the publication's progress and how the field of science journalism is changing.

Documenting South Asian America's Interracial Past

cmswm.it/vivekbald

Vivek Bald, an Associate Professor in CMS/W and member of the MIT Open Documentary Lab, discusses his transmedia project documenting the lives of Bengalis who entered the United States at the height of the Asian Exclusion Era.

Women in Politics: Representation and Reality

cmswm.it/women-politics-representation

Women are chronically underrepresented in U.S. politics. Yet TV shows, fictions, and films have leapt ahead of the electoral curve to give us our first female president(s). What messages about women and power do these fictional representations of female politicians send?

Einstein, Mercury, And The Hunt For Vulcan

cmswm.it/levensonpodcast

MIT professor of science writing **Tom Levenson** discusses his new book, *The Hunt for Vulcan...And How Albert Einstein Destroyed a Planet, Discovered Relativity, and Deciphered the Universe*.

From Firing Line to The O'Reilly Factor

cmswm.it/hendershotpodcast

The conservative William F. Buckley hoped to convert viewers, but there was more to it than that. As professor **Heather Hendershot** tells us, you could actually learn about other points of view.

Ready for more podcasts and videos? Catch up, or subscribe for just-posted ones, at soundcloud.com/mit-cmsw and vimeo.com/cmsw.



MIT Comparative Media Studies | Writing
Building 14E, Room 303 & Building E15, Room 331
77 Massachusetts Avenue
Cambridge, Massachusetts, 02139 USA



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