american ethnologist
JOURNAL OF THE AMERICAN ETHNOLOGICAL SOCIETY

DONNA M. GOLDSTEIN
KIRA HALL
University of Colorado Boulder

Mass hysteria in Le Roy, New York:

How brain experts materialized truth and outscienced environmental inquiry

ABSTRACT

Teenage schoolgirls in Le Roy, New York, captured the attention of the U.S. public in 2011 and 2012 when they developed acute motor and vocal tics. Dramatic images of the girls' involuntary movements were briefly seen on national news and social media before clinical neurologists diagnosed the girls with "mass psychogenic illness" and required their retreat from media as part of the cure. Drawing from perspectives in medical and linguistic anthropology as well as the anthropology of expertise, we interrogate how this diagnosis, called "mass hysteria" in a previous generation of Freudian psychology, came to be favored over attribution to a potential environmental cause. Neurologists countered the evidential vagueness of environmental claims by suggesting that material proof of psychological origin could lie in fMRI data, contributing to a public narrative on female adolescent brains and rural U.S. communities that foreclosed environmental inquiry. [*brain imaging, environmental toxicity, expertise, mass hysteria, media discourse, mimicry, neurology*]

In fall 2011 in the small town of Le Roy, in upstate New York, 12 students enrolled at Le Roy Junior–Senior High School developed involuntary motor and vocal tics that resembled symptoms associated with Tourette syndrome. After widely publicized calls for help (*Today Show* 2012b), experts from the DENT Neurologic Institute in Buffalo and Rochester, a private practice group established in 1963, declared the affliction to be conversion disorder or, rather, because of its purported spread across acquainted persons, mass psychogenic illness (*Today Show* 2012a; WIVB-TV 2012).

The diagnosis initially inspired strong opposition from many parents of afflicted students. Some of them, supported by visiting journalists, wondered whether the causes of the illness might lie in the area's accumulation of multiple and potentially interacting industrial toxins (Dupont et al. 2012; Olmstead and Blaxill 2012a, 2012b), a phenomenon for which we use the shorthand term *toxic layering*. But within the first weeks of national news coverage, so many toxins had been proposed as potential sources of the illness that commentators began to dismiss all such claims as too muddled for consideration. Nevertheless, the possibility of toxic contamination caught the attention of environmental celebrity Erin Brockovich, whose team of assessors arrived in Le Roy, drawing even more news coverage to the cases (*Dr. Drew* 2012a, 2012b). In that coverage, however, Brockovich's investigators were ultimately "outscienced" by the DENT neurologists, who secured public acceptance of their diagnosis by deploying convincingly illustrated scientific discourses about the brain and its relationship to teenage girl sociality.

In this article, we analyze how expert knowledge from brain science came to trump a long list of environmental concerns. Our purpose is not to diagnose the mysterious illness; we are certainly not qualified to make this assessment. Rather, we seek to document how one authoritative profession managed to elevate its own knowledge system at the expense of another. Our interviews with local residents and a lead neurologist in the case during field visits to Le Roy in 2013 and 2014 give us an ethnographic

AMERICAN ETHNOLOGIST, Vol. 42, No. 4, pp. 640–657, ISSN 0094-0496, online ISSN 1548-1425.
DOI: 10.1111/amet.12161

starting point for understanding how this occurred. But we are equally interested in expertise as a broader discursive achievement. The neurologists' expertise was magnified by state administrators and journalists whose audiences were already primed to accept it by media valorizations of brain science and popular ideas regarding the behavior of teenage girls. As the case unfolded, parents and afflicted teenagers who contested this expertise became framed as demonstrating small-town ignorance of contemporary psychiatry (Dominus 2012; WGRZ 2012a).

We argue that the diagnosis of mass psychogenic illness prevailed because it served both a professional need to revalidate psychiatry as clinical neurology and a media investment in the popularization of "brain science." Both of these projects relied on and reinforced gender, age, and class stereotypes and protected powerful political and economic interests by diverting attention away from questions of responsibility and legal liability. In addition, the diagnosis appealed to the very human hope for a cure. But it also prevailed because the opposing discourse was weak: Toxic layering not only complicates causality but also, by its nature, generates audience fatigue, becoming banal. Current methods in laboratory-based science are rarely able to link individual industrial toxins to human harm (Altukhov 1990; van der Schalie et al. 1999), much less toxins in combination. In this late industrial era, when suspicions of toxicity are pervasively mediatized but rarely proven, the public has become increasingly aware of science's inability to provide resolution regarding harm claimed from nuclear, industrial, or agricultural waste (Goldstein 2014; Little 2014; Nash 2007). Even if an environmental diagnosis could have been achieved in the Le Roy case, in the current legal and regulatory climate it would have offered little hope of compensation or future prevention (Jasanoff 2005; Urbina 2013).

Medical anthropologists and scholars in science, technology, and society (STS) studies have exposed the manner by which qualities and symptoms associated with particular kinds of subjects are transformed into categories that then become interpreted by powerful medical and scientific experts (Latour 2013; Scheper-Hughes and Lock 1987). Yet some projects fail to capture the imagination of scientists, perhaps because they are too political, too underfunded, or too difficult to address with current methods and established ways of knowing. This research void, recently highlighted in the literature as "undone science" (Frickel et al. 2010; Hess 2007), includes industrial toxicity and its effects on humans. The variability that accompanies the embedding of toxins in diverse social and geographic landscapes cannot be replicated in laboratories designed to be context free (Nash 2007), leading to impoverished accounts of the effects of toxicity in particularized environments. We thus employ the strengths of a contextualized anthropology to track how science's inability to handle spatial and temporal complexity enables other nonenvironmental theories, even if questionable, to prevail in the space of uncertainty. In the Le Roy case, discursive alignments of Freudian theory, stereotypes of teenage girls, and the promise of new methodological directions in brain science colluded to foreclose environmental questions that could not readily be answered.

Figure 1. Main entry to Le Roy Junior–Senior High School, the site of a Tourette-like epidemic in 2011 and 2012 that was later diagnosed by the New York State Department of Health as mass psychogenic illness. Photograph by Donna Goldstein, 2013.

Expert narrations

In mid-January 2012, a desperate group of Le Roy parents took their children's cases to the national media in the hope of finding a diagnosis. They had spent much of the fall watching their children battle a range of neurological symptoms that also seemed to bewilder their doctors. For some children, these symptoms required hospitalization, involving violent seizures that could not be controlled even under heavy sedation.

Over the following three weeks, several of the girls appeared on television shows like the *Today Show* and *Dr. Drew On Call*. Others uploaded videos of their symptoms to social media and video-sharing websites such as Facebook and YouTube. Audiovisual images of teenage girls with flailing arms, twitching faces, and intermittent vocal outbursts quickly captured the attention of the public. The majority of the victims were students at Le Roy Junior–Senior High School (see Figure 1), and several, but not all, were involved in cheerleading or sports. Two girls from the town of Corinth, about two hundred fifty miles away, developed similar symptoms within the same time frame and were brought into the national spotlight as well. Shortly after the girls began to appear on national television, three

more Le Roy students came down with symptoms, as did a 36-year-old woman who lived in the town but was not overtly associated with the school. One of the students in this second cluster of cases was male, though his biography is rarely discussed in media coverage.

The media appearances were precipitated by what many of the parents saw as a lackadaisical response on the part of school administrators. After the first group of cases surfaced in October 2011, the Le Roy Central School District partnered with the Genesee County Health Department, the New York State Department of Health, the New York State Office of Mental Health, and medical professionals from WorkFit Medical to investigate causes of the illness.[1] On January 11, 2012, the associate commissioner of the New York State Department of Health, Dr. Gregory Young, announced the results to a crowd of over 300 concerned parents and students in the Le Roy school auditorium. Stating that the three-and-a-half-month investigation had "conclusively ruled out" infectious or environmental causes, he alluded to a stress-related diagnosis that could not be disclosed because of medical privacy rules. The statement angered many of the girls' parents, who had never received any kind of diagnosis from the physicians they had visited.[2] They were also disturbed that the investigation had not sampled soil and water on the school grounds. When two of the girls appeared on NBC's *Today Show* (2012b) a week later with their mothers to voice concerns about the investigation, physicians from the DENT Neurologic Institute appeared on local and national television to announce that they had evaluated 11 of the 12 afflicted students and that the diagnosis was conversion disorder (*Today Show* 2012a; WIVB-TV 2012).

At first glance, the collaborative investigation, whose report was released two weeks later, on January 31 (Le Roy Central School District et al. 2012), seems to have been quite thorough. Epidemiologic methods were employed to check out family medical history, significant life stressors, past and current medications, recent illness, drug use, and possible common exposures to toxic materials. Additionally, investigators searched biomedical literature for possible associations between environmental chemical exposures and the development of neurological tics. Three drinking water samples taken from the school building were tested for toxins that included 58 volatile organic chemicals, 63 separate pesticides and herbicides, and 11 metals. Data on indoor air quality and mold were also analyzed. Investigators considered the possibility that the Gardasil vaccine might have been associated with the girls' neurological symptoms. They even checked for PANDAS, a diagnosis that remains controversial in the medical profession for presuming a link between tic disorders and streptococcal infection (Leckman et al. 2011; see Le Roy Central School District et al. 2012:7). None of these tests revealed environmental or infectious disease factors. The report therefore concluded, on the basis of consultations with "the pediatric neurologist" at the DENT Neurologic Institute who had evaluated 8 of the 12 cases, that "this cluster of cases [is] the result of conversion disorder/mass psychogenic illness" (Le Roy Central School District et al. 2012:7).

The January 11 meeting had motivated some of the parents to call in Erin Brockovich, whose 1993 landmark case against Pacific Gas and Electric Company of California was popularized in a 2000 Hollywood film that shares her name. In late January, Brockovich sent a team of assessors to Le Roy, led by civil engineer Bob Bowcock of the California-based Integrated Resource Management firm, to take soil and water samples from the school grounds. Upon arrival at the school, Bowcock was forbidden by local law enforcement to enter the premises, though he was eventually allowed to tour the grounds as long as he did not take samples. A statement issued later that day by Superintendent Kim Cox accused Bowcock's group of "grandstanding" and said that any samples gathered would have had "no scientific value" (2012). Riposting that the district's investigation "wasn't even close to science" (Owens 2012c),[3] Bowcock did manage to collect water samples from four residential wells in the town, two of them in a field adjacent to the school, promising to collect soil samples when the ground thawed. As pressure from parents mounted, the school hired an environmental consulting firm, Leader Professional Services, to review previous testing and make additional recommendations for testing on school grounds.

Like many towns in upstate New York and, indeed, across the United States, Le Roy has a long history of exposure to an extensive list of industrial toxins. Most notable is the not-yet-remediated Lehigh Valley Railroad Derailment Superfund site just 3.5 miles east of the school, where a train accident in 1970 released 30,000 gallons of trichloroethylene (TCE) and 2,000 pounds of cyanide crystals into the ground. A 2014 report by the U.S. Environmental Protection Agency (EPA) describes the TCE-contaminated groundwater plume that extends east and southeast of the original spill.[4] Two other state superfund sites in the area—the Lapp Insulator site and the delisted Target Products site—had earlier contributed to contaminated groundwater near the school (Cattaraugus County Board of Health 2012; DeSmit 2009a, 2009b; Genesee/Finger Lakes Regional Planning Council and EcoLogic 2010). In addition, Le Roy is only 90 miles away from the West Valley nuclear fuel reprocessing plant that is controversial in the region for periodically leaking radioactive materials such as cesium 137, strontium 90, and mercury into the air and water; the plant experienced several leaks shortly before the first Le Roy cases were reported (Cattaraugus County Board of Health 2012). Other industrial pollutants include the arsenic-laden rat poison Rough on Rats, which was manufactured in town at the turn of the 20th century with materials that may

Figure 2. Welcome sign in downtown Le Roy, New York, that showcases the city's industrial achievement as the birthplace of Jell-O. Photograph by Donna Goldstein, 2014.

Figure 3. One of six natural gas wells on the grounds of Le Roy (New York) Junior–Senior High School. Photograph by Donna Goldstein, 2013.

have been improperly disposed of after the plant's closure (lucysfootball 2012; Olmstead and Blaxill 2012a), as well as toxic dye byproducts from the manufacture of (locally invented) Jell-O gelatin (see Figure 2), which residents claim were leaked into Oatka Creek daily until the closure of the General Foods plant there in 1964 (Dominus 2012).

Finally, some parents suspected contaminants in the school itself, constructed in 2003. Their concerns included residual pesticides, such as lead arsenate that might have entered the school grounds from fields formerly used as farmland or hazardous waste dump sites (Olmstead and Blaxill 2012a), as well as brine leaks of "produced water" from at least one of the six fracking wells on school grounds (see Figure 3) onto athletic fields in July 2011 (NYSDEC 2011).[5] Others wondered if the culprit might be a crop-dusting plane, captured on video by a local resident during a school day in late September spraying the insecticide Bifenthrin over a cornfield uphill from the girls' softball field (Olmstead and Blaxill 2012b). Still others voiced suspicion that ergot alkaloids from a fungus that grows on rye might be responsible (Olmstead and Blaxill 2012a). This toxic product, often found in the latex paint used to mark athletic fields, is believed by some scholars to have caused the convulsive symptoms labeled "demon possession" in 17th-century Salem (Caporael 1976; Matossian 1982).

Although extremely common in industrialized areas, such toxic layering complicates the establishment of clear causality with respect to environmentally induced harm. In Le Roy, the potential reach of each of these toxic materials is extended by the unique hydrogeological characteristics of the area, which include underground drainage associated with local karst topography as well as the susceptibility to flooding of Oatka Creek, which runs through the town center (Genesee/Finger Lakes Regional Planning Council and EcoLogic 2010). Indeed, the school itself is partly situated in a Federal Emergency Management Agency flood hazard area and wetlands. The year 2011, the year of Hurricane Sandy, was the wettest in recorded history for New York (National Oceanic and Atmospheric Administration 2012), with Buffalo, Rochester, and Le Roy all experiencing epic rainfalls in the spring preceding the outbreak.

The environmental concerns of Brockovich and Bowcock clustered around a yellow-orange substance seen on the athletic fields, possibly related to the existence of natural gas wells on the school property, and the train derailment spill. In several media interviews (e.g., *Dr. Drew* 2012a, 2012b), the two explained that remediation had not begun on the 1970 derailment site until the 1990s and that large drums of toxic waste still stood on the site. Their public statements motivated the EPA to remove 253 drums in early February 2012; 32 of those drums were found to contain detectable though minimal concentrations of contaminants, including TCE and cyanide.

Supported by a range of environmental bloggers, each of whom advanced his or her own theory about the illness, Brockovich argued that environmental concerns merited an independent toxicology review of the school grounds. Journalists and Le Roy residents familiar with environmental issues in the region understood this as a reasonable demand, given the complex flow of toxic materials through rock, the hydraulic fracturing that had taken place on school grounds, and the many additional forms of toxicity in the area. A 1997 NYSDEC report, which provided Brockovich's team with much of its information, stated that 30,000 gallons of TCE had gone into the ground and never been recovered. The report additionally describes remediation as "complicated" by the ongoing underground movement of the TCE plume.[6] Water samples taken in the early 1990s from more than 35 residential wells east of the site were deemed contaminated, as were samples from both soil and bedrock. Brockovich additionally expressed interest in the claim that contaminated rock from the quarry had been used to build the Le Roy school. The

January 31 report confirms that this was indeed the case, though it speculates that any residue left from that process would have met New York State drinking water standards.

Just a few weeks after the so-called mystery illness was introduced to the public, news stories about Le Roy came to an abrupt halt. From the beginning, the two leading neurologists associated with the Le Roy cases, Dr. Laszlo Mechtler and Dr. Jennifer McVige, had provided therapy that included strong prohibitions on "texting and friending" (Eakin 2012). When the number of students affected rose from 12 to 19 after the case went national,[7] DENT neurologists issued a statement that media coverage exacerbated the girls' symptoms and, through social media mimicry, might create new victims among an already impressionable population. Indeed, Dr. Mechtler overtly blamed the media for the "continued hysteria" and urged parents to "take away the social media and segregate [children] from friends who may be afflicted" (Owens 2012aa). The local media took these warnings seriously. Buffalo NBC affiliate WGRZ, for instance, publicly announced that "if not showing the teens and their tics will help, then we're in. … We've decided to do this because the doctors say it is best for the kids in this situation" (2012c). Without support from local news stations, the national media were unable to sustain interest in the case. A February 17 article by the Batavia, New York, *Batavian,* citing Mechtler on the absence of new cases after this waning in coverage, reported that "the national media spotlight on Le Roy … has nearly faded away" (Owens 2012b).

Not all of the affected families acceded to the media ban. One of the last discussions of the mystery illness in mainstream media was a 2013 interview for ABC's *Good Morning America*. In it, the mother of one of the Corinth teenagers voiced serious concern: "I really think they want people to hide somehow. DENT has clamped the mouths up of Le Roy people and I don't know how or what, but I know a lot of them don't want the media" (Lupkin 2013). But the news story emphasized that this mother, against the advice of DENT neurologists, was pursuing treatment for chronic Lyme disease, a diagnosis not recognized by the mainstream scientific community.

Assorted experts had been deeply involved in the case since its emergence in national news: journalists, academics, environmentalists, and neurologists appearing in outlets such as the *Atlantic,* the *Huffington Post,* the *New Yorker,* and the *New York Times Magazine* as well as scores of bloggers who followed the case from various angles in excruciating detail. While many of these experts expressed skepticism at DENT's involvement when the case first emerged, a majority eventually came to support the diagnosis of mass psychogenic illness. The results of Bowcock's water sampling, released in mid-February, were depicted as a victory for the neurologists. Even though his team had found higher-than-recommended amounts of the illegal gasoline additive MtBE in a well adjacent to the athletic fields, the media overwhelmingly focused on his parallel finding that the TCE plume had not moved toward the school. Brockovich's subsequent promise to continue her investigation was seen as irresponsible, and she too disappeared from the media. In June 2012, when the school district released 6,000 pages of unproblematic findings by Leader Professional Services, Mechtler declared his diagnosis confirmed and asked Brockovich to take back her "dramatic speculation about environmental toxins" (Tan 2012).

Anthropologists often trace contemporary research on expertise to Michel Foucault's (1980, 1994) early work on knowledge and power—work readers may remember as first taking aim at the discursive practices of psychiatry. Foucault brought a new consciousness to social science understandings of the relationship between specialized knowledge and claims to authority, particularly in the medical world. Anthropologists inspired by his work began to examine certain kinds of knowledge as emerging from particular constellations of history, society, and culture. More recently, scholars have emphasized that the continued elevation of expertise requires hard work. Timothy Mitchell, for instance, argues that economic expertise in Egypt "works very hard to help format and reproduce the exclusions that make the economy possible" (2002:301). Dominic Boyer points out that these exclusions are often produced by experts themselves, and he argues that anthropology will never understand the real work of expertise unless it moves beyond treating experts as rational caricatures and instead approaches them as human subjects—as "desiring, relating, doubting, anxious, contentious, affective" (2008:38). We attend somewhat to this prescription here as we relate the story of the lead neurologists in the case, although without inviting legal trouble.

But it is equally important to recognize the human subjectivity of the experts' target audience, as Carla Jones does when she explains that femininity training courses in Indonesia succeed in part because they immerse themselves within existing gendered anxieties while offering "facts in moments of ambiguity" (2010:278). Similarly, E. Summerson Carr, offering a semiotic perspective, asserts that expertise "requires the mastery of verbal performance, including—perhaps most importantly—the ability to use language to index and therefore instantiate already existing inner states of knowledge" (2010:19). Yet expertise is not only communicative; it is also a deployment of structural power. Gwen Ottinger (2013) shows how scientists working for corporations are viewed as more credible than citizen-scientists engaged in data collection, even when their professional involvement is clearly interested. Programs of corporate social responsibility can exploit the cultural capital of hired experts to reposition concerns about the environment as a problem of public relations instead of industrial waste.

In the Le Roy case, neurological and psychiatric expertise gained traction because it appealed to existing anxieties and ideologies regarding teenage girls, the rural U.S. working class, and social media. But it also prevailed because of the compounded power of neuroscience in the early 21st century. The expert narrations we have outlined in this section are not simply competing scientific theories jockeying to provide the best explanation for the girls' affliction. Rather, they are competing regimes of expertise backed by powerful networks of professionals, lay citizens, corporations, resources, funding bodies, and ideas.[8] In what follows, we thus call attention to the expertise that fails as well as to the expertise that succeeds. Our analysis suggests that environmental inquiry is, for many Americans, quite ambiguous, leading to endless research and lawsuits and hence easily supplanted by authoritative epistemologies that appear more concrete.

Modernizing hysteria

Conversion disorder and *mass psychogenic illness* are the contemporary terms for *hysteria* and *mass hysteria,* respectively, which recall the writings of Sigmund Freud. Freud was primarily interested in the hysteria of individuals, not collectives, and did not discuss psychogenic contagion in *Studies of Hysteria* (Breuer and Freud 1955). Nevertheless, contemporary psychologists critical of the modern turn away from Freud watched the Le Roy case with hardly contained glee. Forensic psychologist Stephen Diamond exemplifies this reaction in *Psychology Today:* "In a tiny, unknown New York town, something remarkable is happening. Something that, in this rabidly anti-Freudian, anti-Jungian, anti-psychodynamic, cognitively, behaviorally and pharmacologically indoctrinated climate of contemporary psychology and psychiatry, shouldn't be happening. But it is" (2012).

Most readers are familiar with the voluminous critiques of Freud's writings on hysteria, particularly the Anna O. and Dora case studies. Medical historians claim that Freud missed what would today be viewed as obvious organic causes (Webster 1995). Feminist critics have charged Freud with denying sexual actualities and power dynamics between women and men, and some, like Jeffrey Masson (1984), extend the critique beyond Freud to a broader Victorian context. Cultural and medical anthropologists sympathetic to Foucauldian poststructuralism view Freud's work as a curiously Western mixture of fantasy and repressed Victorianism that has fallen out of analytic fashion. Yet the Le Roy case illustrates that the diagnosis of mass hysteria is alive and well. Resuscitated from its Freudian past by DENT neurologists, the diagnosis rapidly earned nationwide support as the appropriate descriptor for a community of teenage girls suddenly afflicted by involuntary movements.

Anthropologists have long been uneasy about how the psychiatric diagnosis of mass hysteria dismisses culture, political economy, and patient perspectives. Medical sociologist Robert E. Bartholomew (1990) perhaps speaks for many anthropologists when he echoes Arthur Kleinman's argument that "mass hysteria is an imaginary mental disorder invented by Western psychiatry" (1977:473). Bartholomew has since reversed his position on this point (cf. Bartholomew and Wessely 2002), but his early work prefers a Geertzian symbolic interpretive approach, which allows for a particularist exposition of unique cultural contexts that may give rise to the "collective exaggerated emotion" falsely universalized under the label "mass hysteria."

But, as Bartholomew himself acknowledges, a Geertzian approach may underemphasize political and economic influences. A second line of anthropological critique is often traced to Aihwa Ong's (1987) analysis of spirit possession among female factory workers in Malaysia. Ong notes that the medical literature on spirit possession often paints the afflicted as having "superstitious beliefs" and existing outside "modern institutions" (1987:30). In response, she reminds readers of the very material "health hazards in microchip assembly plants" (1987:36–37). Although the behaviors she studied are quite distinct from the "tics" observed in Le Roy, in both cases a categorization as mass hysteria invokes modern hegemonic discourses of medical supervision and does not question whether material conditions may have precipitated the incidents. In the end, Ong suggests that the use of cosmopolitan medical concepts in Third World settings may erase authentic experiences of the sick, whether physiological or psychological.

This suggestion links to a third anthropological critique, that psychiatry tends to overlook patient perspectives. A recent example comes from Susie Kilshaw's work on Gulf War syndrome, which calls for more attention to "sufferers' own accounts" (2008:220). Her work traces how psychiatry's suggestion that the syndrome is stress related and thus psychiatric was "fiercely disputed by [UK] veterans" (2008:226) who maintained that their psychological problems were chemically induced. Kilshaw believes that the UK media, which explored the potential of diverse toxic agents, were instrumental in moving the public to support the veterans' definition of Gulf War syndrome.

In the Le Roy case, the U.S. media saw things differently, and we cannot help but wonder whether the reason involves existing anxieties about both gender and class.[9] The neurologists voiced a Freudian understanding of hysteria, even if they called the condition by its modern name. First, their diagnosis of conversion disorder relied on the idea, popularized by late-19th-century case studies, that adolescent girls are particularly susceptible to the illness. In several public interviews, DENT neurologists argued that mass psychogenic disorder is the only diagnosis that can explain why the illness predominantly affected female teenagers. Their embrace of Freudian tradition contrasts with the high-tech packaging of the DENT Neurologic

Institute in Buffalo, where Dr. McVige sees patients. We visited her there in the spring of 2014 to interview her about the Le Roy case. Surrounded by informational pamphlets celebrating DENT as "West New York's Leader in MRI and CT Imaging," McVige justified the diagnosis by recalling gendered understandings of hysteria: "Why is it only girls? Why are they healthy young teenagers? Why are there not elderly people and children affected? It doesn't make any sense" (Goldstein interview with McVige 2014).

The possibility that women and men—or for that matter, adults, teenagers, and children—may react differently to toxins or confront different kinds of exposure in their daily routines did not surface in this debate. Yet organizations such as the Endocrine Disruption Exchange argue that interactions among hormones and chemicals are key to understanding the toxic effects of chemical exposure (see TEDX 2015). Questions about gendered social routines and differentiated bodies may thus inform the deeply biological.

The DENT neurologists tread carefully between the datedness of Freudian psychiatry and the newness of neurology. Consider how Mechtler answers a question about adolescent girls in a media interview:

> Interviewer: Are adolescent girls somehow more susceptible to this sort of thing?
>
> Dr. Mechtler: They are and—and I'm not sure if we know why. Hippocrates is the father of medicine—used the term *hysteria* initially. And *hysteria* or *hystera* is the uterus. So *hysterectomy* is the taking out of the uterus. So whatever reason, our forefathers in medicine realized young women—adolescent women—are far more prone to have this. Doesn't mean boys can't have it. One could get into the psychosocial reasons why that occurs, but that's a discussion that's too lengthy. [WGRZ 2012a]

Through talk of forefathers and etymologies, Mechtler authorizes himself as an expert on gender and hysteria. But he does this without ever mentioning psychiatry, making Hippocrates his referent instead of Freud. Still, the perception that boys can also suffer from the illness is more aligned with Freud than Hippocrates, who had in the fifth century attributed the condition to a "wandering womb." Freud significantly updated earlier ideas regarding hysteria in his text with Josef Breuer (Breuer and Freud 1955), even arguing for the existence of male hysteria in rare cases.

A second way that DENT neurologists revived Freud was by asserting that the girls had somatized stress. Noting the statistical tendency for mass hysteria to emerge in small rural towns, the DENT team held up the girls' everyday problems (here read as class issues related to rust-belt impoverishment) as a potential source of this stress. Many of the girls themselves, however, joined their parents in rejecting stress as a causal mechanism. Consider the following reactions by several of the girls' parents to the diagnosis, as reproduced in Amanda Blue's (2012) documentary *The Town That Caught Tourette's:*

Figure 4. Retail store in the economically compromised downtown of Le Roy, New York, home of approximately eight thousand residents. Photograph by Donna Goldstein, 2013.

> Katy's mother: I just didn't feel that it was Katy. I mean, she was outgoing, she was doing her schoolwork, she was into sports, she had a boyfriend. Everything was going well for her.
>
> Katy's father: And Katy was on the high honor roll when this all started.
>
> Katy's mother: She never really seemed to be stressed about anything.
>
> Lauren's mother: I know my daughter. I mean, I'm home with my kids and, you know, I—I know. They're on. It just does not make sense.
>
> Lori's mother: It was completely out of this world, to me, that they would say that this was a psychiatric issue. . . . Not that she would never have any problems. She's a teenager—has a boyfriend. There's a lot of issues that we all go through. . . . But—for her to develop into this because of a psychiatric issue? Absolutely not. So when a doctor says it's conversion order, you know I really feel like saying to them, "Stop lying to me and just tell me you don't know what in the hell's going on!"

For DENT neurologists, these responses were just more denial. "No one wants to hear that anything is within self," Dr. McVige asserts in the same documentary. "They want a pill, or a shot, or to blame it on the environment, or to blame it on an infectant—I want the magic pill to make me better."

Across media interviews, the DENT team implied that residents of this rural town of 8,000 people (see Figure 4) were uncomfortable visiting a psychiatrist or admitting

a psychological problem. Those who resisted care were simply too uneducated to recognize expertise:

> Interviewer: Do you think some parents just don't want to have their child affiliated with some sort of psychiatric condition?
>
> Dr. Mechtler: I think to accept a psychiatric disorder is much more difficult to accept than a problem such as MS or brain tumors. … We've reached out to the parents to come in. … The individuals that have come to us and that have been under our care are doing better. And the ones on the media are the ones that have not come to the Institute and are not actually followed by an individual with an expertise in that field. … The way we examine a patient tells us more than any other test. And that's what is very difficult to understand: how a neurologist can examine (the) patient and know that this is a conversion disorder. That's the point that's not being accepted. [WGRZ 2012a]

Indeed, McVige suggested to us that clinical neurology, a field popularly viewed as being about the brain instead of the psyche, is able to escape the stigma of psychiatry in rural areas, even if neurologists and psychiatrists often agree on the same diagnosis and treatment: "Many of the families didn't want to go to a psychiatrist because they didn't want the stigma. So they ended up going to neurology because it's easier to say it's a neurologic disorder than a psychiatric disorder" (Goldstein interview with McVige 2014).

Journalists quickly took the neurologists' class-based reading of the victims to a new level. In a feature essay in the *New York Times Magazine,* introduced by a bleak photograph of two of the girls in a messy kitchen next to a giant box of Froot Loops, Susan Dominus (2012) produces a Freudian-style analysis that emphasizes stress and explores a "common thread" among the victims of absentee biological fathers. Her essay reflects a New York City discomfort with this upstate village, particularly in the way she discusses residents' provincialism with respect to psychiatry and, by implication, attributes the girls' own denial of stress to false consciousness. Dominus is careful throughout the article to address the many different perspectives on the case, so we cannot help but wonder at the ease with which she ignores what the girls themselves tell her.

Other commentators were intrigued by the way the mystery illness managed to transform the banality of small-town America. Marion Rust, a professor of English at the University of Kentucky, theorizes how otherwise "unexceptional women" became temporarily famous by entering a larger cultural debate regarding "the mind's capacity to unravel the body" (2013:16). Rust argues that where middle-class television audiences understood the families' resistance to psychology as reflecting a diminished interpretive capacity, residents of Le Roy searched for nonpsychological explanations that synced with their hardy working-class materialism, preferring "'hard science,' whether in the form of environmental contamination or bacterial infection, to the uncertainties and potential stigma of psychiatric diagnosis" (2013:16). Surely, Rust's essay must be one of the few to portray rural Americans as advocates for hard science.

A third way that DENT neurologists reanimated Freud involved a peculiarly materialist makeover of the talking cure. Gender and class stereotypes did their part in making Freud palatable to a doubting public. But the real game changer was the neurologists' incorporation of brain-imaging technologies. Freud was trained by a leading 19th-century neurologist, Jean Martin Charcot, who suggested that hysteria is not psychiatric but neurological, caused by an elusive "functional lesion" of the brain (Hustvedt 2014:307). In 2000, a new wave of brain researchers published a study that attempted to locate Charcot's functional lesions, using PET scans and comparing the brain of an individual with conversion disorder to that of an individual with left leg paralysis (Halligan et al. 2000). This research set into motion a search for the material foundations of conversion disorder and mass psychogenic illness, which DENT Institute neurologists involved in the Le Roy case have now joined. Two years after the case first broke, Mechtler and McVige edited a special issue of *Neurology Clinics,* a journal devoted to neuroimaging and understanding "biological processes on the central nervous system" (Mechtler 2014:xiii).

Joseph Dumit has called brain imaging "a technology and an apparatus with its own form of veridiction" (2004:125): In the public eye, brain scans provide visual data that validate neuroscience in a biologically deterministic manner. Kelly Joyce (2010) points to the evolving "technoscientization" of health care that serves the pecuniary interests of private actors, who create and expand lucrative imaging markets with little government control. Together, the allure of visualization and the drive for profit have inspired consumerist beliefs in the potential of this technology that often exceed its capability. (See Figure 5.) We see the effects of this development in the Le Roy case, where the mere promise of brain imaging transformed the DENT neurologists into experts of a new kind. Their lineage in psychiatry gave them the credentials to make a diagnosis of mass hysteria; neurology gave them the technology to prove it. Prominent media interviews position lead neurologists in the case in front of computer screens filled with 3D images of swirling neurons in vivid color or fMRI scans of glowing left–right brain hemispheres. In one of these interviews, Mechtler implies that a visual inspection of the brain explains what is going on in the psyche: "We look to see if the fibers are actually normal or they're damaged. … (We) see if we can look into their minds and find out what's so peculiar, what's so different" (WGRZ 2012b).

Figure 5. Human brain made from a gelatin mold on display at the Jell-O Gallery Museum in Le Roy, New York. Neurologist Dr. Adrian Upton challenged the science of new medical technologies in 1974 by connecting an EEG machine to a dome of lime Jell-O. A placard below the display reads, "A Bowl of Jell-O Gelatin and the Human Brain Have the Same Frequency of Brain Waves." Photograph by Donna Goldstein, 2014.

McVige had told us that the DENT team "threw in a couple of brain scans" when the girls' insurance providers refused to cover imaging work. She had hoped the scans would show some organic verification of their diagnosis and was disappointed when they did not. But as Mara Buchbinder has argued with respect to clinical neuroscientists who treat teenagers with conditions that resist diagnostic imaging, the use of "vivid neurobiological language, images, and metaphors" (2014) provides its own sort of therapy. Neither brain scans nor environmental tests thus provided concrete answers to the cause of the girls' symptoms. Yet the diagnosis of conversion disorder, unlike competing environmental claims, managed to maintain its status in the public imagination, even when the basis for it, in the end, did not go much beyond early Freudian theorizing.

The DENT neurologists positioned their diagnosis as necessarily excluding any involvement of toxicity. Their reasoning was circular: The girls exhibited tics that were common symptoms of conversion disorder, and conversion disorder, by definition, has no plausible organic cause.

> Dr. McVige: Any neurologist in their right mind that … witnessed the type of movement—anyone trained properly—would have looked and said, that's ridiculous. I mean the first day I looked and said this is ridiculous. This doesn't make any sense neurologically.
>
> Goldstein: Really? So it wasn't something you had actually seen a lot of ever before? This kind of movement?
>
> Dr. M: Conversion disorder?
>
> G: No. The kind of movements that go along with it.
>
> Dr. M: I do when someone has conversion disorder. [Goldstein interview with McVige 2014]

From Mechtler's and McVige's positioning as neurologists, inquiry about the potential causes of the girls' symptoms began and ended with the brain; their final diagnosis gave no consideration to the possibility that the brain itself might be affected by environmental factors. McVige was clear that had her professional colleagues seen the girls, they would "never" have linked the cases to regional toxicity issues.

While it is true that many harmful substances cannot cross the blood–brain barrier, neurotoxicologist Herbert Schaumburg (2007) points to a broad body of scientific studies indicating that toxins can penetrate the brain and that this process may not be visible in brain-imaging techniques. This process is additionally obscured by the lack of toxicology studies on preadult populations. A report by the National Scientific Council on the Developing Child (2006) notes that of the thousands of new chemicals brought to the EPA for review each year, only a small percentage are evaluated for potential effects on development, whether in the womb, childhood, or adolescence.

Brains, mimicry, and teenage girls

The neurologists' emphasis on brain scans captured the imagination of a U.S. public primed by gendered popularizations of research into the relation between mimicking behavior and mirror neurons, a class of cells that show increased activity when actions are observed as well as performed. Originally discovered in the macaque brain (Rizzolatti et al. 1996), these neurons fire when a monkey performs a goal-directed action, such as grabbing a peanut, and also when a monkey observes a similar action being performed by another individual, for instance, when the monkey watches the experimenter grab a peanut. As the discovery was controversially extended from monkeys to humans (Grafton et al. 1996),[10] vision to sound (Kohler et al. 2002), and, finally, goal-directed to expressive behaviors, cognitive neuroscientists hypothesized that mirror neurons might be the source of imitation patterns observed across several domains of human behavior, including conversation, embodiment, and emotion. V. S. Ramachandran (2009) even named this class of cells "Gandhi neurons" for their expected role in promoting human empathy (see also Iacoboni 2009). Over the past decade, the mainstream media have used mirror neurons to explain everything from social dialects and adolescent behavior—two topics that became important in the Le Roy case—to criminality, racism, pornography, and even culture.

Psychological research on what is often called "nonconscious mimicry" illustrates the central role played by imitation in human interaction: Speakers habitually imitate each other's movements in channels that range from facial expression and body posture to accent, speech rate, and tone of voice (Chartrand and Dalton 2008).[11] Even if the authors of these studies do not claim that mirror neurons

are involved, mirror neuron theorists view the studies as empirical evidence that human beings are neurologically disposed to mimic. Studies show a further correlation between imitative behaviors and perceptions of rapport, likability, and empathy. Studies of contagious yawning, for instance, a frequent topic of mirror neuron specialists, reveal that people are more likely to copycat a yawn if they feel empathy with their interlocutor (Norscia and Palagi 2011).

One year before the first Le Roy case was reported, psychiatrists Yao-Tung Lee and Shih-Jen Tsai (2010) proposed in the journal *Medical Hypothesis* that mirror neurons might be the missing link between mass hysteria and women. Their hypothesis builds on brain-imaging experiments that found women's mirror neuron systems to be more active than men's when subjects observed the hand movements of others (Cheng et al. 2006). If mirror neurons are the source of mimicry, then women should be more likely than men to develop the mimicking behaviors associated with mass hysteria. "Women have empathy, sympathy, understanding," Dr. McVige explained. "If you read the literature, it says that you want to be one with the other person" (Goldstein interview with McVige 2014). McVige went on to describe how northeasterners visiting places like Alabama often return with an accent that is difficult to overcome. Her choice of a southern state to demonstrate verbal mimicry is consistent with popular understandings of southern dialects as highly sociable (Preston 2004), but whether this is a fitting analogy for the neural proclivities of teenage girls is questionable.

The connection among mirror neurons, mimicry, empathy, and gender was tantalizing to journalists who had been reporting for years on another expanding body of mirror neuron research, one regarding autism, a disorder that primarily affects males and is thought to involve lack of empathy. Imaging studies by prominent mirror neuron theorists have suggested that persons with autism show diminished activity in the mirror neuron system (Iacoboni and Mazziotta 2007; Oberman et al. 2005). Indeed, studies have found that persons with autism are less likely to engage in contagious yawning (Senju et al. 2007). In this context, mass hysteria appears as the neurological opposite of autism, caused by an overactive, not underactive, mirror neuron system.

These "brain facts" synced perfectly with perceptions of teenage girl interaction. Contagious behaviors commonly cited in media accounts of the Le Roy case include imitative upspeak, the completion of each other's sentences, the adoption of each other's accents, and even contagious yawning. Consider the following excerpt from Dominus's *New York Times* feature, which describes an interaction between Thera, a cheerleader thought to be one of the two index cases for the illness, and her best friend, Katie:

> Over the course of the afternoon, both girls yawned, one after the other; one mentioned her stomach hurt, then the other one did, too. They spoke in shorthand and overlapping sentences. …
>
> "Katie told me that she wouldn't wish tics on anyone," Thera said, "but if it had to be someone, she was glad she was going through it with her best friend." [2012:33]

Dominus is well versed in the mirror neuron canon and uses it effectively in her account:

> Mass psychogenic illness is the maladaptive version of the kind of empathy that finds expression in actual physical sensation: the contagious yawn or sympathetic nausea or the sibling who grabs his own finger when he sees his brother's bleed. Any two people, as they try to delicately disagree or flirt or compare notes on the best route to Boston, might unwittingly match vocal tones or even frequency of eye blinks. [2012:34]

Alluding to the "enviable unity" of high school cheerleaders, Dominus implies that extremes of nonconscious mimicry are gendered female. The editorial staff of the *Week* embraces this same association: "There's … a theory that cohesive groups, particularly those that wear matching uniforms and excel at synchronized movements, might be more susceptible to mass suggestion" (*Week* Staff 2012). Popular feminist Caitlin Flanagan draws a direct connection among cheerleaders, mass hysteria, and teenage girls in general: "Most parents of adolescent girls will never have to contend with episodes of hysteria of the kind experienced by the cheerleaders. But anyone with a teenage daughter can attest that this is a time of emotional extremes and high drama" (2012). Some journalists and bloggers began to refer to the Le Roy case as "cheerleader hysteria" (e.g., Bell 2012), even though only a few of the students were cheerleaders.

With nonconscious mimicry established as the mechanism of transmission, the DENT neurologists pointed to social media as fueling the illness's spread. Research on what Ilana Gershon (2010) has labeled "media ideologies" suggests that technologically mediated modes of communication are popularly understood as antisocial. But these same modes are also viewed as spreading dangerous forms of sociality. Scholars who write about digital discourse, for example, have exposed how journalists depict textspeak as a kind of verbal contagion that is corrupting youth (Thurlow 2006). Video- and image-sharing sites such as YouTube, Vine, and Snapchat inspire similar anxieties, with commentators expressing concern that adolescent viewers will model embodied practices that range from "twerking" to anorexia and suicide. Dr. McVige echoed these fears when emphasizing female adolescents' need for connection: "When you're a teenager, your whole mindset is what's in the media, what's in Twitter and Facebook. Your whole life's controlled by it" (Goldstein interview with McVige 2014).

The DENT neurologists thus tapped into a broader U.S. anxiety regarding the contagious potential of social media. David Lichter, a children's neurology specialist at Buffalo General Hospital, supported the idea: "It's remarkable to see how one individual posts something, and then the next person posts something—not only are the movements bizarre and not consistent with known movement disorders, but it's the same kind of movements. This mimicry goes on with Facebook or YouTube exposure. This is the modern way that symptomology could be spread" (*Discovery News* 2012). Even Bartholomew, once a critic of psychoanalytic understandings of mass hysteria, cited the Le Roy case as "a milestone of mass psychogenic illness where the primary agent of spread will be the Internet and social media networks" (Bartholomew et al. 2012:511). The diagnosis of mass hysteria therefore served another purpose: It effectively prevented persons afflicted with the illness from reaching out to media or activists.

Several people we spoke with in Le Roy rejected the diagnosis of nonconscious mimicry and instead viewed the behavior as what a young woman at a local museum called "a hoax": "Only one girl ended up with that. The others just wanted to be in the cameras. These are stuck-up descendants from people that have made money over the years—popular people." Even though the neurologists we interviewed at DENT did not see the symptoms as fraudulent, they similarly assumed that popular girls (i.e., the "index cases") would spread the illness to impressionable others. But we wonder what an ethnographic study of this school of 630 students would have revealed. The illness affected students from the 7th to 12th grades and included many who would rarely socialize with each other: cheerleaders, softball pitchers, band members, soccer players, artists, and even an adult mother of two. For linguistic anthropologists and sociolinguists who study identity and interaction (see Bucholtz and Hall 2004, 2005), these diverse actors are unlikely candidates for discursive imitation in U.S. high schools (Bucholtz 2011; Eckert 2000; Mendoza-Denton 2008). In fact, the school district's investigation ruled out infectious causes precisely because "no common in-school or after school activities among the entire group were identified" (Le Roy Central School District et al. 2012:3). The affected students were hardly the "cohesive group" that Mechtler referenced in several of his media interviews (e.g., *Discovery News* 2012).

The banality of toxicity

In March 2013, roughly a year after the case had disappeared from the media, we traveled to Genesee County to get a physical picture of the town, the school, and the federal superfund site. Our visit was decidedly preliminary—we did not expect to talk to anyone during our brief stay. But when we stopped at a local bakery to ask directions to

Figure 6. Carcass of a dead animal next to the limestone quarry that borders the site of the 1970 TCE spill, Le Roy, New York. Photograph by Donna Goldstein, 2013.

Figure 7. Signs warning of danger posted near the Lehigh Valley Train Derailment and Superfund site in Le Roy, New York. Photograph by Donna Goldstein, 2013.

the derailment site, a young employee informally told us that she had grown up near it and that her younger brother had suffered from tics his entire life. She explained that because so many people in the town had tics from an early age, no one could be sure which girl was really ill and which was faking. "Every third person in Le Roy has a tic," she told us, "you just get used to it."[12]

As we drove to the site of the train derailment, we could see to one side the limestone quarry that many Le Roy residents reported having swum in during their youth. (See Figure 6.) The precise location where the train had derailed was fenced in with danger signs posted high on the poles. (See Figure 7.) A few rusty barrels still littered the landscape, but what had occurred here in 1970 was largely invisible. Later that night, we casually asked a waitress at a restaurant in the neighboring, larger town of Batavia about the case. Surrounded by a group of approving coworkers, she offered this summation: "It's like this: You have to dig real deep for something interesting to happen in Le Roy." We realized that she was referencing small-town boredom as the source of what was in her view a fabricated illness, but her answer also seemed an apt metaphor for the industrial disturbance of what lay beneath the earth.

The effects of toxic layering are discursive as well as physical: The public becomes fatigued by the multiple and recursive possibilities. A kind of numbness descends

on many of us as we follow extended media coverage of environmental catastrophes like the BP Gulf oil spill or the Fukushima nuclear plant failure. Don DeLillo (2009) captured this fatigue for an earlier generation in his novel *White Noise,* which describes how residents of a rural midwestern college town deal with a human-made "airborne toxic event" initiated by a railway car derailment. His work is fiction, but ethnographers have likewise narrated fatigue in their analyses of real-world situations. Ottinger (2013), to give just one example, describes the weariness experienced by community residents involved in an air pollution dispute with a Louisiana petroleum refinery. Although the corporation cast itself as socially responsible by developing informational programs that promoted better communication, it continued to remain technically unassailable, limiting the kinds of inquiry that could be pursued. A similar fatigue became evident in Le Roy, except that the multiplicity of toxic possibilities made unified activism impossible. Locals were divided over how to interpret the mystery illness, with a few demanding more environmental action, others shrugging their shoulders, and still others believing that the girls concocted their symptoms to get attention. Even in 2014, many residents jokingly referred to the illness as "mysteria," questioning the diagnosis that ultimately foreclosed environmental inquiry.

The DENT neurologists persuaded others of their expertise in part by representing conversion disorder as the only diagnosis that offered hope for recovery. In response to a question about the TCE spill, Mechtler characterized a toxicological diagnosis as a lifelong sentence: "Let me tell you, if it is causing it, then these patients will have symptoms for the rest of their lives, so that's a bad prognosis. Half of them are already getting improved—significantly improved. So it cannot be environmental fact, it can't be a toxin in the brain" (WGRZ 2012a). Parents, he implied, should choose the diagnosis that offered a cure. The author of an article in the *Atlantic* echoed his optimism: "Conversion disorder can be treated with anti-anxiety drugs for stress, physical therapy for uncontrollable movements, and counseling to resolve any underlying medical or psychological issues. Interested parties may disagree about what's troubling the girls of Le Roy but almost everybody believes they will each make a full recovery" (Jackson 2012).

We were unable to interview the teenage girls directly during our visits to upstate New York, since the treating neurologists did not allow them to talk with the media or other outsiders. But we had caught the early appearance of some of the girls on the *Today Show* and *Dr. Drew On Call*. Even then, it seemed clear to us that many avenues of inquiry had already been closed off, perhaps for fear of what would be found and who would be to blame, perhaps because of the difficulty of defending an environmentally based argument. City administrators had permitted hydraulic fracturing to pay for a state-of-the-art high school in an economically troubled town. According to accounts posted by locals on a number of online forums, this exchange had made a few people wealthy, including a school board member who, in 2000, sold the town the construction site when free land had been offered in another location (Owens 2012c). Could the school's refusal to allow testing by Bowcock's team, some locals wondered, be part of a cover-up? Bowcock overtly questioned the actions of school administrators: "When I'm confronted by officials barring access to something, they usually have something to hide" (Dr. Drew 2012a).

The January 31 report, published as new cases were still emerging, threw its full support to the DENT neurologists, giving their diagnosis equal weight with the health department's own investigation and stressing social transmission among women. The language of the report seamlessly reiterates arguments proposed by DENT neurologists and widely circulated in the press: "Outbreaks of mass psychogenic illness affect females more often than males"; "These eight cases all had significant life stressors, a common factor with conversion disorder"; "Tic-like symptoms may be a sign of conversion disorder" (Le Roy Central School District et al. 2012:4–7). From a policy perspective, the diagnosis of mass hysteria avoids legal questions about responsibility and liability that accompany identification of an environmental cause and constitute toxic tort cases. What the public has come to understand about such cases is that it is almost impossible for plaintiffs to win them (Dixon and Gill 2001). A recent investigative report in the *Nation* found that of 428 cancer cluster investigations conducted since 1990 in the United States, only three have established a link between pollution and illness, and this only after years of litigation (Lerner 2014).

Anthropologists have discussed how the general contour of scientific work is necessarily incomplete and often messy (Fujimura 1998; Latour 1987; Latour and Woolgar 1986), making its digestion in legal proceedings difficult. More to the point, since the 1970s, the courts have moved away from precautionary impulses toward redefining safety as acceptable risk (Boyd 2012) and have raised the bar on what constitutes scientific evidence (Jasanoff 2005). They are demanding numbers that plaintiffs can rarely produce, such as large epidemiological studies of populations living in the area (Goldstein and Stawkowski 2015) or reliable baseline readings of toxicity before contamination allegedly occurred (Goldstein 2012). In addition, the majority of scientific studies on toxic harm utilize animals as "sentinels" to think through how humans might react (van der Schalie et al. 1999), but plaintiffs who attempt to use these studies to prove causality are told that animals have limited generalizability to humans.

The current expectation of "big data" in environmental litigation has led some analysts to challenge earlier landmark victories for the environmental movement. Allan C. Mazur (1998), for example, characterizes the health

effects studies used in the 1970s Love Canal case as "flawed science." These studies, based on survey and blood test data, convinced the federal government at that time to provide emergency assistance to residents whose homes and schools were built on 22,000 tons of toxic chemical waste. Phil Brown and Richard Clapp counter that contaminated communities must now "bear the burden of proof that chemical companies and government regulators should be required to bear" (2002:97). Such communities have recently caught the attention of ethnographers, who follow how victims confront uncertainty in toxic landscapes that have seen industrial accidents (Button 2010; Fortun 2001; Hanna 2014), industrial pollution (Auyero and Swistun 2008, 2009; Brown 2007; Little 2009, 2014; Reno 2011), and nuclear-era waste exposure (Brown 2013; Goldstein 2014; Johnston and Barker 2008; Masco 2006; Petryna 2002; Stawkowski 2014).

Yet even when communities are united in their environmental concerns, their claims are not readily addressed or even believed. In the case of Le Roy, DENT neurologists and supporting media disparaged Brockovich as a divisive harbinger of potential lawsuits rather than seeing her as an environmental activist looking to support communities. In the end, journalists expressed what Charles Briggs and Daniel Hallin (2010) have identified as deep ambivalence regarding the entry of lay activists into the health-related public sphere, adopting a "medical authority model" that communicated the perspectives of the neurologists.

This brings us back to the issue of undone science. Even if Brockovich's team had found harmful agents, there remained the problem of connecting specific environmental toxicities to neurological symptoms. We assert here that the problem of causality is compounded by toxic layering. When research on toxic materials is carried out in laboratories, separate from the particularized terrains that hold interacting chemicals, it cannot account for the effects of the multiple toxic substances present in those terrains. Nor can it account for the range of effects on diverse human subjects, whose social and medical histories may determine the absence, presence, or severity of symptoms. In her discussion of agricultural toxicity in the California Central Valley, Linda Nash (2007) attempts to rescue environmental understandings of disease and health from contemporary shortsightedness; she suggests that the historical development of germ theory and vector-based understandings of disease have obscured environmental ways of knowing. Her discussion advances the idea of toxicity as a localized event, recalling the ways that early settlers dealt with pesticide exposure in an era before environmentalism. Science has moved far from the settler's situated understanding of the relationship between body and environment.

If society is indeed entering an age of toxic layering in which multiple mechanisms underlie environmental harm, parsing causality becomes a daunting project. Scientists who entered Le Roy and carried out tests, whether from the New York State Department of Health or Brockovich's environmental team, were all experts in a particular area of science. Their job was to isolate a variable and then cast it out from the realm of possibility. But what if a combination of factors was the culprit? How do we get to that knowledge?

Conclusions

Susan Sontag (1978), writing about cancer during a time when the disease was widely thought to be related to personality types and psychotherapy was offered as part of treatment, taught us that societally created metaphors can appear to blame an illness on the victim. More recently, S. Lochlann Jain (2013) has extended this critique to the gendered, raced, and sexually oriented metaphorical trappings of contemporary oncology and cancer treatment. In the Le Roy case, the metaphor of conversion disorder became meaningful through its mapping onto teenage girls. The diagnosis engaged with powerful societal ideas about bodies that are "stressed" by being simultaneously working class, rural, fatherless, and female (and therefore empathetic and highly communicative)—bodies that in turn require fMRI scans, psychotherapy, psychopharmacological treatment, and removal from public scrutiny and sociality in order to heal.

We do not claim to know what the proper diagnosis of the Le Roy students is, but what we tracked in this case was disturbing. School district investigators who did not look for toxic traces on the athletic fields tried to bar outsiders from conducting their own investigations. Then community leaders embraced one of the more implausible explanations, mass psychogenic illness, even when the report noted that the afflicted did not socialize together. The diagnosis ultimately won the public's approval and outscienced its competitors, in part because neurology appears to have deep cultural and scientific capital and in part because Le Roy village residents lack wealth and could be readily depicted as parochial and uneducated in medical matters. The diagnosis also had the advantage of not seeking to remediate harm done by a corporation, or a school board, or the U.S. government. Instead, it sought to locate the cause narrowly: inside the brain and among the afflicted themselves.

An excellent review of the Le Roy events by anthropologist Ryan Cook (2013) points out that there was "pushback" to the biomedical diagnostics that came to dominate this case. In Cook's opinion, many of those pushing back desired a less psychological diagnosis. While we agree that there was pushback, we think that it was not so much against psychology or psychiatry per se as against the rather dated diagnosis of mass hysteria and its facile mapping onto teenage girls. The neurologists countered this datedness by revalidating psychiatry as clinical neurology and giving a research basis to Freudian theorizing. They chose to treat patients afflicted with flailing limbs,

stutters, and seizures with what they understood to be the best of modern Western medicine: abstention from social media, prescription sedatives and antidepressants, and individualized counseling sessions to help release the stress of everyday life in rural America.

The process of discovery that the community, local scientists, and media engaged in over the Le Roy health problems suggests that the U.S. public is hesitant to pursue explanations based on industrial toxicity. This insight begs for a larger examination of environmental inquiry in late capitalism. The ready dismissal of known local toxins at the school building and in the community points to broader public fatigue regarding the resolution of toxic harm, whether with respect to causality, remediation, treatment, or liability. Brain science, packaged in brilliant colors for media consumption, serves up a much simpler and more immediate explanation than a thesis alleging toxic causation in a multiply toxic landscape. Pictures of the brain appear concrete next to the evidential vagueness of environmental claims, animating correlations among sex, class, and brain activity rather than the potential toxicity of substances no longer preemptively studied by our defanged EPA and extended scientific culture.

Notes

Acknowledgments. The authors would like to thank Angelique Haugerud, editor of *American Ethnologist,* for her crucial suggestions and comments, as well as the staff of *American Ethnologist*, particularly Linda Forman and Julie Nethercutt. We are also grateful to three anonymous reviewers for offering critical feedback and to Nancy Mann and Linda Forman for providing excellent editorial suggestions. We thank Dr. Jennifer McVige for granting a personal interview with us, respectfully acknowledging our different readings of the case. Many other colleagues have provided important insights to our thinking, among them, Marcus Avelar, Ellen Badone, Charles Briggs, Kate Brown, Mara Buchbinder, Mary Bucholtz, David Caha, Jillian Cavanaugh, Ilana Gershon, Steven Goldstein, Carla Jones, Marjoleine Kars, Susan Levine, Lindsay Ofrias, Bazil Manietta, Claire McFadyen, Christopher Morris, Ayden Parish, Aaron Seaman, Beth Semel, Merrill Singer, Tyanna Slobe, Magda Stawkowski, Linda Whiteford, and the very nice people of Le Roy, New York.

1. According to the January 31, 2012, report issued by these investigators, this partnership began in late October, when the Genesee County Health Department notified the New York State Department of Health that eight Le Roy students had developed neurological symptoms.

2. Parents of the afflicted girls were blindsided by Young's revelation of a definitive medical diagnosis. Jim Dupont exclaimed to a local news station: "If my daughter had a diagnosis and I knew about it … I would tell you that!" (WHAM-TV 2012). Melisa Philips expressed a similar reaction on NBC's *Today Show* (2012b): "Where's the proof, where's the data, where's the testing? When has this been done? Nothing's been collectively done for our daughters. … Testing they say that all the girls have had, they have not had. The facts that they're stating just aren't true."

3. Bowcock continued his critique of the school district's investigation on *Dr. Drew:* "The school and the New York Department of Health have not tested for anything. They hired a ROP program [regional occupational program] in the community, which is literally local students, to come in and do air, temperature, humidity, and CO2. They've not done anything else" (2012a).

4. The report attributes the decades-long delay of remedial action at the site to difficulties in securing coordination between the EPA and the New York State Department of Environmental Conservation (NYSDEC). After a series of actions that began only in the 1990s, NYSDEC took soil samples in 1992 and 1994 that registered TCE concentrations ranging from 46 to 570,000 micrograms per kilogram (ug/kg). Contamination was found in soil and bedrock at the original spill site as well as in the groundwater plume In 1998, the site became part of the EPA's National Priorities List.

5. The Catskill Citizens Organization (2011) registered concern that these spills were not recorded in the public record. NYSDEC does not consider a brine leak to be a chemical spill, but Catskill maintains that "produced water" is radioactive and contains toxic metals.

6. EPA-sponsored reports on the plume's movement are puzzling. A hydrogeologist colleague of ours found it strange that a 1995 report by Rust Environment and Infrastructure showed the same TCE concentration maps that a 2012 report by Unicorn Management Consultants did. She questioned whether the plume had remained stationary for 17 years.

7. The precise number of individuals afflicted by the illness varies across accounts, in part because students continued to develop symptoms long after the release of the January 31 report, even until September of the subsequent school year. In addition, some of those who exhibited symptoms were removed from the subject pool because of a previous history of Tourette syndrome.

8. We are grateful to Ilana Gershon for providing this insight.

9. Race is certainly also at issue in the diagnosis of mass psychogenic illness, a point we plan to address in future publications. Categories of race and ethnicity are ignored in discussions of mass hysteria, but groups associated with the diagnosis in the United States are overwhelmingly white in addition to being female and rural.

10. Mirror neurons have not been recorded directly in humans, since researchers cannot make use of the invasive techniques that "proved" the existence of mirror neurons in the monkey's frontal cortex. But brain-imaging studies point to a homologous area of the human brain that is activated when people imitate action.

11. Studies commonly cited in the mirror neuron literature focus on mimicking behaviors in the domains of accent, body movement and postures, conversation, dialects, emotion, facial expressions, rate of speech, syntax, yawning, and tone of voice.

12. Indeed, at least two of the afflicted teenagers were removed from the patient pool because of a previous history of Tourette. Upstate New York, like much of the industrialized Northeast, has a higher per capita incidence of Tourette than other regions of the United States. Data reveal the following regional prevalence of diagnosed Tourette syndrome per 1,000 children (6–17 years): Northeast 3.8; South 2.8; West 2.5; Midwest 2.3 (Centers for Disease Control and Prevention 2014).

References cited

Altukhov, Yuri P.
1990 Population Genetics: Diversity and Stability. Chur, Switzerland: Harwood Academic.

Auyero, Javier, and Debora Alejandra Swistun
2008 The Social Production of Toxic Uncertainty. American Sociological Review 73(3):357–379.
2009 Flammable: Environmental Suffering in Argentina. New York: Oxford University Press.

Bartholomew, Robert E.
1990 Ethnocentricity and the Social Construction of "Mass Hysteria." Culture, Medicine, and Psychiatry 14(4):455–494.
Bartholomew, Robert E., and Simon Wessely
2002 Protean Nature of Mass Sociogenic Illness: From Possessed Nuns to Chemical and Biological Terrorism Fears. British Journal of Psychiatry 180(4):300–306.
Bartholomew, Robert E., Simon Wessely, and James Rubin
2012 Mass Psychogenic Illness and the Social Network: Is It Changing the Pattern of Outbreaks? Journal of the Royal Society of Medicine 105(12):509–512.
Bell, Vaughan
2012 What's Causing Cheerleader Hysteria? Signs of a Struggle within the Brain? Discover Magazine, February 29. http://blogs.discovermagazine.com/crux/2012/02/29/whats-causing-cheerleader-hysteria-hypnosis-holds-a-clue/#.VNweh0uzJ98, accessed February 11, 2013.
Blue, Amanda, dir.
2012 The Town that Caught Tourette's. 55 min. Raw TV. London.
Boyd, William
2012 Genealogies of Risk: Searching for Safety, 1930s–1970s. Ecology Law Quarterly 39:895–988.
Boyer, Dominic
2008 Thinking through the Anthropology of Experts. Anthropology in Action 15(2):38–46.
Breuer, Josef, and Sigmund Freud
1955[1895] The Standard Edition of the Complete Works of Sigmund Freud, vol. 2: Studies in Hysteria. James Strachey, trans. New York: Basic Books.
Briggs, Charles L., and Daniel C. Hallin
2010 Health Reporting as Political Reporting: Biocommunicability and the Public Sphere. Journalism 11(2):149–165.
Brown, Kate
2013 Plutopia: Nuclear Families, Atomic Cities, and the Great Soviet and American Plutonium Disasters. New York: Oxford University Press.
Brown, Phil
2007 Toxic Exposures: Contested Illnesses and the Environmental Health Movement. New York: Columbia University Press.
Brown, Phil, and Richard Clapp
2002 Looking Back on Love Canal. Public Health Reports 117(2):95–98.
Buchbinder, Mara
2014 Neural Imaginaries and Clinical Epistemology: Rhetorically Mapping the Adolescent Brain in the Clinical Encounter. Social Science and Medicine. http://dx.doi.org/10.1016/j.socscimed.2014.04.012, accessed January 21, 2015.
Bucholtz, Mary
2011 White Kids: Language, Race, and Styles of Youth Identity. Cambridge: Cambridge University Press.
Bucholtz, Mary, and Kira Hall
2004 Language and Identity. *In* A Companion to Linguistic Anthropology. Alessandro Duranti, ed. Pp. 268–294. Oxford: Basil Blackwell.
2005 Identity and Interaction: A Sociocultural Linguistic Approach. Discourse Studies 7(4–5):585–614.
Button, Gregory
2010 Disaster Culture: Knowledge and Uncertainty in the Wake of Human and Environmental Catastrophe. Walnut Creek, CA: Left Coast Press.
Caporael, Linnda R.
1976 Ergotism: The Satan Loosed in Salem? Science 192(4234):21–26.
Carr, E. Summerson
2010 Enactments of Expertise. Annual Review of Anthropology 39:17–32.
Catskill Citizens Organization
2011 Toxic Spills Routinely Unreported by the DEC. http://catskillcitizens.org/learnmore/LE%20ROY%20REPORT.pdf, accessed January 16, 2015.
Cattaraugus County Board of Health
2012 Minutes, February 8. http://www.cattco.org/files/downloads/health/boh˙minutes˙ 2-2012.pdf, accessed February 10, 2015.
Centers for Disease Control and Prevention
2014 Prevalence of Diagnosed Tourette Syndrome 6–17 Years of Age, by Region. http://www.cdc.gov/ncbddd/tourette/research-map.html, accessed November 1, 2014.
Chartrand, Tanya L., and Amy N. Dalton
2008 Mimicry: Its Ubiquity, Importance, and Functionality. *In* Oxford Handbook of Human Action. E. Moresella, J. Bargh, and P. Gollwitzer, eds. Pp. 458–483. New York: Oxford University Press.
Cheng, Yawei, Ovid J. L. Tzeng, Jean Decety, Toshiaki Imada, and Jen-Chuen Hsieh
2006 Gender Differences in the Human Mirror System: A Magnetoencephalography Study. Neuroreport 17(11):1115–1119.
Cook, Ryan J.
2013 "I Didn't Want to Be One of the Contaminated People": Confronting a Mystery Illness in a Rural American Landscape. Somatosphere, April 8. http://somatosphere.net/2013/04/i-didnt-want-to-be-one-of-the-contaminated-people-confronting-a-mystery-illness-in-a-rural-american-landscape.html, accessed November 24, 2014.
Cox, Kim
2012 Le Roy Central School District Press Release, January 28. http://bloximages.chicago2.vip.townnews.com/thedailynewsonline.com/content/tncms/assets/v3/editorial/a/82/a82970fc-4aac-11e1-93cb-001871e3ce6c/4f259939634d7.pdf, accessed February 8, 2015.
DeLillo, Don
1985 White Noise. New York: Viking Penguin Group.
DeSmit, Scott
2009a Lapp, DEC Differ on Cleanup Plans. Daily News Online, March 10. http://www.thedailynewsonline.com/news/article_da9905a5-9dfb-5fc3-a682-d7f910d04d53.html, accessed May 10, 2015.
2009b Lapp Meeting Monday. Daily News Online, March 7. http://www.thedailynewsonline.com/news/article_fc0a36a6-e711-55b8-b2c7-99cb605c2f3c.html, accessed May 10, 2015.
Diamond, Stephen
2012 Return of the Repressed: Is a Mysterious Outbreak of Mass Hysteria Proving Freud Right? Psychology Today, February 5. http://www.psychologytoday.com/blog/evil-deeds/201202/return-the-repressed-is-mysterious-outbreak-mass-hysteria-proving-freud-right, accessed January 14, 2015.
Discovery News
2012 Is Social Media Spreading Twitching Hysteria? February 3. http://news.discovery.com/tech/twitching-disorder-social-media-120203.htm, accessed February 10, 2015.
Dixon, Lloyd, and Brian Gill
2001 Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases since the Daubert Decision. Santa Monica, CA: RAND Institute for Civil Justice.
Dominus, Susan
2012 The Mystery of 18 Twitching Teenagers in Le Roy. New York Times Magazine, March 11: 28–35, 46, 55.

Dr. Drew
2012a Is Toxic Spill Linked to Teen's Illness? January 30. http://transcripts.cnn.com/TRANSCRIPTS/1201/30/ddhln.01.html, accessed February 11, 2015; http://www.hlntv.com/video/2012/01/31/dr-drew-toxic-spill-linked-ny-teen-illness, accessed May 10, 2015.
2012b Woman Has Same "Medical Mystery" as NY Teens. January 31. http://transcripts.cnn.com/TRANSCRIPTS/1201/31/ddhln.01.html, accessed February 11, 2015.
Dumit, Joseph
2004 Picturing Personhood: Brain Scans and Biomedical Identity. Princeton: Princeton University Press.
Dupont, Jim, Judy Braiman, Claire Barnett, and Anne Rabe
2012 Letter to Superintendent Kim Cox, February 7. blogs.democratandchronicle.com/watchdog/files/2012/02/Leroy-School-Letter-Feb-7-2012.pdf, accessed November 26, 2014.
Eakin, Emily
2012 Hysterical: Le Roy Postcard. New Yorker, March 5. http://www.newyorker.com/magazine/le-roy-postcard, accessed February 11, 2015.
Eckert, Penelope
2000 Linguistic Variation as Social Practice: The Linguistic Construction of Identity in Belten High. Malden, MA: Wiley-Blackwell.
Environmental Protection Agency (EPA)
2014 Lehigh Valley Railroad Derailment Site, New York. October 14. http://www.epa.gov/Region2/superfund/npl/0203481c.pdf, accessed January 12, 2015.
Flanagan, Caitlin
2012 Hysteria and the Teenage Girl. New York Times, January 28. http://www.nytimes.com/2012/01/29/opinion/sunday/adolescent-girl-hysteria.html?_r=0, accessed January 10, 2015.
Fortun, Kim
2001 Advocacy after Bhopal: Environmentalism, Disaster, New Global Orders. Chicago: University of Chicago Press.
Foucault, Michel
1980 History of Sexuality, vol. 1: An Introduction. Robert Hurley, trans. New York: Vintage.
1994[1973] The Birth of the Clinic: An Archaeology of Medical Perception. New York: Vintage.
Frickel, Scott, Sahra Gibbon, Jeff Howard, Joanna Kempner, Gwen Ottinger, and David J. Hess
2010 Undone Science: Charting Social Movement and Civil Society Challenges to Research Agenda Setting. Science, Technology, and Human Values 35(4):444–473.
Fujimura, Joan H.
1998 Authorizing Knowledge in Science and Anthropology. American Anthropologist 100(2):347–360.
Genesee/Finger Lakes Regional Planning Council and EcoLogic
2010 Oatka Creek Watershed Characterization Report. http://www.gflrpc.org/Publications/BlackOatka/Characterization/OatkaCreekWatershed/FinalOatkaCharacterization.pdf, accessed January 12, 2014.
Gershon, Ilana
2010 Media Ideologies: An Introduction. Journal of Linguistic Anthropology 20(2):283–293.
Goldstein, Donna M.
2012 *Experimentalité*: Pharmaceutical Insights into Anthropology's Epistemologically Fractured Self. *In* Medicine and the Politics of Knowledge. Susan Levine, ed. Pp. 118–151. Cape Town: Human Sciences Research Council.
2014 Toxic Uncertainties of a Nuclear Era: Anthropology, History, Memoir. American Ethnologist 41(3):579–584.
Goldstein, Donna M., and Magdalena E. Stawkowski
2015 James V. Neel and Yuri E. Dubrova: Cold War Debates and the Genetic Effects of Low-Dose Radiation. Journal of the History of Biology 48(1):67–98.
Grafton, Scott T., Michael A. Arbib, Luciano Fadiga, and Giacomo Rizzolatti
1996 Localization of Grasp Representations in Humans by Positron Emission Tomography: Observation Compared with Imagination. Experimental Brain Research 112(1):103–111.
Halligan, Peter W., Bal S. Athwal, David A. Oakley, and Richard S. J. Frackowiak
2000 Imaging Hypnotic Paralysis: Implications for Conversion Hysteria. Lancet 355(9208):986–987.
Hanna, Bridget
2014 Toxic Relief: Science, Uncertainty, and Medicine after Bhopal. Ph.D. dissertation, Department of Anthropology, Harvard University.
Hess, David
2007 Alternative Pathways in Science and Industry: Activism, Innovation, and the Environment in an Era of Globalization. Cambridge, MA: MIT Press.
Hustvedt, Siri
2014 I Wept for Four Years and When I Stopped I Was Blind. Neurophysiologie Clinique/Clinical Neurophysiology 44(4):305–313.
Iacoboni, Marco
2009 Mirroring People: The Science of Empathy and How We Connect with Others. New York: Farrar, Straus and Giroux.
Iacoboni, Marco, and M. D. Mazziotta
2007 Mirror Neuron System: Basic Findings and Clinical Applications. Annals of Neurology 62(3):213–218.
Jackson, Nicholas
2012 It Could Just Be Stress: The Teens of LeRoy and Conversion Disorder. Atlantic, February 5. http://www.theatlantic.com/health/archive/2012/02/it-could-just-be-stress-the-teens-of-leroy-and-conversion-disorder/252582/, accessed February 11, 2015.
Jain, S. Lochlann
2013 Malignant: How Cancer Becomes Us. Berkeley: University of California Press.
Jasanoff, Sheila
2005 Science at the Bar: Law, Science, and Technology in America. Cambridge, MA: Harvard University Press.
Johnston, Barbara Rose, and Holly M. Barker
2008 The Consequential Damages of Nuclear War: The Rongelap Report. Walnut Creek, CA: Left Coast Press.
Jones, Carla
2010 Better Women: The Cultural Politics of Gendered Expertise in Indonesia. American Anthropologist 112(2):270–282.
Joyce, Kelly
2010 The Body as Image: An Examination of the Economic and Political Dynamics of Magnetic Resonance Imaging and the Construction of Difference. *In* Biomedicalization: Technoscience, Health, and Illness in the U.S. Adele E. Clarke, Laura Mamo, Jennifer Ruth Fosket, Jennifer R. Fishman, and Janet K. Shim, eds. Pp. 197–217. Durham, NC: Duke University Press.
Kilshaw, Susie
2008 Gulf War Syndrome: A Reaction to Psychiatry's Invasion of the Military? Culture, Medicine, and Psychiatry 32(2):219–237.
Kleinman, Arthur
1977 Depression, Somatization and the "New Cross-Cultural Psychiatry." Social Science and Medicine 11(1):3–10.

Kohler, Evelyne, Christian Keysers, M. Alessandra Umiltà, Leonardo Fogassi, Vittorio Gallese, and Giacomo Rizzolatti
2002 Hearing Sounds, Understanding Actions: Action Representation in Mirror Neurons. Science 297(5582):846–848.
Latour, Bruno
1987 Science in Action: How to Follow Scientists and Engineers through Society. Cambridge, MA: Harvard University Press.
2013 An Inquiry into Modes of Existence: An Anthropology of the Moderns. Cambridge, MA: Harvard University Press.
Latour, Bruno, and Steve Woolgar
1986 [1979] Laboratory Life: The Construction of Scientific Facts. Princeton: Princeton University Press.
Leckman, James F., Robert A. King, Donald L. Gilbert, Barbara J. Coffey, Harvey S. Singer, Leon S. Dure IV, Heidi Grantz, Lilliya Katsovich, Haiqun Lin, Paul J. Lombroso, Ivana Kawikova, Dwight R. Johnson, Roger M. Kurlan, and Edward L Kaplan
2011 Streptococcal Upper Respiratory Tract Infections and Exacerbations of Tic and Obsessive-Compulsive Symptoms: A Prospective Longitudinal Study. Journal of the American Academy of Child and Adolescent Psychiatry 50(2):108–118.
Lee, Yao-Tung, and Shih-Jen Tsai
2010 The Mirror Neuron System May Play a Role in the Pathogenesis of Mass Hysteria. Medical Hypothesis 74(2):244–245.
Lerner, Sharon
2014 Brain Cancer Cases Shot Up in This Florida Town—Is a Defense Contractor to Blame? Nation, November 3. http://www.thenation.com/article/182099/brain-cancer-rate-girls-town-shot-550-defense-contractor-blame, accessed April 26, 2015.
Le Roy Central School District, Genesee County Health Department, New York State Department of Health, New York State Office of Mental Health, and WorkFit Medical
2012 Investigation of Neurologic Symptoms among Le Roy Jr/Sr High School Students, January 31. http://www.leroycsd.org/files/1458956/health%20department%20report.pdf, accessed February 8, 2015.
Little, Peter C.
2009 Negotiating Community Engagement and Science in the Federal Environmental Public Health Sector. Medical Anthropology 23(2):94–118.
2014 Toxic Town: IBM, Pollution, and Industrial Risks. New York: New York University Press.
lucysfootball
2012 Don't Worry Dear: They'll Die Outside. January 22. http://lucysfootball.com/2012/01/22/dont-worry-dear-theyll-die-outside/, accessed December 4, 2014.
Lupkin, Sydney
2013 Girl with Tics Bucks Doctors, Blames Lyme Disease. Good Morning America, May 7. https://gma.yahoo.com/girl-tics-bucks-doctors-blames-lyme-disease-033636578–abc-news-wellness.html, accessed February 11, 2015.
Masco, Joseph
2006 The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico. Princeton: Princeton University Press.
Masson, Jeffrey M.
1984 Assault on Truth: Freud's Suppression of the Seduction Theory. New York: Farrar, Straus and Giroux.
Matossian, Mary
1982 Ergotism and the Salem Village Witch Trials. American Scientist 70(4):355–357.
Mazur, Allan C.
1998 A Hazardous Inquiry: The Rashomon Effect at Love Canal. Cambridge, MA: Harvard University Press.
Mechtler, Laszlo
2014 Preface. Theme issue, "Neuroimaging," Neurologic Clinics 32(1):xiii–xiv.
Mendoza-Denton, Norma
2008 Homegirls: Language and Cultural Practice among Latina Youth Gangs. Malden, MA: Wiley-Blackwell.
Mitchell, Timothy
2002 Rule of Experts: Egypt, Techno-Politics, Modernity. Berkeley: University of California Press.
Nash, Linda
2007 Inescapable Ecologies: A History of Environment, Disease, and Knowledge. Berkeley: University of California Press.
National Oceanic and Atmospheric Administration
2012 NOAA: 2011 A Year of Climate Extremes in the United States. January 19. http://www.noaanews.noaa.gov/stories2012/20120119˙global˙stats.html, accessed February 8, 2015.
National Scientific Council on the Developing Child
2006 Early Exposure to Toxic Substances Damages Brain Architecture. Working Paper, 4. http://developingchild.harvard.edu/resources/reports_and_working_papers/working_papers/wp4/, accessed November 2014.
New York State Department of Environmental Conservation (NYSDEC)
1997 Record of Decision, Lehigh Valley Railroad Derailment Site, Town of Le Roy, Genesee County, Site No. 8-19-014, March. Albany: New York State Department of Environmental Conservation.
2011 Well Inspection Report. http://catskillcitizens.org/learnmore/FEE6SPILL.pdf, accessed January 16, 2015.
Norscia, Ivan, and Elisabetta Palagi
2011 Yawn Contagion and Empathy in *Homo sapiens*. PLoS ONE 6(12): e28472. doi:10.1371/journal.pone.0028472, accessed November 2, 2014.
Oberman, Lindsey M., Edward M. Hubbard, Joseph P. McCleery, Eric L. Altschuler, Vilayanur S. Ramachandran, and Jaime A. Pineda
2005 EEG Evidence for Mirror Neuron Dysfunction in Autism Spectral Disorders. Cognitive Brain Research 24(2):190–198.
Olmstead, Dan, and Mark Blaxill
2012a Tics and Toxins: Evidence Points to Environment, Infection in LeRoy Outbreak. http://www.ageofautism.com/2012/02/tics-and-toxins-evidence-points-to-environment-infection-in-leroy-outbreak.html, accessed May 10, 2015.
2012b Tics and Toxins: New Evidence Raises Pesticide Concerns in New York State Outbreak. http://www.ageofautism.com/2012/07/tics-and-toxins-new-evidence-raises-pesticide-concerns-in-new-york-state-outbreak.html, accessed May 2, 2015.
Ong, Aihwa
1987 The Production of Possession: Spirits and the Multinational Corporation in Malaysia. American Ethnologist 15(1):28–42.
Ottinger, Gwen
2013 Refining Expertise: How Responsible Engineers Subvert Environmental Justice Challenges. New York: New York University Press.
Owens, Howard B.
2012a Another Conversion Disorder Patient Reported in Le Roy. Batavian, February 7. http://thebatavian.com/howard-owens/another-conversion-disorder-patient-reported-le-roy/30348, accessed February 8, 2015.
2012b As Media Coverage Subsides, So Do New Movement Cases. Batavian, February 17. http://thebatavian.com/howard-owens/media-coverage-subsides-so-do-new-movement-cases-dent/30520, accessed February 11, 2015.

2012c Specialist Questions Scientific Validity of Le Roy District's Environmental Reports. Batavian, January 28. http://thebatavian.com/howard-owens/specialist-questions-scientific-validity-le-roy-districts-environmental-reports/30187, accessed February 10, 2015.

Petryna, Adriana
2002 Life Exposed: Biological Citizens after Chernobyl. Princeton: Princeton University Press.

Preston, Dennis R.
2004 Language Attitudes to Speech. *In* Language in the USA: Themes for the 21st Century. Edward Finegan and John R. Rickford, eds. Pp. 480–492. Cambridge: Cambridge University Press.

Ramachandran, V. S.
2009 The Neurons That Shaped Civilization. TEDIndia. http://www.ted.com/talks/, accessed January 15, 2015.

Reno, Joshua
2011 Beyond Risk: Emplacement and the Production of Environmental Evidence. American Ethnologist 38(3):516–530.

Rizzolatti, Giacomo, Luciano Fadiga, Vittorio Gallese, and Leonardo Fogassi
1996 Premotor Cortex and the Recognition of Motor Actions. Cognitive Brain Research 3(2):131–141.

Rust, Marion
2013 An "Epidemical Distemper." Common-Place 13(3):1–17.

Rust Environment and Infrastructure
1995 Well Locations and Maximum Extent of TCE Contamination during Period 1991–1995, October 27. Albany, NY: Rust Environment and Infrastructure.

Schaumburg, Herbert H.
2007 Chemicals and the Nervous System. The Dana Guide. http://www.dana.org/Publications/GuideDetails.aspx?id=50005#sthash.CJ5JYGJy.dpuf, accessed February 10, 2015.

Scheper-Hughes, Nancy, and Margaret Lock
1987 The Mindful Body: A Prolegomenon to Future Work in Medical Anthropology. Medical Anthropology Quarterly 1(1):16–41.

Senju, Atsushi, Makiko Maeda, Yukiko Kikuchi, Toshikazu Hasegawa, Yoshikuni Tojo, and Hiroo Osanai
2007 Absence of Contagious Yawning in Children with Autism Spectrum Disorder. Biology Letters 3(6):706–708.

Sontag, Susan
1978 Illness as Metaphor. New York: Farrar, Straus and Giroux.

Stawkowski, Magdalena E.
2014 Radioactive Knowledge: State Control of Scientific Information in Post-Soviet Kazakhstan. Ph.D. dissertation, Department of Anthropology, University of Colorado Boulder.

Tan, Sandra
2012 New Study Finds No Toxins in Le Roy; Neurologists Link Twitches to Psychological Stress. Buffalo News, June 14. http://www.buffalonews.com/article/20120614/CITYANDREGION/306149960, accessed February 11, 2015.

TEDX
2015 The Endocrine Disruption Exchange. http://endocrinedisruption.org, accessed January 16, 2015.

Thurlow, Crispin
2006 From Statistical Panic to Moral Panic: The Metadiscursive Construction and Popular Exaggeration of New Media Language in the Print Media. Journal of Computer-Mediated Communication 11(11):667–701.

Today Show
2012a Doctor: Teens' Mystery Symptoms Are Psychological. January 18. http://videopediaworld.com/video/84740/Doctor-Teens'-mystery-symptoms-are-psychological, accessed May 10, 2015.
2012b School Baffled by 12 Girls' Mysterious Symptoms. January 17. https://www.youtube.com/watch?v=T9RPs_ysYgE, accessed May 10, 2015.

Unicorn Management Consultants
2012 Existing and Proposed Monitoring Wells. http://www.epa.gov/region2/superfund/npl/lehighvalley/LVRR˙Monitoring_Wells.pdf, accessed February 1, 2015.

Urbina, Ian
2013 As OSHA Emphasizes Safety, Long-Term Health Risks Fester. New York Times, March 30: A1.

van der Schalie, W. H., H. S. Gardner Jr., J. A. Bantle, C. T. DeRosa, R. A. Finch, J. S. Reif, R. H. Reuter, L. C. Backer, J. Burger, L. C. Folmar, and W. S. Stokes
1999 Animals as Sentinels of Human Health Hazards of Environmental Chemicals. Environmental Health Perspectives 107(4):309–315.

Webster, Richard
1995 Why Freud Was Wrong: Sin, Science, and Psychoanalysis. New York: Basic Books.

Week Staff
2012 Conversion Disorder: An Epidemic Spread by Sight. Week, March 23. http://m.theweek.com/articles/477146/conversion-disorder-epidemic-spread-by-sight, accessed January 15, 2015.

WGRZ
2012a Dr. Laszlo Mechtler Interview. http://www.wgrz.com/video/1432173021001/1/Dr-Laszlo-Mechtler-Interview—, accessed February 11, 2015.
2012b LeRoy Students Get Latest in High-Tech Brain Testing. February 23. http://www.wgrz.com/news/article/154380/0/LeRoy-Students-Get Latest In-High-Tech-Brain-Testing, accessed February 10, 2015.
2012c Students Suffering from Uncontrollable Tics. February 23. http://www.wgrz.com/news/article/154420/37/Doctor-Offers-Second-Opinion-on-LeRoy-Illnesses, accessed February 10, 2015.

WHAM-TV
2012 12 High School Girls with Mystery Disease—PANDAS? January 11. https://www.youtube.com/watch?v = hQqQxQ5eqxE, accessed February 8, 2015.

WIVB-TV
2012 Dr. Divulges Name of Illness in Le Roy, January 17. https://www.youtube.com/watch?v=vMU8dZFBO8I, accessed May 10, 2015.

Donna M. Goldstein
Department of Anthropology
University of Colorado Boulder
Hale Building, Campus Box 233
Boulder, CO 80309-0233

donna.goldstein@colorado.edu

Kira Hall
Department of Linguistics
University of Colorado Boulder
Hellems 290, 295 UCB
Boulder, CO 80309-0295

kira.hall@colorado.edu