

# Changing Knowledge, Local Knowledge, and Knowledge Gaps: STS Insights into Procedural Justice

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## Abstract

Procedural justice, or the ability of people affected by decisions to participate in making them, is widely recognized as an important aspect of environmental justice (EJ). Procedural justice, moreover, requires that affected people have a substantial understanding of the hazards that a particular decision would impose. While EJ scholars and activists point out a number of obstacles to ensuring substantial understanding—including industry's nondisclosure of relevant information and technocratic problem framings—this article shows how key insights from Science and Technology Studies (STS) about the nature of knowledge pose even more fundamental challenges for procedural justice. In particular, the knowledge necessary to inform participation in decision making is likely not to exist at the time of decision making, undermining the potential for people to give their informed consent to being exposed to an environmental hazard. In addition, much of the local knowledge

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important to understanding the consequences of hazards will develop only after decisions have been made, and technoscientific knowledge of environmental effects will inevitably change over the period during which people will be affected by a hazard. The changing landscape of knowledge calls into question the idea that consent or participation during one decision-making process can by itself constitute procedural justice. An STS-informed understanding of the nature of knowledge, this article argues, implies that procedural justice should include proactive knowledge production to fill in knowledge gaps, and ongoing opportunities for communities to consent to the presence of hazards as local knowledge emerges and scientific knowledge changes.

**Keywords**

environmental justice, procedural justice, knowledge gaps, local knowledge, public participation

Harlon Rushing moved to New Sarpy, Louisiana, in 1969. A pipe fitter by trade, he made his living doing construction in various petrochemical plants near his small town situated on the east bank of the Mississippi River between New Orleans and Baton Rouge, but he never worked at the oil refinery closest to his home. That refinery, Rushing told me when I interviewed him in 2003, did not even exist when he moved to New Sarpy, and the huge storage tanks visible from homes just two streets over were not built until the early 1980s. Like many of his neighbors, who spent 2001 and 2002 campaigning for relocation away from the refinery, Rushing felt that an injustice had been done: the proximity of the tanks endangered the community, he felt, and

It's just not right for people to have to live in that fear. I mean, if I'd a moved here after they built those tanks, I wouldn't a said a word about it, it would have been my fault. When I moved here, them tanks and all wasn't there. They wasn't there. And they infringed on my rights.

Notably, Rushing felt wronged less because of the presence of the refinery and its accompanying health and safety issues than because he felt that his right to choose whether to live so close to a hazardous facility had been trampled on. The injustice was compounded by the fact he and his neighbors had appealed to the local government in an attempt to stop the building of the tanks but felt that their protests fell on deaf ears.<sup>1</sup>

Rushing is not the only one who thinks that he should have been able to give, or withhold, his consent to environmental hazards like a nearby oil refinery. Environmental justice (EJ) scholars and activists see communities' ability to participate meaningfully in decisions that affect the local environment, including siting decisions for refineries, power plants, waste dumps, and the like, to be integral to the idea of EJ (Cole and Foster 2001; Schlosberg 2007). For some, this explicitly includes the notion of consent: participatory processes are a means through which community members can give their consent (or not) once they fully understand the scope and consequences of a proposal (Shrader-Frechette 2005, 2007). Common in EJ campaigns, community assertions that "we were here first," refer to this requirement of informed consent by implying that when residents moved into the neighborhood—an act often construed as constituting consent to whatever local hazards may exist—they did not know what they would end up living with.

But not all participants in EJ campaigns can claim to have been there first. Jeffrey Trahan and his family moved to New Sarpy in 2000, knowing of the refinery's proximity. At the time, Trahan told me in 2003, "I considered a little bit the plant right there, but I didn't think there was any kind of hazard or anything." Two years later, he was a member of the group calling for relocation away from the refinery, and he was among the residents trained to take air samples with a community-friendly "bucket" monitor. Over his time living in the neighborhood, he said, he had come to think that the neighboring refinery was violating environmental laws, and he had experienced firsthand the effects of their pollution: "I wake up sometimes and it's hard for me to breathe, like today, it's a lot harder to breathe than normal."

Stories like Trahan's are rarely heard in the EJ context—or, when they are, they are offered as evidence that residents of fence-line communities are victims not of structural injustice but of their own poor choices. Yet Trahan's story actually offers something important to thinking about what constitutes justice for communities living with environmental hazards. Specifically, it turns a spotlight on the limitations of the information available to communities asked to give their consent to an industrial facility—whether by moving to a town like New Sarpy or supporting a company's request for a permit to build a new plant. Having adequate information about the nature of one's choice is commonly accepted as necessary to giving meaningful consent (Faden and Beauchamp 1986). Yet, until he began waking up next to the oil refinery, Trahan could not know that its routine emissions would make it harder to breathe. As a long-time resident of the region, he would surely have been aware of environmental activists'

claims that petrochemical pollution caused adverse health effects, encapsulated in the area's well-known nickname, "Cancer Alley"; however, he would also have been exposed to frequent reassurances from government and industry experts, repeated and amplified by local media, that there was in fact nothing to worry about.

Scholars in STS have amply demonstrated the importance of local knowledge like Trahan's to robust understandings of environmental health issues (Fischer 2000; Irwin 1995 synthesize much of this research); they have also shown that science and technology are subject to constant remaking and revision (see Cohen and Ottinger 2011 for a review), and that political and institutional forces produce structured gaps in knowledge, especially around chemical exposures and their effects on human health (Frickel 2005; Frickel et al. 2010; Hess 2007; Magnus 2008; Michaels 2008). In this article, I bring these insights from STS to bear on EJ advocates' concerns with meaningful participation and consent as key components of procedural justice. Drawing on ethnographic fieldwork conducted in New Sarpy and the neighboring fence line community of Norco in 2002 and 2003, I show how changes in knowledge and technology, structured knowledge gaps, and necessarily situated knowledge of environmental hazards and their consequences undermine the ability of fence line communities to give or withhold their informed consent to a local hazard, especially over a span of decades—the length of time that an industrial facility can be expected to coexist with nearby residential communities. I argue that what we know about the nature of science and technology suggests that a model of meaningful participation that rests on community members consenting once to enduring hazards cannot be fully just; rather, STS-informed models of procedural justice should include both ongoing opportunities for consent as scientific understandings evolve and the obligation to continue to produce and refine knowledge relevant to residents' decisions.

The next section outlines the ideas of procedural justice and informed consent as they arise in thinking about EJ, with particular attention to the role that knowledge is to play in informing participation in decision making. In the sections that follow, I discuss New Sarpy residents' understandings of the hazards posed by emissions from the nearby refinery, showing how three themes in their talk about local environmental issues—not knowing, knowing from experience, and changing knowledge—not only illustrate STS arguments about knowledge gaps, local knowledge, and the inherent dynamism of science, but also suggest the consequences of these insights for the goal of procedural justice. The article's final section summarizes the challenges that STS poses to current notions of meaningful participation

and informed consent and argues for expanding the requirements of procedural justice to include proactive knowledge production and ongoing opportunities for participation and consent.

## **Consent and Justice**

The unfair distribution of environmental hazards was arguably the galvanizing injustice of the EJ movement. At a time when African American communities were protesting nearby hazardous waste dumps in the American south, studies showed a strong correlation between the racial makeup of a community and the presence of such facilities; that is, the higher the percentage of racial minorities in a community, the more likely it was to be home to a hazardous waste dump, even controlling for income and other socioeconomic factors (see Cole and Foster 2001). The concern with distributive justice has come to extend to poor and working class white communities who do not claim to be victims of environmental racism but nonetheless allege that they bear more than their share of exposures to industrial hazards, and the health impacts associated with them, relative to more affluent communities. Current policy responses also tend to focus on—or at least begin with—the distribution of hazards: in identifying “environmental justice communities,” environmental agencies look for those “experiencing disproportionate environmental and public health burdens” (National Environmental Justice Advisory Committee 2010, 1).

At the same time, the EJ movement has shown a keen awareness of the ways that distributive injustices are linked to inequities in structures for environmental decision making. EJ advocates have called attention to siting practices that target communities of color because of their political marginalization. In order to challenge the siting of hazardous facilities, communities of color have also had to confront exclusionary decision-making processes characterized by unrepresentative local governments, monolingual proceedings, and reliance on technocratic risk assessments, to name a few (Cole and Foster 2001). As a result, one of the Principles of EJ adopted in 1991 by the People of Color Environmental Leadership Summit calls explicitly for justice in decision-making practices: “Environmental Justice demands the right to participate as equal partners at every level of decision-making.”

Acknowledging procedural justice as an essential aspect of EJ,<sup>2</sup> one strand of legal and policy scholarship has analyzed the potential of various decision-making paradigms to enable the full and meaningful participation of community groups (Guana 1998, Hampton 1999). For the most part,

these assessments focus on the ability of community members to have their voices heard by decision makers and their potential to influence the decisions that are made; they suggest that if residents of affected communities have a genuine opportunity to change the outcome of a siting decision through their participation in policy processes—a high bar in itself—then the requirement of procedural justice is satisfied. Philosopher Kristin Shrader-Frechette (2005), however, sets a higher standard for procedural or, in her terms, “participative justice.” For her, participative justice demands not only that community members have a voice in decision making equal to that of scientific experts and other powerful actors, but also that they have the same rights as medical patients to informed consent. The right of informed consent is justified by the principle of respect for autonomy; grounded in Kantian moral philosophy, it requires that people not be used as means to the ends of others, but be able to assert their status as autonomous beings by making choices and taking action free from external control (Faden and Beauchamp 1986, 7-9). Where a potentially dangerous facility is sited close to a community over the objections of residents, it can be argued that their autonomy has not been respected because they were unable to choose the risks that they would live with. As a result, in Shrader-Frechette’s formulation, being a full-fledged participant in siting processes—the form of procedural justice that most EJ scholars focus on—is not enough because that alone does not guarantee that residents will be able to exercise their right to autonomous choice. Participative justice requires instead that those who stand to be affected by a siting decision actually be able to refuse to consent to a proposed facility’s presence in their community and thereby prevent it from being built.

The requirement of informed consent makes information about, or knowledge of, environmental hazards a central problem for procedural justice. Philosophers generally agree that, in order for consent to be considered valid, an individual must be competent to make a decision, be in a position to give their consent voluntarily and without coercion, have had information relevant and material to their decision disclosed to them, and have a substantial understanding of the consequences of their decision (Faden and Beauchamp 1986, see also Shrader-Frechette 2005, 77-81). Seeing disclosure as an important element of informed consent provides ethical grounds to excoriate polluting industries for suppressing information, making misleading scientific claims, and intimidating scientists who wish to draw attention to the health risks they pose (see, e.g., Schrader-Frechette 2007, 39-75). At the same time, the language of disclosure assumes that the

information necessary to understand the consequences of consenting to a siting proposal exists and need only be made accessible to those being asked to give their consent.

Individual informed consent is arguably too strict a criterion for procedural justice in siting decisions, creating as it does the possibility that a small number of people could bring industrial siting to a halt (Wenz 1995). Even community consent, which potentially causes similar issues, is not the standard used in most calls for procedural justice articulated by activists; rather, they demand to be included in decision-making processes in a way that recognizes communities' cultural values and disadvantaged place in political structures (Schlosberg 2007). Yet thinking about informed consent underscores the knowledge requirements embedded in even these broader notions of procedural justice. Citing Shrader-Frechette, philosopher David Schlosberg identifies access to information as one of the three central aspects of procedural justice as defined by the EJ movement, and he, too, suggests that lack of disclosure and even purposeful deception are primary obstacles to informed participation. At the same time, though, Schlosberg acknowledges that the "understanding" element of informed consent may not be able to be satisfied merely through the provision of information by experts. As a result, he includes community-based participatory research—a strategy that makes community members full partners in the production of environmental health knowledge—in his definition of procedural justice (Schlosberg 2007, 69-70). In so doing, he joins other EJ scholars in arguing that, because community members' ways of knowing the effects of local environmental hazards can differ substantially from those of scientists, local knowledge ought to be recognized and included as part of just environmental decision making (DiChiro 1997).<sup>3</sup>

The experience of people like Harlon Rushing—individuals living with a major environmental hazard over the span of several decades—shows that nondisclosure of relevant information and even the dominance of expert ways of knowing in decision-making processes are far from the only obstacles to achieving the substantial understanding of hazards necessary to procedural justice, however stringently defined. Any process affording community members a role as informed participants in decision making must also confront the facts that relevant information may simply not exist, that it may by its very nature be inaccessible at the time decisions must be made, and that it may undergo consequential changes during the period of time over which a policy decision or act of consent will expose people to hazards.

## Understanding Hazards in New Sarpy

New Sarpy residents' understanding of how the refinery affected their health were a frequent part of my conversations with them about how they came to live in close proximity to an oil refinery and how they felt about continuing to live there. The role of these understandings in their decision making should not be overstated: no community member described his or her residency in New Sarpy as the product of a calculated choice involving the weighing of environmental risks against perceived benefits (Ottinger 2013), nor did those who claimed to have been there prior to the refinery refer to an assessment of available information—or criticize public officials' failure to provide information—in their complaints about not having a say in the political processes that allowed the refinery to come so close. But even though residents' real decisions defied idealized versions of rational choice and informed consent, their reflections on the information available to them during their tenure in New Sarpy offer insight into inherent limitations to understanding the consequences of local environmental hazards, corroborating key STS findings and highlighting their implications for procedural justice. Three themes were particularly prominent in residents' accounts: not knowing, knowing as a product of experience in the community, and shifts in knowledge over time.

### *Not Knowing*

One January afternoon, I was taken for a driving tour of New Sarpy by Lara Oxnard\*,<sup>4</sup> a middle-aged woman I knew from church. She no longer lived in the town, but pointed out to me the house in which she had grown up and where other members of her extended family still lived. Oxnard told me that her father had worked for General American, a predecessor of the nearby refinery that owned and maintained tanks and rail vessels for industrial chemicals. Then, in the same breath, she told me that her father had died of cancer. I was puzzled by the way she juxtaposed the two facts without asserting any connection between the two, so I asked her if she thought her father's cancer was a result of his work in the industry. Oxnard's answer came quickly and with a tone of finality that ended our talk of industry and cancer: "I don't know," she said.

Oxnard was not the only one who conveyed a profound absence of knowledge when it came to the effects of industrial emissions on community health. Harold Masters\*, for example, told me that he wanted to move away from New Sarpy because he was sick. When I asked whether he



thought he was sick because of the refinery, he responded, “Well, it could be. It could not be. I don’t know for sure.” Audrey Taylor also described to me how she wondered about the connections between pollution from the refinery and illnesses suffered by members of her family: a doctor had told her that the kind of cancer from which one of her daughters died was found frequently in people who worked in industrial facilities or around pesticides—which, she said, made her “wonder.” She also worried about the health of her two brothers who had worked at Shell Chemical in the neighboring town of Norco: the surviving brother had a tumor at the base of his head which could not even be biopsied without endangering his life, and she wondered about a possible connection between the tumor and her brother’s work at Shell.

Like Masters and Oxnard, Taylor was not willing to blame petrochemical emissions outright for the ill health of her loved ones; indeed, she served on an industry-sponsored Community Advisory Panel and was inclined to accept plant engineers’ assurances that they were operating responsibly and in compliance with the law. Yet she would not dismiss the possibility, either. As she explained to me,

when you think in terms of the raw products that are made there [at Shell Chemical] to make all of these things that we have, and it’s bound to not always be so helpful to our health, because when you think in terms of even with cleaning products, you got to be careful with inhaling them.

Taylor’s common sense about the potency of industrial chemicals, combined with the lack of any definitive information demonstrating a link between emissions and health, thus left her—like others in the community—simply not knowing how to evaluate the hazards posed by the nearby refinery.

Many STS-informed studies of EJ emphasize what residents *do* know about the health effects of local hazards; in fact, the local knowledge claimed by some New Sarpy residents is an important theme of this article as well. Yet the not-knowing experienced by other community members is equally important, for it calls attention to the consequences of a different phenomenon well documented by STS scholars: the simple absence of certain kinds of information. To some extent, we can regard this absence as a “native” kind of ignorance: fence line communities are a place where “knowledge [of environmental health] has not yet penetrated,” and which can be a prompt for the creation of new knowledge (Proctor 2008, 4-5). Yet the absence of knowledge in this case is simultaneously systemic and strategic. Historical patterns of development, patterns in research funding,

academic incentives, and regulatory structures have been shown to result in the “systematic nonproduction of knowledge” (Frickel et al. 2010, 446; see also Frickel 2008; Hess 2007)—especially in domains like environmental health, where better knowledge would likely threaten the interests of industry, the military, and other political elites (Hess 2007, see also Michaels 2008, Proctor 2008).

Experienced as not-knowing by New Sarpy residents, the areas of undone science theorized by STS scholars complicate the problem of securing procedural justice for communities selected to play host to hazardous industrial facilities. The “substantial understanding” required for informed consent cannot be achieved through simple disclosure, if gaps in the relevant knowledge exist—as they are almost certain to, given the nature of the knowledge required in EJ cases. Even less stringent standards for procedural justice likewise demand that individuals be well informed of the consequences of the decisions to be made. Without knowledge of, for example, how the chemicals to be released from a proposed industrial facility affect human health, community members could hardly be said to have the opportunity to participate meaningfully in siting decisions.

### *Knowing through Experience*

Had Jeffry Trahan attempted to conduct a careful review of the risks of living next door to a refinery prior to moving to New Sarpy in 2000, he would have found himself thwarted by gaps in the scientific knowledge available. But after living in the neighborhood for a few years, Trahan was among a second group of residents who felt that they knew a good deal about the effects of refinery emissions as a result of their own experiences. For the fit, thirty-something father, finding it hard to breathe on some mornings was ample evidence that the pollution put out by the refinery did have health consequences that warranted residents’ demand that they be given the opportunity to relocate to a cleaner neighborhood.

For other residents in this group, it was not just their personal experience of symptoms but also their knowledge of the larger community that convinced them that refinery emissions were indeed harmful to human health. Lifelong New Sarpy resident Ida Mitchell told me that she was sure that pollution from the refinery was “poisoning” people. When I asked her why she thought so, she cited the patterns of disease that she and other residents had observed:

Because there’s too much cancer in this neighborhood . . . Too many people. Just in this neighborhood here my mom had leukemia, my sister had the three

types of cancer, and the man next door had prostate cancer, I guess they took care of that. You know, it's, in every neighborhood, in every street there are people who have died of cancer.

For Mitchell, the number of cancer cases in the neighborhood was, further, very relevant to questions of whether a community and a refinery should be located in close proximity to one another. Given what she had observed of the refinery's effects, she told me, "I don't know why anybody would want to build next to where they have a refinery. I really don't."

Pointing to their own experiences of pollution and their knowledge of patterns of illness in the community, Trahan and Mitchell expressed the kind of "local knowledge" that STS scholars have long argued to be both a legitimate form of knowledge and an essential contributor to environmental decision making (e.g., Allen 2003; Brown 1993; Corburn 2005; Fischer 2000; Irwin 1995). In the context of New Sarpy residents' demand for relocation away from the neighboring refinery, though, Trahan and Mitchell's discussions of what they knew about the refinery's health effects highlighted an inherent property of local knowledge consequential for procedural justice: such knowledge can, by definition, not be gleaned from a distance, whether of space or time (see Wynne 1996). That is, neither Trahan nor Mitchell could have come to understand the effects of refinery emissions without first living in the community. The point was underscored by another New Sarpy resident, Harriet Isaac\*, who insisted that legitimate knowledge of the refinery's effects would only be produced if scientists themselves gained firsthand experience of conditions in New Sarpy: "Let them come in and live with *us* in the community and not just drive in and out of the community, you know? . . . Come live with us for two or three months. Here."

The very situatedness of local knowledge poses a challenge to models of procedural justice that call for community members' consent, or participation, prior to the siting of a facility. Both Trahan and Mitchell indicated that the understandings they reached as a result of living in the community would have made a difference to whether or not they "consented" to having a refinery in close proximity—Mitchell marveling at why anyone would want to build near such a facility, and Trahan joining the campaign for relocation after just a few years in his home. But those understandings could not have come from information disclosed to them in advance, as part of a process of securing informed consent or ensuring their full participation in a siting decision; they only became available as a result of time spent in the community with the refinery in operation nearby.

### *Shifting Knowledge*

Whether they were convinced of the effects of refinery pollution through their firsthand experiences, or felt they could not say for sure how it affected them, nearly everyone I spoke to in New Sarpy talked about how much things had changed during their time in residence. Harold Masters told me that it had been a nice neighborhood when he and his wife Irene had moved there, not “bad like it is now.” Others described how the refinery had gotten closer to the community with the construction of the storage tanks and become more visible when a wooded area was cleared to make a parking lot for the facility. On the other hand, when they talked about the neighboring town of Norco, sandwiched in between a refinery and a chemical facility, people usually told me how much things had improved. The Masters, for example, recalled how terrible the town used to smell when Harold was a young man in the 1950s:

HM: [by the] time you get close to Norco, you could smell it.

IM: Everybody used to say, “we in Norco now, y’all.”

Notably in the Masters’ account, “that little smelly town”—as Norco resident George Lewis\* put it—was a thing of the past. “That’s one odor I think they completely gotten rid of,” Lewis told me.

The changes in petrochemical facilities’ proximity and impact, both positive and negative, reflected underlying changes in industrial practices, as a few residents pointed out. Audrey Taylor, for instance, called attention to the way that petrochemical operations had increased in scope and complexity over the years:

I’m thinking in terms of years ago they weren’t making so many things. All right. And so when you think in terms of all the chemicals and things that’s being used now, to make the products better, you know, like that, I think you have more dangerous chemicals being used than what you were using back then, because let’s face it, they weren’t making as many products.

Taylor suspected that the technological advances made inside plant fence lines—namely, the proliferation of chemicals used “to make products better”—exposed the community to greater hazards.

Yet changes in industrial practices cut both ways. Ida Mitchell contrasted the current state of awareness of environmental hazards with a time when everyone, including industry, was “ignorant of the fact that these chemicals

cause all these cancer[s].” Her sense of times being very different (if not her belief in the causal link between chemicals and cancer) was echoed by Shell Chemical Norco’s Health, Safety, and Environment Manager Randy Armstrong, who described to me how much the industry’s environmental practices had changed during his career:

RA: When I came here, we had direct discharges into the river untreated. 30 years ago. We were using injection wells for some things. And we were only 2 miles upstream from the river water intake for St. Charles Parish drinking water.

GO: At that time, was that sort of, would that have been regarded as egregious conduct, or was that sort of best practice for the industry?

RA: That was best practice in 1975. And when I say we’ve made tremendous progress, those were perfectly legal, permitted activities for both of those kind of incidents.

The dramatic changes in industrial practice described by Armstrong suggest good reasons that Norco is no longer a little smelly town—even as they do not account for the ways that increasingly efficient operations and facility expansions might simultaneously be increasing impacts on nearby communities.

The countervailing changes experienced in New Sarpy and Norco, again, illustrate a fundamental claim of STS, namely that technoscience is inherently dynamic. While STS scholarship has challenged models of inevitable, linear “progress” in science and technology, it has offered in their place theories that account for the development of scientific knowledge and technological objects and infrastructures in socially situated terms (e.g., Bijker and Pinch 1984; Kuhn 1962; Latour 1987). Not only the accumulation of anomalies within science (Kuhn 1962) but also changes in how science is funded, shifts in regulatory contexts for technical systems and science advising, and demands by social movement groups, both expert and lay, put pressure on scientists and engineers to reconsider how they do their work, what claims they accept as fact, and what technologies they regard as the “best available.”<sup>5</sup> These ever-present pressures foster changes, small and large, in knowledge, technology, and technical practice, giving science a dynamic character (Cohen and Ottinger 2011; Ottinger and Cohen 2012). In the US petrochemical industry, for example, approaches to environmental health and safety issues have changed and changed again with the adoption of environmental laws in the 1960s and 1970s; the subsequent

neoliberal turn from command-and-control regulation to voluntary and industry-led approaches to environmental protection; public scrutiny following tragedies like the 1984 methyl isocyanate release from a Union Carbide plant in Bhopal, India; and ongoing challenges to claims about the health and environmental impacts of emissions from EJ activists (Hoffman 2001, Fortun 2001, Ottinger and Cohen 2012).

In communities like New Sarpy and Norco, the fact that science and technology are constantly being revised in response to institutional, intellectual, and economic pressures poses particular challenges for procedural justice.<sup>6</sup> From their position on the fence lines of major industrial facilities, community members have watched science and technology change, over the course of decades, in ways that both ameliorate the hazards to which they are exposed and give them grounds to be increasingly concerned about the consequences of those exposures. Even if they had had the ability to give informed consent to the facilities next door, or otherwise to influence the processes through which they were sited, the information and understandings on which their consent was based would have been long since rendered incomplete, inaccurate, or irrelevant by new scientific understandings of ever-shifting technological configurations. Nor is the situation any different for communities asked now to give their consent to new facilities that will operate for many years to come: the picture painted by STS research of the dynamic character of technoscience leads us to expect that today's best practices in refinery operations will look just as egregious from the vantage point of thirty years hence as those of 1975 look today.<sup>7</sup>

## **Procedural Justice as if STS Mattered**

Current discussions of procedural justice in the siting of environmentally hazardous facilities are far from naïve about the limitations of scientific knowledge. EJ advocates have not only criticized industry and government scientists for patently unethical practices like suppressing data (e.g., Shrader-Frechette 2007), they have pointed out the ways that scientific ways of knowing and technocratic modes of decision making can circumscribe community members' ability to have a say in decisions that will affect their local environments (Guana 1998; Shrader-Frechette 1991); they have also asserted the need for community members' local knowledge to be recognized as part of just decision-making procedures (Allen 2003; Fischer 2000).

Yet these discussions also do not incorporate several important insights offered by scholarship in STS. Arguments for informed consent, like offered by Shrader-Frechette, typically do not acknowledge that relevant

information, rather than being hidden by powerful actors, may simply not exist. Perhaps more importantly, EJ scholars have tended to assess procedural justice, whether judged by the standards of informed consent or by a less stringent standard of meaningful participation, by looking at discrete moments when a decision must be made, usually moments when a permit to site a facility is at stake. Their focus on decision points has allowed them to treat scientific knowledge, and even local understandings of hazards, as static—and thus to evaluate procedural justice in terms of the extent, type, and quality of the knowledge that is allowed to inform the decision at hand. But what research in communities like New Sarpy shows is that the consent or participation of residents in those moments can, if a facility is sited, bind a community for many years, possibly even many decades—a period over which knowledge can hardly be treated as static. Not only will accepted scientific knowledge and technological practices change, local knowledge will emerge as community members begin to experience the impacts of the neighboring facility.

The phenomenon of knowledge gaps challenges current notions of procedural justice because it suggests that the substantial understanding required by norms of informed consent, or even informed participation, may not be attainable. The temporality of local knowledge and the dynamism of technoscience, on the other hand, call into question the very idea that consent or participation by a community at one decision point can be considered meaningful for the life of the facility. That is, it would very hard to argue that people who agreed to live near a refinery at a time when neither communities nor scientists had raised concerns about the carcinogenicity of petrochemical emissions gave their informed consent to lifetime exposure to a host of cancer-causing chemicals—as they are now known to be at high enough doses.

STS insights into the fragmented, changing, and necessarily situated nature of knowledge thus suggest that procedural justice for communities facing environmental hazards requires something more than even stringent standards for informed consent currently imply. First, I would argue that, in order to create the possibility for substantial understanding of the consequences of a siting decision, systematic efforts should be made to identify and fill in gaps in knowledge relevant to decision making. Where possible, research to fill knowledge gaps might be undertaken prior to consent being given; however, it seems likely that many questions regarding the local environmental and health impacts of a facility will not be answerable until it is operational, especially where relatively new technologies are involved. In those cases, ongoing production of knowledge should be a condition of the facility's permit.

Second, because understandings of a facility's consequences can be expected to change over time—as local knowledge develops, as related scientific research progresses, and as data required by knowledge-gap conscious permits are collected—communities hosting hazardous facilities should be given opportunities to renew or withdraw their consent when understandings of the hazards they face change. Periodic permit renewals could serve this function. For the demands of procedural justice to be satisfied, however, there would have to be a real possibility that a community's input would cause a permit renewal for an established facility to be denied, and the community's decision would have to meet the criteria of voluntariness and noncoercion despite the facility's economic and political power.

Continuing opportunities for consent would shift the risks of knowledge gaps and changing knowledge onto the companies whose operations produce environmental hazards. That is, if a chemical process were found to pose more of a threat to the public health than initially anticipated, the company or industry using the process would suffer the losses associated with retooling or decommissioning plants in which they have made a substantial investment. As a change to existing policies which effectively allow companies to externalize these risks—it is currently neighboring communities who pay, in the form of ill health and increased health care bills, for industry miscalculations—any requirement that facilities submit to periodic permit renewals whose outcomes are actually in doubt would surely be opposed by corporations. Yet were such measures to be adopted, they would significantly increase industry's incentives to examine carefully the likely impacts of their operations—to mitigate knowledge gaps to the fullest extent possible—rather than remaining strategically ignorant. Companies and communities wishing to host industrial facilities might, moreover, be inspired to rethink how plants could be built to mitigate the risks posed by new information. Taking seriously the idea that large engineering projects amount to social experiments (Martin and Schinzingler 1983), they could design them in a way that permitted the experiment to be discontinued or redirected depending on its results.<sup>8</sup> A facility might, for example, be designed to accommodate several viable alternative processes instead of being optimized narrowly around one whose effects are not completely known, or construction might be planned in phases that allowed a company to scaleup its investment as it became more certain of its impacts.

The practical dilemmas involved in creating just procedures for environmental decision making that incorporate insights from STS are, admittedly, considerable. Resources would have to be found to do gap-filling research; more dauntingly, diverse stakeholders would have to agree on what



information would be relevant and meaningful to environmental health questions (see Ottinger 2009, 2010). Companies would have to be persuaded to invest in expensive, large-scale facilities with the knowledge that new information—which they would be expected to participate in producing—could cause residents of neighboring communities to revoke their consent before the facility had necessarily reached the end of its useful life, or even paid for itself. Our current political institutions, technological infrastructures, and power structures all militate against such changes. Yet neither practical difficulties nor reluctance on the part of those in power obviate the underlying ethical obligations. Creative solutions are called for if the phenomena of knowledge gaps, important but necessarily situated local knowledge, and inevitable shifts in scientific knowledge are to be acknowledged in attempts to secure procedural justice for the communities most affected by environmental hazards.

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### **Notes**

1. My interview with Rushing, as well as the other empirical material presented in this article, is part of an ethnographic study of community–industry relations in St. Charles Parish, Louisiana. Conducted primarily in 2002 and 2003, my fieldwork consisted of participant observation in New Sarpy residents' campaign for relocation, involvement in community life in New Sarpy and the neighboring towns of Norco and Destrehan, and interviews with residents of New Sarpy and Norco, top-ranking engineers and scientists at St. Charles Parish chemical plants, and environmental regulators and EJ activists involved in the region.

2. Schlosberg (2007) argues that EJ includes four aspects: distributive justice, procedural justice, recognition, and the opportunity for development of capabilities.
3. Tests of substantive, or distributive, justice might also be used as an alternative to overly stringent criteria of informed consent. A Rawlsian notion of justice, for example, would ask us to ascertain that communities not be left worse off by the siting of a proposed facility (Rawls 2001). Wenz (1995) offers an alternative proposal, suggesting that the environmental burdens taken on by any community be commensurate with the benefits that they enjoy in the industrialized, consumer economy. While a detailed consideration of the implications of using a substantive framework is beyond the scope of this article, it is worth noting that determining whether a group was “worse off,” or whether burdens and benefits were “commensurate,” would be plagued by the same problems of absent and emergent knowledge discussed here.
4. Not her real name. Each pseudonym used in this article will be marked by an asterisk (\*) at its first occurrence.
5. Frickel and Moore (2006) theorize the role of these “meso-level” forces on the development of science and technology in their *New Political Sociology of Science*. The effects of social movements are especially well documented in the STS literature (see, e.g., Epstein 1995; Frickel 2004; Hess 2007; Ottinger and Cohen 2011), and the transformations in science likely to result from the neoliberal reorganization of research funding, among other institutional changes, is a topic of growing interest (Lave, Mirowski, and Randalls 2010; Moore et al. 2011).
6. Keulartz et al. (2004) make a related point about the challenge that technology’s dynamic character poses for applied ethics more generally.
7. These challenges are compounded by the fact that regulatory science and industry practice do not even necessarily incorporate the latest insights from research science.
8. See Ottinger 2011 for an extended discussion of what designing for EJ, including procedural justice, might entail.

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