

## The Oklahoma City Sonic Boom Experiment and the Politics of Supersonic Aviation

*David Suisman*

In 1964, the people of Oklahoma City were bombarded by sound. For six months, eight times daily, military jets assaulted Oklahoma's capital with sonic booms. Each one lasted only a fraction of a second, but the impact every time was powerful and profound. People heard the booms with their ears, felt them through their skin, saw their effects with their eyes. Bodies quivered, windows shattered, huge cracks appeared in ceilings, pictures hung on walls fell to the floor and broke. Trinkets resting on mantelpieces did, too. Babies cried; adults recoiled. Gradually, the booms grew in intensity. By July, they were, on average, twice as forceful as they had been in February. A few booms were more than three times the February levels. Meanwhile, thousands of residents complained to the government, many filed damage claims, some brought lawsuits. Then, at the end of July, after 1,253 blasts had rained down on the city, the sonic booms ceased.

These violent acoustic shock waves were not inadvertent. They were an experiment by the US government to determine the effects of sonic booms on people and buildings over a prolonged period of time. All but forgotten today, this experiment involved some 500,000 test subjects—the city's whole population—none of whom volunteered to participate, and all of whom were intensely affected. This article explores the history of sonic booms, with special focus on the causes, contexts, and

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consequences of the Oklahoma City experiment. It argues that within the political economy of the Cold War, sonic booms became a new kind of state power, grounded in both civilian and military authority, with deep implications for understanding the reach of what historians have called the “modern national security state.”<sup>1</sup> Each sonic boom was, in effect, an assault, felt both as a social and political act and as a physiological, emotional experience. Through sound, the state touched people’s bodies. It also entered their homes uninvited, penetrated the most intimate spaces of their lives, and damaged their property. Thus, sonic booms reverberated simultaneously in multiple registers—social, political, economic, legal, environmental, emotional, and psychological—and as they did, they created a new relation between state and citizen, connecting the affective and material experience of the soundscape to the political and economic will of the state. Never before had a state exerted such immense sonic power, and never before had sound figured so directly into what Michel Foucault called “governmentality,” a dynamic form of power continually redefining the boundaries between public and private.<sup>2</sup>

The first human-made sonic booms occurred in the 1940s and 1950s, produced by military aircraft flying at supersonic speeds. Then, in the early 1960s, the US government launched a decade-long program to build a civilian supersonic transport, or “SST” as it was known. The program, had it been realized, would have made sonic booms a regular part of daily life. This complex interplay between military and civilian technologies recalls Gabrielle Hecht and Paul Edwards’s concept of “technopolitics,” which they define as a “hybrid form of power . . . with cultural, institutional, and technological dimensions.” It is, more specifically, the use of technology or sociotechnical systems for political ends, producing artifacts whose design features have demonstrable political effects.<sup>3</sup> Supersonic aviation was just such a political technology, and sonic booms were just such a political design feature. At the same time, sonic booms do more than exemplify technopolitics; they deepen how we understand them, by revealing how technopolitics intruded upon the practice of everyday life.

Thinking about sonic booms also recalls the writings of theorist Paul Virilio, for whom speed and the interplay between military and civilian initiatives have been important themes. In *Speed and Politics*, Virilio argued that military technology has had an essential influence on civilian life and that military priorities and logics—especially the pursuit of speed—have guided nonmilitary societal development. Few technological initiatives would seem to bear out Virilio’s ideas as well as the SST, which was precisely an attempt to adapt a faster-than-ever military technology for civilian use.<sup>4</sup> The history of the SST complicates Virilio’s ideas, however, in that Virilio, who places great importance on vision and visibility, fails to recognize the crucial role that sound could play in determining the viability of a civilian technology. Virilio notwithstanding, the problems presented by sonic booms demon-

strated that speed alone was not a guarantor of success in the domain of civilian technological innovation.

Indeed, thinking about sound can expand how we think about peace, security, and the Cold War. That is, through sonic booms, we can perceive how the Cold War was mapped onto the field of sensory experience—not in terms of the ideological struggle between East and West, but rather within the West, where control over the sonic environment presented new kinds of problems that were as personal as they were political. Clashes over sonic booms reveal that peace and security are concepts that have an inherent auditory dimension. For its part, the national security state did not function only at the level of national and global politics, nor was it experienced only through emotions of uncertainty and anxiety. It also produced a sensory environment; sonic booms were, among other things, a phenomenon by which the civilian population experienced the national security state through their ears. In this, sonic booms prompt us to think about the Cold War in a new and intimate way, as something people experienced with their bodies, through their senses, as well as by other means. In turn, the history of sonic booms does three additional things. First, it expands our understanding of the ways that the Cold War transpired at the community level; second, it illuminates tensions that arose between national and local priorities; and third, it shows the manner in which the federal government was forced to acknowledge grassroots demands.

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Before turning to the technopolitics of sonic booms, let us first be clear about what a sonic boom is, and isn't. Technically, a sonic boom is not a *sound wave* but a *shock wave*, a release of compressed energy that is produced by an object moving through air faster than the sound waves it creates. Such a wave contains orders of magnitude more energy than an ordinary sound wave. In qualitative terms, this makes a big difference, because a sonic boom is heard and felt all at once, like an explosion, unlike regular airplane noise, which is experienced gradually and gives the brain an opportunity to adjust to changing sound levels. A sonic boom, in other words, takes the brain by surprise, which is often intensely startling. For example, when a sonic boom ripped across Seattle in 2010, it left local residents shaken and stunned. Indeed, so many believed a major calamity had occurred that they crashed the 9-1-1 emergency call system. Afterward, many people tweeted about what they had experienced. "Scare the fuck out of me!" one Twitter user wrote. Another said, "I was toileting and it shook my whole house. Freaked me out: I thought we were getting nuked." Other tweets included, "I thought I had lived through my first earthquake . . . or bombing!" and "Nearly Crapped Myself! . . . terrifying."<sup>5</sup>

Second, *sonic boom* does not refer, as many people believe, to a single momentary event—like a clap of thunder—that occurs when an airplane surpasses

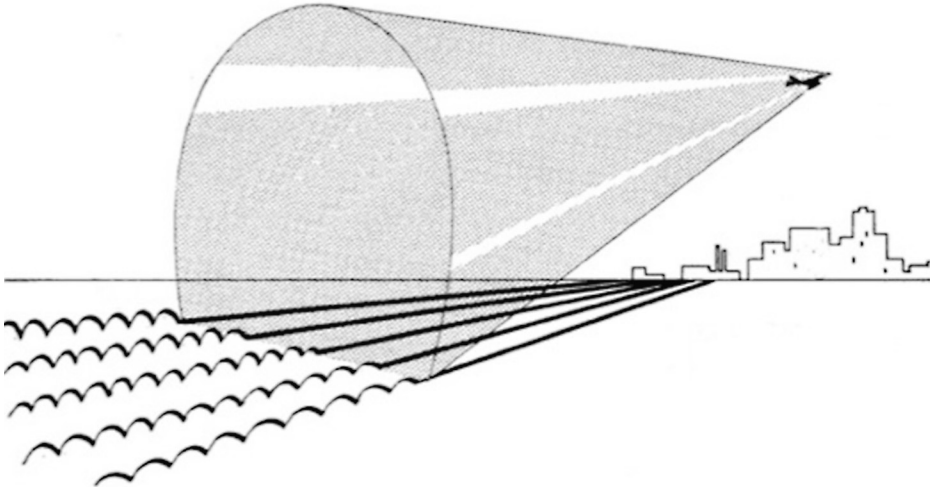
**THE SONIC BOOM**

Figure 1. A sonic boom is a cone-shaped shock wave produced by supersonic aircraft, heard the entire length of its flight path. Image from the US Air Force pamphlet “The Sonic Boom” (n.d.), modified in Photoshop by David Suisman

the speed of sound. Rather, it is a continuous blanket of sound that follows the entire flight path of a plane flying at supersonic speed, in a strip approximately fifty miles wide (see fig. 1). Its intensity, which is measured in pounds-per-square-foot of atmospheric “overpressure,” varies according to a host of factors, including the speed, altitude, weight, shape, and angle of the aircraft; weather conditions; topography; and the composition of material structures on the ground. Outside the fifty-mile strip, its force is still felt but with diminished intensity, eventually turning into a regular sound wave. Thus, the sonic boom from a single coast-to-coast supersonic flight could affect tens of millions of people on the ground.

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The pattern for public exposure to sonic booms was set in the 1950s and early 1960s. In those years, supersonic aviation became a basic feature of military technopolitics, with supersonic aircraft often leaving in their wake a considerable amount of ill will and damage. In 1953, at the inaugural public demonstration of the United States Air Force’s (USAF) first regular-production supersonic fighter, the F-100 Super Sabre, a sonic boom blew out six big plate-glass windows and shattered twenty smaller windows in the administration building at the Palmdale, California, airport in the Mojave Desert. As glass went flying, “no one was hurt,” the *New York Times* reported, “but children among the approximately 150 onlookers cried or clung to their parents.”<sup>6</sup> Six years later, *Time* magazine reported on the demonstration of another plane, the F-104 Starfighter, in Ottawa. On the day before the dedication of

a new terminal at the airport, a USAF fighter pilot triggered a sonic boom so great as to shatter a whole wall of windows and to dislodge roof tiles and insulation, at a reported cost of \$500,000.<sup>7</sup> By the 1950s and early 1960s, the air force and navy were flying no fewer than ten different kinds of supersonic aircraft, including both fighters and bombers, and with them came a rash of damage claims and complaints. According to a classified report prepared for the President's Advisory Committee on Supersonic Transport in 1964, between 1956 and 1963 the air force received nearly fourteen thousand damage claims totaling approximately \$6.5 million (on which it had paid out only \$531,000).<sup>8</sup>

Such numbers, a spokesman for the air force's Community Relations Division noted elsewhere, did not count the "thousands of irate phone calls received by local police stations around the country" or complaints to other government agencies by telephone and mail.<sup>9</sup> To quell such reactions, the air force and navy tried to use the Cold War to make sonic booms acceptable. In 1960, for example, they released *Mission: Sonic Boom*, a film that aimed to promote acceptance of sonic booms as a military necessity. It implored viewers to think of sonic booms as the "sound of security." A single flight, the film acknowledged, could disturb "tens of millions [of people] in a mere ten minutes," but sonic booms were a "necessary nuisance" to "shield you from aggression."<sup>10</sup> The air force and Federal Aviation Agency (later renamed the Federal Aviation Administration, FAA) also distributed various pamphlets explaining what sonic booms were and what danger they posed, and appealing for public tolerance, which was always framed, at least in part, in terms of national security. As one put it, "YOU can make your contribution to our nation's defense by understanding the need for supersonic flights."<sup>11</sup>

In the early 1960s, the phrase "sound of security" was retired in favor of "the sound of freedom." Typical was the public relations message that accompanied a military supersonic test flight from New York to Los Angeles and back in 1962. In a press release, an air force official urged Americans to recognize the sonic boom as a necessary piece in a bigger Cold War puzzle. Whatever disturbance the test flight might cause, he said, Americans should recognize that sonic booms were "the sound of freedom" and that people must learn to live with them "or they might not live at all."<sup>12</sup>

Many people, however, remained unpersuaded by this "sound of security" and "sound of freedom" rhetoric. In the *New Yorker* in 1959, John Updike published a poem titled "Sonic Boom," which began, "I'm sitting in the living room, / When, up above, the Thump of Doom / Resounds. Relax. It's a sonic boom."<sup>13</sup> Other skeptics and critics were ordinary citizens who lived near Air Force bases where supersonic planes flew training missions. Many of these people reached out to their members of Congress and explicitly impugned the pro-boom propaganda. One Wisconsin woman wrote in 1962, "I feel that sonic booms are a menace. . . . I am not a crackpot—just a mother who would like to get her sleep and also not have to comfort a frightened child who is regularly being awakened. . . . Above all, I do not want

to hear that sonic booms are ‘the Sound of Freedom’ or any such trite nonsense as that.”<sup>14</sup> Another letter, which merits quoting at length, read,

It is one thing to have a couple booms a week literally scaring the devil out of your family and livestock and banging the walls and doors and windows out of folks’ homes for the sake of some air force personnel’s satisfaction in seeing how fast they can hotrod a jet bomber, and rationalize that they maybe too are scaring the heck out of Krush [i.e., Khrushchev], even more than they are the home folks. It is another thing, however, when they start traveling . . . at supersonic speeds that cause even more apprehension and damage and then use the blackmail kind of statement that “Americans had better learn to live with them, or they might not live at all.” Kind of like ol’ Krush’s way of warning folks who don’t like what’s being done to them, don’t you think? . . . Can’t something be done to protect us from our “protectors”?<sup>15</sup>

This letter ended with a pencil drawing, inspired by Edvard Munch’s *The Scream*, of a person being driven to madness by sonic booms (fig. 2).

By the early 1960s, sonic booms occupied an ambiguous place in Cold War America. On the one hand, only a relatively small number of people had themselves



**Figure 2.** This drawing, included in a letter to Wisconsin senator William Proxmire, shows a man being driven to madness by sonic booms (after Edvard Munch’s *The Scream*). Courtesy Wisconsin Historical Society

experienced a sonic boom (relative to the whole US population, that is)—mainly people who lived in the vicinity of air force bases or in naval or air force flight corridors. On the other hand, sonic booms were becoming well known enough that newspapers and magazines ceased placing square quotes around the term and explaining what sonic booms were, as had been typical in the 1950s. The fact that the *New Yorker* could run a satirical poem about sonic booms is also revealing of how widely known they were. Meanwhile, the

government attempted to defuse and preempt criticism of sonic booms by couching them in a language of security and freedom. If this succeeded in placating some Americans, it appears to have inflamed the ire of others, a dynamic that anticipated the Oklahoma City experiment a few years later.

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If sonic booms had remained only an offshoot of military aviation, the story would largely end here, but in the early 1960s, the US government launched a program

to make supersonic transportation a part of everyday civilian aviation. Were such a project to have been realized, it would have filled the skies with exponentially more sonic booms than had ever been heard before—every day, multiple times a day, all around the world. However jarring this may sound today, officials at the time had many reasons to be optimistic about the public reaction, for the SST program appeared to have broad support. Numerous factors contributed to this. For one thing, during the early Cold War, American society and politics were suffused, by and large, with the belief that American science and technology were infallible, benevolent, and politically and ethically neutral.<sup>16</sup> If American engineers were doing it, this thinking went, then it must be beneficial and acceptable.

For another thing, champions of the SST program, most importantly, FAA administrators Elwood Quesada (under Dwight Eisenhower) and Najeeb Halaby (under John Kennedy and Lyndon Johnson), advanced four popular arguments. First, the SST was said to be the “next logical step” in American aviation; given the military’s supersonic capabilities and the rapid growth in civilian air travel, the SST was thought to be part of the natural order of technological progress. Second, the manufacture of supersonic aircraft, it was said, would create jobs. Third, proponents claimed the sale of these planes to foreign airlines would improve the United States’ balance of trade. Fourth, the SST was said to be crucial to the United States’ international prestige. The French and English, it was known, were collaborating on a supersonic plane of their own, called the Concorde, and the Soviet Union, it was reported, was working on a comparable aircraft. According to this argument, *not* developing a supersonic passenger plane would jeopardize the United States’ global standing. If the Soviet Union were to develop such an aircraft first, supporters said, the result would be “another Sputnik”—that is, a spectacular international embarrassment. What’s more, failure to develop the SST stood to upset the United States’ assumed “natural” place as the world’s leader of technological progress, thereby off-loading American national duty to create such progress to other nations, whether ally or enemy.<sup>17</sup>

Combined, these four arguments gave the idea for a supersonic transport tremendous social and political weight. Still, at the presidential level, support for the SST was slow in coming. Dwight Eisenhower was not persuaded by the arguments in favor of developing such an airplane, nor was John F. Kennedy at first. Kennedy’s outlook changed, however, in the spring of 1963 when he learned that Pan Am, the nation’s most prestigious airline, had purchased options to buy six Concorde aircraft from the French-English partnership when the airplane went into production. At that point, with American dollars and prestige on the line, and fearing that other airlines would follow Pan Am’s lead, Kennedy reversed his position and agreed to back the SST program. In June 1963 in a speech at the Air Force Academy, Kennedy announced the program and sketched out its scope: the United States would have its own supersonic civilian airplane, it would fly at speeds 50 percent faster

than the European plane, and building it would be a national objective. Thus began a supersonic race analogous to the arms race and the space race. Although funding amounts were not specified in Kennedy's initial speech, he later specified that to get this plane in the air, the US government would cover \$750 million of the \$1 billion it was estimated would be required for research and development costs.<sup>18</sup> In other words, the government would cover 75 percent of the costs of a project that aimed, in part, to demonstrate the superiority of the free-market system. (The government's share was later increased to 90 percent.)

Developing the SST hinged on resolving numerous difficult questions. The first were economic. Unlike the space program, the SST was to be a commercial technology and ultimately needed to be profitable, which some people familiar with the economics of the airline and aerospace industry doubted it would be.<sup>19</sup> Other skeptical voices, such as those of Secretary of Defense Robert S. McNamara, chairman of the Council of Economic Advisors Walter W. Heller, and the authors of an ad-hoc study by the Department of Commerce, questioned the economic benefits that the SST would allegedly bring. Elsewhere, others raised concerns about the health and safety of people on the planes. The sonic boom issue was discussed as well, but generally only as a secondary concern. Even at this time, however, a few people did appreciate the gravity and complexity of the sonic boom issue and tried to draw attention to it. The most important of these was a Swedish aeronautical engineer named Bo Lundberg, who distinguished himself as the most persistent and outspoken critic of supersonic aviation in the early to mid-1960s. As early as 1961, he warned against sonic booms' environmental impact, their potential unacceptability to members of the public, legal problems related to personal and property damage, and other issues. Such was the sonic boom problem, he wrote, that "never before in history would so many have been disturbed so much by so few!" Instead of supersonics, he urged development of safer, low-cost subsonic aviation: "If we have to think in terms of a race with Russia, let us engage in a 'race of common sense' instead of a 'supersonic race.'"<sup>20</sup> Closer to the SST program itself, a prescient report by the USAF also sounded an alarm about sonic booms. "In designing any supersonic transport," it concluded, "the problem of sonic boom is a primary consideration and it may prove to be paramount. . . . The sonic boom problem cannot be ignored or treated lightly. It is severe and controversial now and will be magnified by future supersonic aircraft development. Such aircraft, especially the SST, must be designed and flown with the sonic boom effect as one of the most important parameters to be considered."<sup>21</sup>

At the time, such admonitions largely fell on deaf ears. From 1958 to 1963, the National Aeronautics and Space Administration (NASA), the FAA, the air force, and the navy conducted nine studies of sonic booms, but these were primarily technical in nature.<sup>22</sup> Then, however, in 1964, the FAA, in collaboration with NASA



and the air force, began the first (and, to date, only) large-scale study of what sonic booms would mean in people's lives. Would civilians on the ground accept the sonic booms the SST would cause? How many booms? How often? Of what magnitude? And what of the effects of the booms on physical structures? Might the booms be dangerous to the physical integrity of buildings? How were insurance companies to process claims for damage caused by sonic booms? To answer these questions, supersonic fighter jets were to bombard a test city, Oklahoma City, with eight sonic booms daily, for six months, with the intensity of the booms doubling over time. Oklahoma City was selected because it met a variety of geographic, demographic, architectural, and climatic criteria and because of its proximity to a suitable base of operations, Tinker Air Force Base.<sup>23</sup> It may also have mattered that Oklahoma senator A. S. "Mike" Monroney was the powerful chairman of the Senate Subcommittee on Aviation, that the FAA and the air force were the city's two largest employers, and that nearly a third of city residents had a personal or family connection to the aviation industry.<sup>24</sup>

To test the impact of the booms on people and buildings, the FAA did several things. To study the impact on structures, it rented eleven buildings, outfitted them with sensitive measurement devices, and contracted with a team of engineers to monitor them.<sup>25</sup> To study the damage and liability issues, it engaged a local firm, the Remmert Adjustment Company, to inspect and evaluate all claims for alleged boom damage.<sup>26</sup> And most important, to test the impact on people, the government hired the National Opinion Research Center of the University of Chicago, a leading public opinion research group, to conduct a longitudinal study of Oklahoma City's 500,000 residents, to be based on nearly 10,000 personal interviews.

To produce the most favorable outcome possible, the FAA met numerous times with the Chamber of Commerce and designated civic leaders before the test began, in the hopes of garnering their support. Instead of focusing on the test itself in these presentations, the FAA representative stressed the commercial potential of the SST program, while placing special emphasis on the benefits that could accrue for a striving, mid-size city like Oklahoma City.<sup>27</sup> The FAA's preemptive outreach also included a pamphlet, which was widely distributed at restaurants, stores, and gas stations. In carefully crafted language, the pamphlet explained what the SST program was and why it was necessary ("so that the United States can retain its world aviation leadership"); what sonic booms were and how little was known of community response to them ("which cannot be [measured] in an aeronautical laboratory or factory"); and how the Oklahoma City study was structured and what city residents could expect of it ("There is absolutely no evidence, it should be emphasized, of injury to persons or animals from sonic boom[s]"). In essence, it sought to elicit people's patriotic support and reassure them that the government would be responsive to their rights and needs. Moreover, the pamphlet explained, the sched-

ule of sonic booms would be well publicized so people would have advance warning, and through its cooperation, Oklahoma City would be aiding a study of “immense importance” to the SST program and to technological progress generally.<sup>28</sup>

The test began on February 3, 1964, with supersonic military jets flying overhead at eight preannounced times from 7:00 a.m. to 1:20 p.m., which they would do daily until the end of July. Quickly, the test proved deeply divisive, not simply pitting city residents against the government but also against each other. Indeed, crucial to understanding the Oklahoma City experiment is making sense of the extent to which people tolerated and supported it. Although there were many dissenters, there were also a great number of residents who gave the study their emphatic approbation. When the *Oklahoma City Times* interviewed 250 people about the sonic booms, reactions ranged from “I hate them if that’s plain enough for you” to “I think they’re real great,” with very few people ambivalent or undecided. Among those whose opinions were favorable, many supported the test in the belief that it served a bigger purpose. One man said, “I guess it’s for science and must be OK. I just hope they’re really accomplishing something to make it all worthwhile.” Another concluded, “I’d rather we’d do it than the damned Russians.” And another said simply, “If they help, they’re A-OK with me.”<sup>29</sup> This kind of easy acceptance of the sonic booms may seem remarkable from today’s perspective, but it makes more sense in the context of the national security discourse that prevailed during the Cold War (and, in a different form, persists today). In those years, domestic programs and policies were regularly filtered through the discourse of containment, even in contexts in which the actual threat (or even relevance) to “national security” was remote or nonexistent. Science, especially, became shackled to the bipolar logic of Cold War militarization and often received popular and financial support in proportion to its perceived benefit to the national security state. Indeed, these oblique allusions to the Cold War reflect the influence of this discourse on many people’s day-to-day outlook, particularly in areas of the country touched by the military-industrial complex, as Oklahoma City was.<sup>30</sup>

On the other side, there were many opponents of the test as well, and some of them actively fought to have the experiment stopped. Less than a month into the test, city councilman William C. Kessler condemned the booms. People were “being used as human guinea pigs,” he charged, and their “basic human rights [were] being ignored and violated.” The city council then voted unanimously, 7–0, in favor of a resolution asking the FAA to suspend the test. Tellingly, however, this protest by the council produced a fierce backlash. In response to the city council’s resolution, the conservative Chamber of Commerce immediately passed its own resolution calling for the test to continue. Meanwhile, a conservative pro-boom group was launched, Citizens for Progress of Oklahoma City, which circulated a petition in support of the test, and both the mayor and the governor announced their opposition to the council’s resolution. So too did the *Daily Oklahoman*, which editorialized that the council’s resolution threatened Oklahoma City’s national reputation as a forward-looking,

aviation-friendly city. It was followed the next day by an article under the headline, “Supersonic Plane Predicted to Bring City Fantastic Trade Benefits,” laying out the possibility of supersonic commercial traffic between Oklahoma City and Lagos, Nigeria. Finally, banker J. Leland Gourley led a conservative group of more than one hundred civic leaders who were involved in planning Oklahoma City’s seventy-fifth birthday celebration to call on the city council to rescind the resolution. Several days later, in the face of overwhelming and unremitting pressure, the city council voted 5–2 to repeal the measure.<sup>31</sup>

The courts proved equally ineffective for challenging the booms. First, in February there were two lawsuits seeking injunctions against the booms—one by a woman who claimed the booms damaged her house and aggravated her high blood pressure, the other by a plumber who alleged the booms had impaired his daughter’s hearing and inflamed an existing inner-ear condition of his own. These suits were dismissed on the grounds that the government could not be sued without its consent.<sup>32</sup> Then in May, a citizens’ group represented by attorney George Miskovsky filed a third lawsuit to get an injunction against the booms. The group won in state court, and the booms were halted for a day, but immediately, the Department of Justice intervened, instructing Federal District Court Judge Stephen Chandler to assume jurisdiction over the case on the grounds that a state court lacked the power to rule on federal operations. Chandler overturned the injunction, and after he handed down his ruling, he gave an extended address on the need for the test and the obligation of the patriotic citizens of Oklahoma City to support it, which he compared to the duty of a young man conscripted into military service. “He’d just as soon [see] someone else be drafted,” he said, “but he has to go.”<sup>33</sup> To shore up his argument, he then appealed to the discourse of national security. While the test primarily served the ends of civilian aviation, he asserted, it also served the ends of national defense, providing “information that the government should have and must have.”<sup>34</sup>

As the test reached its last month, the FAA began its endgame. It experimented with increased boom pressures, intermixed with a greater number of high-altitude flights (in excess of forty thousand feet), which often produced somewhat weaker booms, in order to see what the public reaction would be. It also focused on public relations and whatever could be done to put the test, the SST program, and the FAA in the best possible light. Related to this, it sought to emphasize that the Oklahoma City test was a *national* program in the *national* interest and that the commercial airlines and manufacturers were not the only beneficiaries.<sup>35</sup> “If it were at all feasible to make advantageous test modifications that would be recognized as a *demonstration of our concern* for citizens’ views, we should do so,” wrote the head of the FAA, Najeeb Halaby, to the head of the SST program, Gordon Bain (emphasis in original). Even more telling, however, was Halaby’s artful approach to publicity before and after the test’s end. “I have in mind that we should deliberately avoid seeking any publicity,” he wrote, “and that it is most desirable that we ease out of

Oklahoma City as gracefully as possible. Our success in doing so in this last month may reduce the number of residual claims that people are willing to file at the conclusion of the program. We should also seek to separate the FAA Center from the testing, placing the responsibility (blame) squarely on the ‘National Supersonic Transport Program.’” Once the test ended, however, this low-profile strategy was to be reversed, Halaby instructed. At that time, Bain was to organize such celebratory measures as a “boom appreciation day,” open houses at the test buildings, a public appearance by “Halaby and/or Bain,” and a letter of appreciation to the people of Oklahoma City sent to the mayor.<sup>36</sup>

In the end, the FAA and air force received more than fifteen thousand complaints, of which nearly ten thousand were damage claims.<sup>37</sup> This number of complaints, however, may have been artificially low, for the public opinion study found that a much greater number of people were annoyed by the booms than actually complained. The study attributed this differential to the fact that more than 70 percent of respondents did not know where to register a complaint, that most believed it would be futile anyway, and that residents of Oklahoma City generally avoided complaining about local problems. Furthermore, the structure of the test may have also biased the results. Because the sonic booms occurred only at regular and pre-announced times, and only from morning until early afternoon, they likely annoyed people less than if they sounded throughout the day and night, as they would if supersonic transportation went into real service. Thus, the number of complaints may not have been an accurate reflection of how much SST service would actually vex people in their day-to-day lives.<sup>38</sup> (The Swedish aeronautical engineer Bo Lundberg later charged that the test was biased in another way as well, namely, that the booms were too *quiet*. If real SST service were put into operation, Lundberg argued, the real sonic booms would be much more forceful than those blasting Oklahoma City, making the data and experience gleaned from the test there a distorted measure of people’s experiences and reactions under real conditions.)

Meanwhile, area residents mailed hundreds, probably thousands, of letters of complaint to President Johnson, Oklahoma senator Mike Monroney, Mayor Jack Wilkes, Governor Henry Bellmon, FAA administrator Halaby, the FAA, and the Oklahoma City Aeronautical Center. A typical letter read, “I am of the opinion that you would like to hear the public’s opinion concerning sonic booms. I am the public and here is my opinion: FORGET IT, BUD!!! I feel six months of these nerve- and window-shattering booms are unnecessary, ridiculous, and absurd.” Filling this correspondence were words like *detest*, *resent*, *monstrosity*, *totalitarianism*, *hellish*, *senseless*, *insane*, *maddening*, and *inhuman*. Some letter writers objected to being used, as several people put it, as “human guinea pigs.” Others resented what they perceived as Washington’s disregard for people who lived far from the seat of power. Numerous other writers charged that the SST served only private commercial inter-

ests and would not benefit the people of Oklahoma. And a considerable number expressed concern about the health of their families and pets.<sup>39</sup>

As far as many people were concerned, the underlying issue with the sonic boom test was rights. Repeatedly and in a variety of ways, the language of rights ran through much of the correspondence—particularly the right not to be molested, harmed, or violated by the government. In broadest terms, the sonic boom test trampled on “people’s basic human rights,” City Councilman Kessler complained.<sup>40</sup> More specifically, many people charged that the test infringed on their right to property and to privacy. Before the test even began, one resident charged that the booms would “[place] in jeopardy the comfort, welfare, and property rights of the citizens in the area” and many others agreed when the test was underway.<sup>41</sup> Another resident decried the “invasion of individual personal rights and the taking of private property.”

Others were less specific about the rights abrogated, referring generally to “Constitutional rights,” “freedom,” “justice,” and the prerogatives of US citizenship. As one angry citizen pleaded, “FOR THE LOVE OF HUMANITY AND JUSTICE TO THE PEOPLE, PLACES, HEATH AND MATERIAL DAMAGES, PLEASE STOP [THE BOOMS]!” (emphasis in the original). In a letter to Governor Bellmon from “an Oklahoma Voter,” the issue was rendered in terms of both physical health and property damage: “Aggravating heart conditions and impairing children’s hearing are not small annoyances, to say nothing of the houses that are being damaged by these booms.”<sup>42</sup>

Another woman wrote, “We have lost our rights as Americans,” while another letter, cosigned by fourteen people, framed the property damage caused by the sonic booms as a threat to freedom itself: “We feel that our Constitutional Rights are being violated by the use of our homes and property for these tests which are known, by all, to be damaging. The denial of a means with which to protect ourselves and our property, poses a threat to our freedom.”<sup>43</sup> Many residents of Oklahoma City believed they were somehow less free because of the government’s sonic imposition on their lives. “This infringes on our freedoms,” one woman wrote. Others contended that the sonic boom test was simply un-American—that it befitted a totalitarian regime like the Soviet Union perhaps, but not the United States.<sup>44</sup> “Is this America or Russia?” one complainant wrote, “We are American citizens and our rights are being violated.”<sup>45</sup> Thus, as loyal and patriotic citizens sought protection from sonic booms, day-to-day understandings of citizenship came into conflict with the imperatives of the national security state. Much as historian Gretchen Heefner has shown with regard to the installation of Minuteman missile silos in the American West, many erstwhile supporters of the Cold War became opponents of policies that they saw as infringing on their property rights when the war became manifest in their own backyard.<sup>46</sup>

Meanwhile, throughout the test, dozens of vexed residents threatened to harm or kill personnel who were involved with the study. Radio and television station WKY received numerous telephone calls from people who said they were going to shoot down or blow up the offending airplanes. Members of the Chamber of Commerce received threats against their lives. One woman told the flight control center that she would “get a gun and shoot everyone connected with the program.” A man warned that he was going to drag Najeeb Halaby from his meeting with the Chamber of Commerce and lynch him. Mark Weaver, the FAA public affairs officer, received calls from people who said they would blow up his house, poison his milk, and lynch him. There was also a woman who threatened to send out “poison rays” to make everyone at the FAA sick.<sup>47</sup> While it is difficult to know how seriously to take all these threats, it is worth remembering that Oklahomans were not strangers to extralegal violence; the twentieth century’s deadliest “race riot” had occurred in Tulsa, a hundred miles away, less than a half-century earlier.<sup>48</sup>

If the letters and telephone calls suggested a qualitative reaction to the sonic boom test, the study by the National Opinion Research Center (NORC) offered a more thorough-going, quantitative picture of community response. This longitudinal study involved interviewing more than three thousand people, a cross-section of the population, three times each, once at the beginning of the study, once in the middle, and once near the end. Both in person and by telephone, interviewees were asked their opinions about the SST and the sonic booms, and to describe how the sonic booms were affecting their lives and what, if anything, they had done about it. In the second and third interview periods, two hundred additional interviewees were added each time to test for possible interview effects, that is, people’s responses being affected by having been previously interviewed. While most (70 percent) of respondents had heard about the purpose of the booms, very few (5 percent) had heard about the community reaction study—numbers that suggest the limited effectiveness of the FAA’s public information campaign. Interestingly, having a personal or family connection to the aviation industry appears not to have influenced people’s responses. Approximately the same proportions of those with and without connections to professional aviation believed the SST was important, that the sonic booms were necessary, and that it was acceptable to complain about booms if annoyed.<sup>49</sup>

To establish a baseline of attitudes, subjects were asked at the end of the first interview their opinion about the necessity of a civilian SST program. Roughly one-third responded that it was absolutely necessary; another third said it was probably necessary; and the final third said it was not necessary or that they didn’t know. Notably, those who answered other than “absolutely necessary” were then told that the British, French, and Russians were already building their own versions of the SST and asked their views again. Sixty percent of the two-thirds changed their answer to “absolutely necessary,” with an additional 22 percent opting for “probably

necessary.” With these adjustments, the totals came to 73 percent saying SST was “absolutely necessary,” and another 15 percent saying it was “probably necessary.” In other words, the test in Oklahoma City began with a population that was either favorably predisposed to the SST project or capable of being persuaded by couching the project in the dynamics of the Cold War. Nearly three in ten respondents (29 percent) also believed it was improper for people to complain about the sonic booms even if annoyed—a figure that again suggests many people’s deference to the national security state. (Because such people were statistically less likely to report negative reactions to booms, their responses were removed from the larger pool of data in order to eliminate this group as a possible source of bias. Their responses were, however, included separately.)<sup>50</sup>

Some of the study’s findings were straightforward, following a certain commonsense logic. Those who believed the SST was a vital national interest were more likely to be tolerant of the sonic booms, and those who did not believe it was vital were less likely. Those who believed the booms were unavoidable and harmless were less likely to complain, and those who believed the opposite were more likely. Also not surprising was the finding that those who lived directly under the flight path, where the force of the sonic booms was strongest, were the most likely to complain and report damage, and those who lived the farthest the least likely.<sup>51</sup> Such findings were somewhat intuitive but important to confirm empirically.

Other results were more striking—although sometimes leading to conflicting interpretation. Nearly *all* respondents reported some interference in their life caused by the sonic booms—such as being startled, having sleep or rest disturbed, or having conversations interrupted—and 40 percent felt their homes had been damaged. More important was the percentage of people (73 percent) who said they could live indefinitely with eight sonic booms a day, which was in some respects the crux of the study. To some people—proponents of the SST, especially—what mattered most was that this group made up a sizable majority. To others, the most important finding was the inverse: the size of the minority—the more than one-quarter who said they could *not* live with eight sonic booms of such magnitude every day indefinitely. Moreover, those who looked at the findings from this perspective were quick to note, too, the marked decline over the course of the study of the size of the majority who said they *could* live with such booms, from more than 90 percent during the first eleven weeks to about 73 percent during the final seven weeks. They also noted that the number of people who deemed the booms annoying or disruptive *increased* over time. Rather than registering lower levels of annoyance as they became accustomed to the booms, people’s negative reactions grew the longer the booms went on—a striking challenge to the assertion by SST proponents that people would get used to the booms.<sup>52</sup>

Indeed, to the extent that people did find the sonic booms disturbing, their reactions may have been especially strong because of where they experienced them,

meaning for most people, at least in part, in the home—a place of unique emotional and psychological significance. Echoing the physicist G. W. C. Kaye's definition of noise as "sound out of place," the artist and sound theorist Brandon LaBelle has argued that sounds that people perceive as offensive are often those that violate or deviate from an implicit place-based logic and that no place has such an implicit logic as the home. Drawing on the philosopher Gaston Bachelard, LaBelle writes that home is "a fixed yet potent concept against which all other spaces are balanced and experienced, an archetypal image generating an array of psychic projections." If this is so, then bombarding people with sonic booms in their homes represented a special kind of violation, unsettling not only how people felt at home but also how they felt about themselves in relation to the world.<sup>53</sup> This intersection of soundscape and ontology may help explain why the people who filed complaints in Oklahoma City—opposed to those who simply were annoyed by sonic booms—tended to be middle-aged, middle-class women, that is, the segment of the population most likely to be spending its days at home and probably the segment most committed to that potent concept.<sup>54</sup>

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The impact of the sonic boom test was felt far beyond Oklahoma City. In May 1964, at the suggestion of the Presidential Advisory Committee on Supersonic Transportation, chaired by Secretary of Defense Robert S. McNamara, President Johnson asked the National Academy of Sciences (NAS) to evaluate the sonic boom problem and to offer guidance on sonic boom testing.<sup>55</sup> The result was the formation of the NAS Committee on SST-Sonic Boom, chaired by John R. Dunning, dean of the School of Engineering and Applied Science at Columbia University (and a veteran of the Manhattan Project). Other members of the committee were leading figures in the fields of aeronautics, psychology, audiology, mechanical and civil engineering, and business (insurance, aviation, etc.). This body represented the first time that the sonic boom issue would be scrutinized from a range of perspectives—*aeronautics, law and insurance, finance, buildings and structures*—resulting in booms being transformed from a peripheral concern for SST to a central one.<sup>56</sup> The sonic boom problem, wrote NAS president Fred Seitz, "may well turn out to be the crucial one when a final decision is made by the President on the supersonic transport question."<sup>57</sup>

Initially, the committee looked on the sonic boom problem quite optimistically. The adverse effects of sonic booms had been exaggerated, Dunning believed, and the committee as a whole seemed to think that the problem could be managed through modifications in design, flight behavior, and public relations. On the one hand, it was thought that sonic booms could be weakened by modifying design specifications and by altering how the planes were flown. On the other, the committee solicited input from Kenneth Youel, a Washington, DC, public relations (PR)



consultant and former General Motors PR executive, and Robert Harper, director of public relations for the School of Engineering and Applied Science at Columbia University. Their advice for the NAS group was to establish a public relations subcommittee, which would design enhanced messaging strategies to better communicate sonic booms' essential harmlessness and, more importantly, to preempt potentially damaging protest and opposition (as had occurred in Oklahoma City). Working with television, radio, and print media, they argued, would be essential for fostering positive public reaction to sonic booms; "for instance," they proposed, "the 'Today Show' might be broadcast from the test site with test officials as special guests." More broadly, the proposed subcommittee would be encouraged to consider a variety of techniques from the public relations arsenal: "informational type letters to the editor, columnists and other leaders; literature; motion pictures; slide films for schools, luncheon clubs, etc.; TV-Radio material; information for public speakers; and statements by leaders on the necessity for super-sonic transports for defense and transportation." In this view, therefore, the problem with sonic booms rested on how they were perceived, rather than being a problem because of their actual effects.<sup>58</sup>

The PR men were not wrong to believe that media mattered. The Oklahoma City test received substantial coverage in the *New York Times*, *Los Angeles Times*, the *Christian Science Monitor*, the *Washington Post*, *Time*, *Newsweek*, *Business Week*, and *The New Republic*, particularly in relation to the protests and opposition. Much of the coverage consisted of straight reportage, but a considerable amount of it involved critical commentary too. The harshest assessment to appear was in the *Saturday Review*, the prominent news and culture weekly. Under the title "The Era of Supersonic Morality," the magazine's science editor, John Lear, used the Oklahoma City test as a lens through which to look at the SST program generally, and he did not like what he saw. As the title suggests, he believed the Oklahoma City test marked the start of a new age, in which moral considerations, not just practical ones, were raised by faster-than-sound air travel. Indeed, his ideas prefigured the recent work of sound scholars who have conceptualized the soundscape as a field of ethical and political relations.<sup>59</sup> Generally, Lear was concerned about the state exercising a new kind of direct power over its population, at the expense of the interests of ordinary citizens. More specifically, he objected strenuously to the involvement of the NAS, whose integrity he contended was compromised by contributing to the SST program. Whether people should be forced to endure sonic booms was a political question, he argued, not merely a scientific or technical one, which is what it became once the NAS was called in. "The onus of the SST project," he wrote, "has been subtly shifted to the NAS."<sup>60</sup>

In some respects, Lear's assessment was quite right; as power shifted to the NAS, it shifted away from the FAA.<sup>61</sup> He erred, however, in believing that the NAS Committee was completely unified or fixed in its views. Some members of the

committee came to view the sonic boom problem as more complex and difficult to resolve than they had first believed. The information about protests and property damage streaming in from Oklahoma City raised serious concerns, as did the results of the community reaction study, which were released in early 1965, especially the finding that more than one quarter of people polled said they could not learn to live with booms of the frequency and intensity they experienced during the test.

The committee's confidence was also undermined by an incident associated with another, more restricted sonic boom test in White Sands, New Mexico, in November and December 1964. On December 2, the FAA held a public demonstration of sonic booms for the press and for NAS committee members. After a series of uneventful test flights, the guests went inside for a final briefing when an F-104 made one last low-altitude flyover for the benefit of the press photographers. Accidentally accelerating to supersonic speed a mere two hundred feet overhead, the pilot triggered a tremendous super boom of approximately 40 pounds per square foot (p.s.f.) (compared to the 1.0–2.0 p.s.f. booms of Oklahoma City), which cracked windows and plaster, damaged molding on a test storefront, and interrupted radio broadcasts from the site's radio station. Meanwhile, an Air Force general who was in the middle of explaining the benignity of the booms was so startled that he dropped a glass of water he was holding in his hand. Needless to say, the incident left the press and the NAS committee members with much to think about.<sup>62</sup>

Indeed, the committee was in the middle of a great shift in recognizing the human dimension of the sonic boom problem. At the outset, the committee's primary concern was the impact of sonic booms on structures and on managing public opinion. As their work went on, however, a growing number of committee members questioned this orientation. They objected that it was improper for a disinterested NAS committee to recommend public relations as a solution for what were substantial and complex problems, and they expressed growing concern over the human reaction issue. This led to the creation of a new subcommittee on psychological response and gradually to a more skeptical set of recommendations regarding sonic booms.<sup>63</sup>

Under the forceful leadership of John Dunning, who had little regard for the human dimension of the sonic boom problem, the committee's first interim report had been strikingly positive, but subsequent reports introduced serious doubts and questions. The second interim report took aim at the FAA's conclusion that booms of 1.5 to 2.0 p.s.f. would be acceptable to a general population. A final report, while positive in its overall thrust (and recommending that the SST program advance to building a prototype), called unequivocally for additional testing of the psychological impact of sonic booms and noted the risks that attended the sonic booms' startle effect (e.g., the slip of a surgeon's hand, falling from a ladder, heart attack). It also warned that sonic booms would disrupt sleep and have deleterious effects for hospitals. Finally, as it called for more and better public relations, the report acknowl-

edged the limited but real effectiveness of the opposition to sonic booms: Oklahoma City showed that even a relatively small number of protesters could disrupt testing and generate a sizable amount of negative media coverage. Thus, the optimistic and sympathetic attitude the committee had in the beginning evolved in the face of unfavorable findings and expanded analysis into a position that was more ambivalent and oriented to an unprecedented degree to the human, psychological dimension of SST's impact.<sup>64</sup> This was hardly the same thing as outright condemnation, but given the stature of the committee and its initial stance, this was a shift of enormous importance.

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Development of—and debate over—the American SST would continue for six more years, by which time an additional \$944 million would be poured into the program.<sup>65</sup> Eventually, it was defunded in 1971, after years of persistent oppositional pressure by scientists, engineers, environmentalists, laypeople, and others. Seen in retrospect, 1964–65 proved a turning point, when sonic booms changed from being a minor or peripheral concern to being a central, fundamental consideration. After this time, no conversation about SST would fail to have sonic booms as a major point of discussion—never the only factor but always at or near the top of the list, alongside economics, national priorities, and, later, airport noise and potential atmospheric pollution. In 1967, Harvard physicist William Shurcliff established what would become the leading anti-SST activist group in the country. It was called the Citizens League against the Sonic Boom.<sup>66</sup> A second organization, called The Coalition against the SST, was formed by a group of environmental activists in 1970, and the sonic boom problem always appeared prominently in its communications as well.<sup>67</sup> In this way, the fight against sonic booms and the SST resonated, with an even bigger political formation emerging in the late 1960s: the suburban and metropolitan “quality of life” complaints that helped spark the environmental movement in the 1970s.<sup>68</sup>

Whether or not sonic booms were cited first out of all concerns is of secondary importance. The significance of sonic booms is not that they were *the* most important factor in the anti-SST effort but rather that they were *an* important factor that commingled with others (such as the SST's economic viability). Sound has a political dimension precisely because it never exists in isolation. If it did, its aural impact could be cordoned off, but instead it shows how a range of analytical registers—social, psychological, environmental, economic, and so on—were linked implicitly and inextricably to the body. Put differently, the SST was a complex technological phenomenon, one of whose dimensions was acoustic, and its “meaning” was never merely technical, political, and economic, but also sensory, somatic, and affective.

One of the things that made the Oklahoma City test so remarkable was that

it demonstrated the exercise of a kind of state power that generally remained latent: acoustic power. When activated, this was a power that violated the security of the home, penetrated the recesses of private life, and upset people's emotional well-being. In "The Age of Supersonic Morality," John Lear asked, "If the people of Oklahoma City cannot obtain the help of the law to save themselves from being used as subjects of an experiment by a distant government, can any American citizen anywhere feel secure against invasion of his body and mind at any official's whim?"<sup>69</sup> Before the law, acoustic power could be construed as a form of trespass and a taking—both an invasion and an infringement on property rights, in terms of damage and of a person's right to enjoy his or her property unmolested.<sup>70</sup> And this threat to property undermined the feeling people had for the security and sanctity of their homes. In this way, sound was experienced not merely as an aural phenomenon but as a material phenomenon too, and one that political protest and recourse to the courts were at pains to halt.

Nothing demonstrates better what was at stake in the "era of supersonic morality" than the parallel history of the use of sonic booms as a *tactical weapon*. In the same years that some government officials were publicly dismissing charges that sonic booms were harmful or dangerous, other officials clearly believed the opposite. In the early 1960s, while the government was officially encouraging people to hear sonic booms as the "sound of freedom," the army, air force, and NASA were, at the same time, exploring if sonic booms could be wielded deliberately to inflict damage and disrupt everyday life. Very powerful booms, a 1960 test found, were capable of causing "severe damage," including "the buckling of foundations, walls, and roofs."<sup>71</sup> Then, in 1962, army officials proposed to President Kennedy that sonic booms be used as a weapon against the regime of Fidel Castro. In a classified memorandum titled "Possible Actions to Provoke, Harass, or Disrupt Cuba," army officials proposed a plan called "Operation Invisible Bomb," according to which the US military would deliberately bombard Cuba with sonic booms. This, the memo said, would create the impression among Cubans, who were "generally less familiar" with sonic booms than Americans were, that the island was being bombed, and this would throw the government into confusion, while causing "varying degrees of malicious damage."<sup>72</sup> In actuality, "Operation Invisible Bomb" was never executed, but the fact that it was even proposed reveals a great deal. Moreover, sonic booms were used exactly this way against Nicaragua in 1984. They were also used this way more recently, in 2005, by the Israeli air force against the Palestinians in the Gaza Strip. In this case, Israel received a great deal of international criticism, particularly after the booms were linked to an increase in rates of miscarriage among pregnant women.<sup>73</sup>

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Since the defeat of the SST program in 1971, sonic booms have lived on in various forms in popular culture—in the title of an album by Kiss, as a form of attack in the video game *Street Fighter*, as a cartoon character, as an indie-rock pseudonym, and as the name of an extra-loud alarm clock. Stripped of their complex and contested technopolitical context, the meaning and power of sonic booms have changed. No longer do sonic booms function as a relation between state and citizen, and no longer do they connect the affective experience of the soundscape to global struggles for ideological and economic dominance. Sonic booms have been reduced to signs; they symbolize power rather than exerting it.

Today, sonic booms are much rarer than they used to be, but the issues they raised about sound and state power have persisted. Generally speaking, the contradictions of the “sound of freedom” have not so much disappeared as they have been resituated in a new technopolitics of sound. For one thing, sound is implicated in the growth of surveillance, especially through cell phones, and this, we know, has been couched in its own rhetoric of national security.<sup>74</sup> For another, sound has also been increasingly militarized, as with the use of music and other kinds of audio to break down the will of prisoners in interrogation.<sup>75</sup> Such practices have been officially denied but have been widely reported on.<sup>76</sup> Sound has also been instrumentalized as a nonlethal antipersonnel weapon, in the form of Long Range Acoustic Devices (LRADs). These mechanisms are capable of emitting extremely loud sounds in a narrow “beam,” either for the purposes of communication or to disable people and to disperse groups. Originally designed as a military technology (as supersonic aviation was), LRADs have gradually been making incursions into the civilian domain (as the SST program tried to do). In 2009, an LRAD was used to disperse protesters at the G-20 summit in Pittsburgh, and since then, the police departments of New York, Chicago, San Diego, and other cities have each acquired one or more of these devices.<sup>77</sup> (During the Occupy Wall Street protests in 2011, the New York Police Department brandished one of its new LRADs, but there are no confirmed reports that it was actually used.) Meanwhile, the use of this same technology for commercial purposes (for aural advertising) and to “protect” wildlife (i.e., to keep animals away from human habitats) further blurs the line between military and civilian application.<sup>78</sup> Moreover, just as with sonic booms, the new technopolitics of sound reflect the degree to which peace and security are implicitly sonic concepts. To many people’s ears, a noisy environment resounds with hostility, while peace and security presuppose relative quiet.

Looking back, in the 1960s Americans’ views about technology underwent a profound change. Earlier, Americans had had a virtually limitless optimism about, and faith in, technology, but by the early 1970s, their feelings were more ambivalent and conflicted. The battle over the SST was not the only reason for this; the influence of Rachel Carson’s *Silent Spring* and the nuclear disarmament movement can

hardly be overstated.<sup>79</sup> But the SST issue did refract a complex range of concerns and figured prominently in many discussions about technological development.<sup>80</sup> As such, it also helped launch what became known as the technology assessment movement: the movement to evaluate the likely or potential effects of a given technological system before committing to its full realization. This represented a major shift in the way people thought about technology, as did the notion that technological development might have social and political limits that came before technological ones.<sup>81</sup> At the same time, the SST demonstrated the emergence of a new kind of political relationship, one based on the ability of the state to exert direct power over the bodies of its citizens. Arguably, other initiatives in the United States, such as the war on poverty, COINTELPRO, and the building of the interstate highway system also altered the relationship between citizens and the state, but the Oklahoma City test did so in a way that affected people physiologically, sensorially, and somatically. The emergence of this power had profound, reverberant implications, both for those subjected to the sonic boom test in Oklahoma City and also for us today, in an era when new sonic practices and technologies are coming into being.

### Notes

I would like to thank Mara Mills, Jonathan Sterne, Jason Weems, Susan Strasser, members of the Penn Humanities Forum, and two anonymous readers for the *Radical History Review* for their critical feedback.

1. The phrase “modern national security state” refers to the unified pattern of attitudes, policies, and institutions around which the federal government—“the state”—became organized for perpetual confrontation and war in the years after World War II. Its most visible manifestations included the ballooning defense bureaucracy, which afforded the creation of the Central Intelligence Agency, the National Security Council, a unified armed services, and a permanent Department of Defense; the harnessing of science for military purposes; and the increased presence of security issues in budget debates and on the national affairs agenda generally. Less visibly, it also included the rise of a new class of “defense intellectuals” and “national security managers” who moved back and forth between government service and the private sector of business and finance, and the growing importance for congressional careers of delivering a share of the national security budget for local contractors and of establishing an ironclad reputation on military and security matters. See Michael J. Hogan, *A Cross of Iron: Harry S. Truman and the Origins of the National Security State, 1945–1954* (Cambridge: Cambridge University Press, 1998), 2–5; Gretchen Heefner, *The Missile Next Door: The Minuteman in the American Heartland* (Cambridge, MA: Harvard University Press, 2012), 6; Daniel Yergin, *Shattered Peace: The Origins of the Cold War and the National Security State* (Boston: Houghton Mifflin, 1977); Michael S. Sherry, *In the Shadow of War: The United States Since the 1930's* (New Haven, CT: Yale University Press, 1995), xi–xii; Charles Neu, “The Rise of the National Security Bureaucracy,” in *The New American State: Bureaucracies and Policies Since World War II*, ed. Louis Galambos (Baltimore, MD: Johns Hopkins University Press, 1987), 85–108.
2. Michel Foucault, “Governmentality,” in *The Foucault Effect: Studies in Governmentality*, ed. Graham Burchell, Colin Gordon, and Peter Miller (Chicago: University of Chicago Press, 1991), 87–104. For a more theoretical take on governmentality and music, see

- Jacques Attali, *Noise: The Political Economy of Music*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1985).
3. Gabrielle Hecht and Paul N. Edwards, "The Technopolitics of the Cold War," in *Essays on Twentieth Century History*, ed. Michael Adas (Philadelphia, PA: Temple University Press, 2010), 274.
  4. In the age of supersonic aircraft, Virilio wrote in 1977, "There is no longer a truly civilian aviation." See Paul Virilio, *Speed and Politics: An Essay on Dromology*, trans. Mark Polizzotti, 2nd ed. (Los Angeles: Semiotext[e], 2006), 138.
  5. Tweets by Skyblaze (Johnny So); Noahk10 (Noah Kline); the2Rammels (Amanda Rammel); 965JackFM (JulanC), www.twitter.com, August 17, 2010. All accessed August 18, 2010. While Twitter may seem like "unfiltered" reactions to the boom, many or perhaps all these tweets were written after people had learned what the sounds were.
  6. *New York Times*, October 21, 1953.
  7. "The Sound of Security," *Time*, April 25, 1960, 54.
  8. Office of Deputy Administrator for Supersonic Transport Development, Federal Aviation Agency, "Sonic Boom Information for the President's Advisory Committee on Supersonic Transport," April 27, 1964, 4, Records of Robert S. McNamara, RG 200, Box 171, folder "Sonic Boom Information for the President's Advisory Committee on Supersonic Transport," National Archives II, College Park, MD. Hereafter "Sonic Boom Information."
  9. Fred Keefe and Grover Amen, "Boom," *New Yorker*, May 19, 1962, 33.
  10. *Mission: Sonic Boom*, motion picture, 1960. See also Claude Witze, "Learning to Live with the Sonic Boom," *Popular Science*, May 1959; "Sound of Security," *Time*, April 25, 1960, 54.
  11. "Sonic Boom," n.d., box 40, folder 22, Henry Reuss Papers, Wisconsin Historical Society. Hereafter "Reuss Papers." On the influence of foreign policy and national security issues on domestic politics, see Campbell Craig and Fredrik Logevall, *America's Cold War: The Politics of Insecurity* (Cambridge, MA: Belknap Press of Harvard University Press, 2009).
  12. *New York Times*, March 6, 1962; Donald Malcolm, "Notes and Comment," *New Yorker*, March 17, 1962, 33; "Sonic Boom Information," 4. This phrase continued to be used at least through the 1980s. See "To B-1 or Not to B-1?," *In These Times*, October 14–20, 1987. Thanks to Doug Kahn for this citation.
  13. John Updike, "Sonic Boom," *New Yorker*, August 8, 1959, 89.
  14. Elaine Sandahl to William Proxmire, July 9, 1962, box 168, folder 65, William Proxmire Papers, Wisconsin Historical Society. Hereafter "Proxmire Papers."
  15. C. Fricker to William Proxmire, March 6, 1962, box 168, folder 65, Proxmire Papers. In addition to the scores of letters in this folder, see also box 37, folder 23, Reuss Papers.
  16. Hecht and Edwards, "Technopolitics," 285; Gabrielle Hecht and Michael Thad Allen, "Introduction: Authority, Political Machines, and Technology's History," in *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes*, ed. Michael Thad Allen and Gabrielle M. Hecht (Cambridge, MA: MIT Press, 2001); Stuart W. Leslie, *The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford* (New York: Columbia University Press, 1993).
  17. On the history of the SST, see Mel Horwitch, *Clipped Wings: The American SST Conflict* (Cambridge, MA: MIT Press, 1982); Erik Conway, *High-Speed Dreams: NASA and the Technopolitics of Supersonic Transportation, 1945–1999* (Baltimore, MD: Johns Hopkins University Press, 2005); Kenneth Owen, *Concorde and the Americans: International Politics of the Supersonic Transport* (Washington, DC: Smithsonian Institution Press, 1997); Joshua Rosenbloom, "The Politics of the American SST Programme: Origin, Opposition, and Termination," *Social Studies of Science* 11, no. 4 (1981): 403–23; George Basalla, *The*

*Evolution of Technology* (New York: Cambridge University Press, 1988). My work builds on the existing SST literature in two respects. First is its concern with the significance of the sensory environment for the Cold War national security state. Second is the focus on the Oklahoma City experiment, which Horwitch discusses but does not analyze in detail. It should also be noted that I did not have access to one of the richest sources of material related to the SST, the 151 boxes of records of the FAA's Office of Supersonic Transport Development, which have been destroyed. Fortunately, Mel Horwitch did have access to these materials in the writing of his thorough and meticulous *Clipped Wings*, to which I am therefore unusually indebted. On the Sputnik comparison, see Richard Witkin, "Air Experts Back Supersonic Plane," *New York Times*, January 28, 1960; Charles Leedham, "Who Will Win the Supersonic Race?," *New York Times*, August 23, 1964. On the perception of technological progress as an American national duty, see David Nye, *American Technological Sublime* (Cambridge, MA: MIT Press, 1994).

18. Horwitch, *Clipped Wings*, 52–53, 59; Joel Primack and Frank Von Hippel, "Scientists, Politics, and SST: A Critical Review," *Bulletin of the Atomic Scientists* 28, no. 4 (1972): 25.
19. Louis M. Kohlmeier, "Supersonic Grief?," *Wall Street Journal*, October 7, 1963.
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21. Director of Development Planning, DCS/Research and Development, Headquarters USAF, "Sonic Boom Problem," March 1963, quoted in "Sonic Boom Information," 16–18.
22. "Sonic Boom Information," 3, 12; The exceptions were a study to investigate the use of sonic booms as a tactical weapon (discussed below) and a brief and limited community reaction study of St. Louis in 1962. See Domenic J. Maglieri, Vera Huckel, and Tony L. Parrott, "Ground Measurements of Shock-Wave Pressure for Fighter Airplanes Flying at Very Low Altitudes and Comments on Associated Response Phenomena," NASA report TM x-611, December 1961; Paul N. Borsky, "Community Reaction to Sonic Booms," Report no. 87, August 1962, National Opinion Research, New York.
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24. *New York Times*, July 12, 1964.
25. Two of the eleven were in Tulsa, out of the boom area, and were used as experimental controls.
26. "Sonic Boom Information," 7.
27. *Daily Oklahoman*, February 28, 1964; Wm. M. Jackson, untitled address to Board of Directors, January 30, 1964, #2000.044 box 32, folder 2, Oklahoma City Chamber of Commerce Collection, Oklahoma Historical Society.
28. *Daily Oklahoman*, January 31, 1964; Federal Aviation Agency, "The Sonic Boom," pamphlet, n.d., box 32, folder 2, Oklahoma City Chamber of Commerce Collection, Oklahoma Historical Society.
29. "City Boom Reaction Mixed," *Oklahoma City Times*, n.d., in Citizens League against the Sonic Boom Collection, box 18, folder "Oklahoma," MIT Archives.
30. On the Cold War's influence on domestic policies and programs, see Craig and Logevall, *America's Cold War*. On the national security discourse and its influence on science, see Hogan, *Cross of Iron*. On the growth of the military-industrial complex, see Ann Markusen



- et al., *The Rise of the Gunbelt: The Military Remapping of Industrial America* (Oxford: Oxford University Press, 1991).
31. *Daily Oklahoman*, February 25, 1964; and February 26, 1964; *Ocala Star-Banner*, February 26, 1964; *Daily Oklahoman*, February 27, 1964; *Oklahoma Advertiser*, February 27, 1964; *Daily Oklahoman*, March 3, 1964, and March 4, 1964. Kessler quoted in *Daily Oklahoman*, February 25, 1964.
  32. *Daily Oklahoman*, February 13, 1964, February 29, 1964, and May 13, 1964.
  33. *Oklahoma City Times*, May 21, 1964.
  34. *New York Times*, May 22, 1964.
  35. Najeeb Halaby to Gordon Bain, July 9, 1964, Records Group 237, box 97, folder “Deputy Administrator for Supersonic Transport, SS-1, 1964,” National Archives II, College Park, MD.
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  38. Paul N. Borsky, “Community Reaction to Sonic Booms in the Oklahoma City Area,” 3 vols., 1:2, Report no. 101, January 1965, National Opinion Research, New York. Hereafter, Borsky, “Community Reaction.” See also *New York Times*, July 12, 1964.
  39. Letters quoted in “Sonic Boom Information,” 55–74. The original letters do not survive.
  40. *Daily Oklahoman*, February 25, 1964.
  41. “Sonic Boom Information,” 60.
  42. *Ibid.*, 73.
  43. *Ibid.*, 60, 63.
  44. Eric T. Averell to the FAA, Oklahoma City, February 15, 1964, quoted in *ibid.*, 61. See also Ruth Crawford to Mike Monroney, n.d., in *ibid.*, 64; Glen W. Woodward to Lyndon Johnson, March 5, 1964, in *ibid.*, 65; Mrs. Don Campbell to Gordon Bain, March 26, 1964, in *ibid.*, 65.
  45. Lela Qualls to Mike Monroney, March 20, 1964, in *ibid.*, 64.
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  52. *Ibid.*, 1:2, 12, 18, 30. According to Borsky, the increased level of annoyance may also have been attributable to the increased average boom levels, but this claim is weakened by the data showing that opinions about the necessity of the booms changed before the increase in boom level. See *ibid.*, 1:31–33.
  53. G. W. C. Kaye, “The Measurement of Noise,” *Proceedings of the Royal Institution of Great Britain* 26 (1931): 435–88; Brandon LaBelle, *Acoustic Territories: Sound Culture and*

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  55. Lyndon Johnson to Fred Seitz, May 20, 1964, folder "EIR, Panel Adv. to FAA Sonic Boom Test Program," Accession 71-002, Committee on SST-Sonic Boom, National Academy of Sciences. Hereafter NAS files.
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  58. Kenneth Youel, "Public Opinion Aspects of Sonic Boom Problem and Public Relations Recommendations," box 1, folder "Reference Material Mailed to SST-Sonic Boom Committee," NAS files; Kenneth Youel, "Notes re Possible Public Protests re Sonic Boom," box 2, folder "Youel, Mr. Kenneth," *ibid.*
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  63. *Ibid.*, 80.
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