

KYLLO v. UNITED STATES

Certiorari to the United States Court of Appeals for the Ninth Circuit

No. 99-8508.

Argued February 20, 2001—Decided June 11, 2001

Suspicious that marijuana was being grown in petitioner Kyllo's home in a triplex, agents used a thermal imaging device to scan the triplex to determine if the amount of heat emanating from it was consistent with the high-intensity lamps typically used for indoor marijuana growth. The scan showed that Kyllo's garage roof and a side wall were relatively hot compared to the rest of his home and substantially warmer than the neighboring units. Based in part on the thermal imaging, a Federal Magistrate Judge issued a warrant to search Kyllo's home, where the agents found marijuana growing. After Kyllo was indicted on a federal drug charge, he unsuccessfully moved to suppress the evidence seized from his home and then entered a conditional guilty plea. The Ninth Circuit ultimately affirmed, upholding the thermal imaging on the ground that Kyllo had shown no subjective expectation of privacy because he had made no attempt to conceal the heat escaping from his home. Even if he had, ruled the court, there was no objectively reasonable expectation of privacy because the thermal imager did not expose any intimate details of Kyllo's life, only amorphous hot spots on his home's exterior.

Held: Where, as here, the Government uses a device that is not in general public use, to explore details of a private home that would previously have been unknowable without physical intrusion, the surveillance is a Fourth Amendment "search," and is presumptively unreasonable without a warrant. Pp. 3-13.

- (a) The question whether a warrantless search of a home is reasonable and hence constitutional must be answered no in most instances, but the antecedent question whether a Fourth Amendment "search" has occurred is not so simple. This Court has approved warrantless visual surveillance of a home, see *California v. Ciraolo*, 476 U. S. 207, 213, ruling that visual observation is no "search" at all, see *Dow Chemical Co. v. United States*, 476 U. S. 227, 234-235, 239. In assessing when a search is not a search, the Court has adapted a principle first enunciated in *Katz v. United States*, 389 U. S. 347, 361: A "search" does not occur—even when its object is a house explicitly protected by the Fourth Amendment—unless the individual manifested a subjective expectation of privacy in the searched object, and society is willing to recognize that expectation as reasonable, see, e.g., *California v. Ciraolo*, *supra*, at 211. Pp. 3-5.
- (b) While it may be difficult to refine the *Katz* test in some instances, in the case of the search of a home's interior—the prototypical and hence most commonly litigated area of protected privacy—there is a ready criterion, with roots deep in the common law, of the minimal expectation of privacy that *exists*, and that is acknowledged to be *reasonable*. To withdraw protection of this minimum expectation would be to permit police technology to erode the privacy guaranteed

by the Fourth Amendment. Thus, obtaining by sense-enhancing technology any information regarding the home's interior that could not otherwise have been obtained without physical "intrusion into a constitutionally protected area," *Silverman v. United States*, 365 U. S. 505, 512, constitutes a search—at least where (as here) the technology in question is not in general public use. This assures preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted. Pp. 6-7.

- (c) Based on this criterion, the information obtained by the thermal imager in this case was the product of a search. The Court rejects the Government's argument that the thermal imaging must be upheld because it detected only heat radiating from the home's external surface. Such a mechanical interpretation of the Fourth Amendment was rejected in *Katz*, where the eavesdropping device in question picked up only sound waves that reached the exterior of the phone booth to which it was attached. Reversing that approach would leave the homeowner at the mercy of advancing technology—including imaging technology that could discern all human activity in the home. Also rejected is the Government's contention that the thermal imaging was constitutional because it did not detect "intimate details." Such an approach would be wrong in principle because, in the sanctity of the home, *all* details are intimate details. See *e.g.*, *United States v. Karo*, 468 U. S. 705; *Dow Chemical, supra*, at 238, distinguished. It would also be impractical in application, failing to provide a workable accommodation between law enforcement needs and Fourth Amendment interests. See *Oliver v. United States*, 466 U. S. 170, 181. Pp. 7-12.
- (d) Since the imaging in this case was an unlawful search, it will remain for the District Court to determine whether, without the evidence it provided, the search warrant was supported by probable cause—and if not, whether there is any other basis for supporting admission of that evidence. Pp. 12-13.

190 F. 3d 1041, reversed and remanded.

Scalia, J., delivered the opinion of the Court, in which **Souter, Thomas, Ginsburg, and Breyer, JJ.**, joined. **Stevens, J.**, filed a dissenting opinion, in which **Rehnquist, C. J.**, and **O'Connor and Kennedy, JJ.**, joined.

Justice Scalia delivered the opinion of the Court.

This case presents the question whether the use of a thermal-imaging device aimed at a private home from a public street to detect relative amounts of heat within the home constitutes a "search" within the meaning of the Fourth Amendment.

I

In 1991 Agent William Elliott of the United States Department of the Interior came to suspect that marijuana was being grown in the home belonging to petitioner Danny Kyllo, part of a

triplex on Rhododendron Drive in Florence, Oregon. Indoor marijuana growth typically requires high-intensity lamps. In order to determine whether an amount of heat was emanating from petitioner's home consistent with the use of such lamps, at 3:20 a.m. on January 16, 1992, Agent Elliott and Dan Haas used an Agema Thermovision 210 thermal imager to scan the triplex. Thermal imagers detect infrared radiation, which virtually all objects emit but which is not visible to the naked eye. The imager converts radiation into images based on relative warmth—black is cool, white is hot, shades of gray connote relative differences; in that respect, it operates somewhat like a video camera showing heat images. The scan of Kyllo's home took only a few minutes and was performed from the passenger seat of Agent Elliott's vehicle across the street from the front of the house and also from the street in back of the house. The scan showed that the roof over the garage and a side wall of petitioner's home were relatively hot compared to the rest of the home and substantially warmer than neighboring homes in the triplex. Agent Elliott concluded that petitioner was using halide lights to grow marijuana in his house, which indeed he was. Based on tips from informants, utility bills, and the thermal imaging, a Federal Magistrate Judge issued a warrant authorizing a search of petitioner's home, and the agents found an indoor growing operation involving more than 100 plants. Petitioner was indicted on one count of manufacturing marijuana, in violation of 21 U. S. C. §841(a)(1). He unsuccessfully moved to suppress the evidence seized from his home and then entered a conditional guilty plea.

The Court of Appeals for the Ninth Circuit remanded the case for an evidentiary hearing regarding the intrusiveness of thermal imaging. On remand the District Court found that the Agema 210 "is a non-intrusive device which emits no rays or beams and shows a crude visual image of the heat being radiated from the outside of the house"; it "did not show any people or activity within the walls of the structure"; "[t]he device used cannot penetrate walls or windows to reveal conversations or human activities"; and "[n]o intimate details of the home were observed." Supp. App. to Pet. for Cert. 39-40. Based on these findings, the District Court upheld the validity of the warrant that relied in part upon the thermal imaging, and reaffirmed its denial of the motion to suppress. A divided Court of Appeals initially reversed, 140 F. 3d 1249 (1998), but that opinion was withdrawn and the panel (after a change in composition) affirmed, 190 F. 3d 1041 (1999), with Judge Noonan dissenting. The court held that petitioner had shown no subjective expectation of privacy because he had made no attempt to conceal the heat escaping from his home, *id.*, at 1046, and even if he had, there was no objectively reasonable expectation of privacy because the imager "did not expose any intimate details of Kyllo's life," only "amorphous 'hot spots' on the roof and exterior wall," *id.*, at 1047. We granted certiorari. 530 U. S. 1305 (2000).

II

The Fourth Amendment provides that "[t]he right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated." "At the very core" of the Fourth Amendment "stands the right of a man to retreat into his own home and there be free from unreasonable governmental intrusion." *Silverman v. United States*, 365 U. S. 505, 511 (1961). With few exceptions, the question whether a warrantless search of a home is reasonable and hence constitutional must be answered no. See *Illinois v. Rodriguez*, 497 U. S. 177, 181 (1990); *Payton v. New York*, 445 U. S. 573, 586 (1980).

On the other hand, the antecedent question of whether or not a Fourth Amendment “search” has occurred is not so simple under our precedent. The permissibility of ordinary visual surveillance of a home used to be clear because, well into the 20th century, our Fourth Amendment jurisprudence was tied to common-law trespass. See, e.g., *Goldman v. United States*, 316 U. S. 129, 134-136 (1942); *Olmstead v. United States*, 277 U. S. 438, 464-466 (1928). Cf. *Silverman v. United States*, *supra*, at 510-512 (technical trespass not necessary for Fourth Amendment violation; it suffices if there is “actual intrusion into a constitutionally protected area”). Visual surveillance was unquestionably lawful because “the eye cannot by the laws of England be guilty of a trespass.” *Boyd v. United States*, 116 U. S. 616, 628 (1886) (quoting *Entick v. Carrington*, 19 How. St. Tr. 1029, 95 Eng. Rep. 807 (K. B. 1765)). We have since decoupled violation of a person’s Fourth Amendment rights from trespassory violation of his property, see *Rakas v. Illinois*, 439 U. S. 128, 143 (1978), but the lawfulness of warrantless visual surveillance of a home has still been preserved. As we observed in *California v. Ciraolo*, 476 U. S. 207, 213 (1986), “[t]he Fourth Amendment protection of the home has never been extended to require law enforcement officers to shield their eyes when passing by a home on public thoroughfares.”

One might think that the new validating rationale would be that examining the portion of a house that is in plain public view, while it is a “search”¹ despite the absence of trespass, is not an “unreasonable” one under the Fourth Amendment. See *Minnesota v. Carter*, 525 U. S. 83, 104 (1998) (Breyer, J., concurring in judgment). But in fact we have held that visual observation is no “search” at all—perhaps in order to preserve somewhat more intact our doctrine that warrantless searches are presumptively unconstitutional. See *Dow Chemical Co. v. United States*, 476 U. S. 227, 234-235, 239 (1986). In assessing when a search is not a search, we have applied somewhat in reverse the principle first enunciated in *Katz v. United States*, 389 U. S. 347 (1967). *Katz* involved eavesdropping by means of an electronic listening device placed on the outside of a telephone booth—a location not within the catalog (“persons, houses, papers, and effects”) that the Fourth Amendment protects against unreasonable searches. We held that the Fourth Amendment nonetheless protected *Katz* from the warrantless eavesdropping because he “justifiably relied” upon the privacy of the telephone booth. *Id.*, at 353. As Justice Harlan’s oft-quoted concurrence described it, a Fourth Amendment search occurs when the government violates a subjective expectation of privacy that society recognizes as reasonable. See *id.*, at 361. We have subsequently applied this principle to hold that a Fourth Amendment search does *not* occur—even when the explicitly protected location of a *house* is concerned—unless “the individual manifested a subjective expectation of privacy in the object of the challenged search,” and “society [is] willing to recognize that expectation as reasonable.” *Ciraolo*, *supra*, at 211. We have applied this test in holding that it is not a search for the police to use a pen register at the phone company to determine what numbers were dialed in a private home, *Smith v. Maryland*, 442 U. S. 735, 743-744 (1979), and we have applied the test on two different occasions in holding that aerial surveillance of private homes and surrounding areas does not constitute a search, *Ciraolo*, *supra*; *Florida v. Riley*, 488 U. S. 445 (1989).

The present case involves officers on a public street engaged in more than naked-eye surveillance of a home. We have previously reserved judgment as to how much technological

¹ When the Fourth Amendment was adopted, as now, to “search” meant “[t]o look over or through for the purpose of finding something; to explore; to examine by inspection; as, to *search* the house for a book; to *search* the wood for a thief.” N. Webster, *An American Dictionary of the English Language* 66 (1828) (reprint 6th ed. 1989).

enhancement of ordinary perception from such a vantage point, if any, is too much. While we upheld enhanced aerial photography of an industrial complex in *Dow Chemical*, we noted that we found “it important that this is *not* an area immediately adjacent to a private home, where privacy expectations are most heightened,” 476 U. S., at 237, n. 4 (emphasis in original).

III

It would be foolish to contend that the degree of privacy secured to citizens by the Fourth Amendment has been entirely unaffected by the advance of technology. For example, as the cases discussed above make clear, the technology enabling human flight has exposed to public view (and hence, we have said, to official observation) uncovered portions of the house and its curtilage that once were private. See *Ciraolo, supra*, at 215. The question we confront today is what limits there are upon this power of technology to shrink the realm of guaranteed privacy.

The *Katz* test—whether the individual has an expectation of privacy that society is prepared to recognize as reasonable—has often been criticized as circular, and hence subjective and unpredictable. See 1 W. LaFare, *Search and Seizure* §2.1(d), pp. 393-394 (3d ed. 1996); Posner, *The Uncertain Protection of Privacy by the Supreme Court*, 1979 S. Ct. Rev. 173, 188; *Carter, supra*, at 97 (*Scalia, J.*, concurring). But see *Rakas, supra*, at 143-144, n. 12. While it may be difficult to refine *Katz* when the search of areas such as telephone booths, automobiles, or even the curtilage and uncovered portions of residences are at issue, in the case of the search of the interior of homes—the prototypical and hence most commonly litigated area of protected privacy—there is a ready criterion, with roots deep in the common law, of the minimal expectation of privacy that *exists*, and that is acknowledged to be *reasonable*. To withdraw protection of this minimum expectation would be to permit police technology to erode the privacy guaranteed by the Fourth Amendment. We think that obtaining by sense-enhancing technology any information regarding the interior of the home that could not otherwise have been obtained without physical “intrusion into a constitutionally protected area,” *Silverman*, 365 U. S., at 512, constitutes a search—at least where (as here) the technology in question is not in general public use. This assures preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted. On the basis of this criterion, the information obtained by the thermal imager in this case was the product of a search.²

The Government maintains, however, that the thermal imaging must be upheld because it detected “only heat radiating from the external surface of the house,” Brief for United States 26. The dissent makes this its leading point, see *post*, at 1, contending that there is a fundamental difference between what it calls “off-the-wall” observations and “through-the-wall surveillance.”

² The dissent’s repeated assertion that the thermal imaging did not obtain information regarding the interior of the home, *post*, at 3, 4 (opinion of *Stevens, J.*), is simply inaccurate. A thermal imager reveals the relative heat of various rooms in the home. The dissent may not find that information particularly private or important, see *post*, at 4, 5, 10, but there is no basis for saying it is not information regarding the interior of the home. The dissent’s comparison of the thermal imaging to various circumstances in which outside observers might be able to perceive, without technology, the heat of the home—for example, by observing snowmelt on the roof, *post*, at 3—is quite irrelevant. The fact that equivalent information could sometimes be obtained by other means does not make lawful the use of means that violate the Fourth Amendment. The police might, for example, learn how many people are in a particular house by setting up year-round surveillance; but that does not make breaking and entering to find out the same information lawful. In any event, on the night of January 16, 1992, no outside observer could have discerned the relative heat of *Kyllo*’s home without thermal imaging.

But just as a thermal imager captures only heat emanating from a house, so also a powerful directional microphone picks up only sound emanating from a house—and a satellite capable of scanning from many miles away would pick up only visible light emanating from a house. We rejected such a mechanical interpretation of the Fourth Amendment in *Katz*, where the eavesdropping device picked up only sound waves that reached the exterior of the phone booth. Reversing that approach would leave the homeowner at the mercy of advancing technology—including imaging technology that could discern all human activity in the home. While the technology used in the present case was relatively crude, the rule we adopt must take account of more sophisticated systems that are already in use or in development.³ The dissent’s reliance on the distinction between “off-the-wall” and “through-the-wall” observation is entirely incompatible with the dissent’s belief, which we discuss below, that thermal-imaging observations of the intimate details of a home are impermissible. The most sophisticated thermal imaging devices continue to measure heat “off-the-wall” rather than “through-the-wall”; the dissent’s disapproval of those more sophisticated thermal-imaging devices, see *post*, at 10, is an acknowledgement that there is no substance to this distinction. As for the dissent’s extraordinary assertion that anything learned through “an inference” cannot be a search, see *post*, at 4-5, that would validate even the “through-the-wall” technologies that the dissent purports to disapprove. Surely the dissent does not believe that the through-the-wall radar or ultrasound technology produces an 8-by-10 Kodak glossy that needs no analysis (*i.e.*, the making of inferences). And, of course, the novel proposition that inference insulates a search is blatantly contrary to *United States v. Karo*, 468 U. S. 705 (1984), where the police “inferred” from the activation of a beeper that a certain can of ether was in the home. The police activity was held to be a search, and the search was held unlawful.⁴

The Government also contends that the thermal imaging was constitutional because it did not “detect private activities occurring in private areas,” Brief for United States 22. It points out that in *Dow Chemical* we observed that the enhanced aerial photography did not reveal any “intimate details.” 476 U. S., at 238. *Dow Chemical*, however, involved enhanced aerial photography of an industrial complex, which does not share the Fourth Amendment sanctity of the home. The Fourth Amendment’s protection of the home has never been tied to measurement of the quality or quantity of information obtained. In *Silverman*, for example, we made clear that any physical

³ The ability to “see” through walls and other opaque barriers is a clear, and scientifically feasible, goal of law enforcement research and development. The National Law Enforcement and Corrections Technology Center, a program within the United States Department of Justice, features on its Internet Website projects that include a “Radar-Based Through-the-Wall Surveillance System,” “Handheld Ultrasound Through the Wall Surveillance,” and a “Radar Flashlight” that “will enable law officers to detect individuals through interior building walls.” www.nlectc.org/techproj/ (visited May 3, 2001). Some devices may emit low levels of radiation that travel “through-the-wall,” but others, such as more sophisticated thermal imaging devices, are entirely passive, or “off-the-wall” as the dissent puts it.

⁴ The dissent asserts, *post*, at 5, n. 3, that we have misunderstood its point, which is not that inference *insulates* a search, but that inference alone is *not* a search. If we misunderstood the point, it was only in a good-faith effort to render the point germane to the case at hand. The issue in this case is not the police’s allegedly unlawful inferencing, but their allegedly unlawful thermal-imaging measurement of the emanations from a house. We say such measurement is a search; the dissent says it is not, because an inference is not a search. We took that to mean that, since the technologically enhanced emanations had to be the basis of inferences before anything inside the house could be known, the use of the emanations could not be a search. But the dissent certainly knows better than we what it intends. And if it means only that an inference is not a search, we certainly agree. That has no bearing, however, upon whether hi-tech measurement of emanations from a house is a search.

invasion of the structure of the home, “by even a fraction of an inch,” was too much, 365 U. S., at 512, and there is certainly no exception to the warrant requirement for the officer who barely cracks open the front door and sees nothing but the nonintimate rug on the vestibule floor. In the home, our cases show, *all* details are intimate details, because the entire area is held safe from prying government eyes. Thus, in *Karo, supra*, the only thing detected was a can of ether in the home; and in *Arizona v. Hicks*, 480 U. S. 321 (1987), the only thing detected by a physical search that went beyond what officers lawfully present could observe in “plain view” was the registration number of a phonograph turntable. These were intimate details because they were details of the home, just as was the detail of how warm—or even how relatively warm—Kyllo was heating his residence.⁵

Limiting the prohibition of thermal imaging to “intimate details” would not only be wrong in principle; it would be impractical in application, failing to provide “a workable accommodation between the needs of law enforcement and the interests protected by the Fourth Amendment,” *Oliver v. United States*, 466 U. S. 170, 181 (1984). To begin with, there is no necessary connection between the sophistication of the surveillance equipment and the “intimacy” of the details that it observes—which means that one cannot say (and the police cannot be assured) that use of the relatively crude equipment at issue here will always be lawful. The Agema Thermovision 210 might disclose, for example, at what hour each night the lady of the house takes her daily sauna and bath—a detail that many would consider “intimate”; and a much more sophisticated system might detect nothing more intimate than the fact that someone left a closet light on. We could not, in other words, develop a rule approving only that through-the-wall surveillance which identifies objects no smaller than 36 by 36 inches, but would have to develop a jurisprudence specifying which home activities are “intimate” and which are not. And even when (if ever) that jurisprudence were fully developed, no police officer would be able to know *in advance* whether his through-the-wall surveillance picks up “intimate” details—and thus would be unable to know in advance whether it is constitutional.

The dissent’s proposed standard—whether the technology offers the “functional equivalent of actual presence in the area being searched,” *post*, at 7—would seem quite similar to our own at first blush. The dissent concludes that *Katz* was such a case, but then inexplicably asserts that if the same listening device only revealed the volume of the conversation, the surveillance would be permissible, *post*, at 10. Yet if, without technology, the police could not discern volume without being actually present in the phone booth, *Justice Stevens* should conclude a search has occurred. Cf. *Karo, supra*, at 735 (*Stevens, J.*, concurring in part and dissenting in part) (“I find little comfort in the Court’s notion that no invasion of privacy occurs until a listener obtains some significant information by use of the device.... A bathtub is a less private area when the plumber is present even if his back is turned”). The same should hold for the interior heat of the home if only a person present in the home could discern the heat. Thus the driving force of the dissent, despite its recitation of the above standard, appears to be a distinction among different

⁵ The Government cites our statement in *California v. Ciraolo*, 476 U. S. 207 (1986), noting apparent agreement with the State of California that aerial surveillance of a house’s curtilage could become “ ‘invasive’ ” if “ ‘modern technology’ ” revealed “ ‘those intimate associations, objects or activities otherwise imperceptible to police or fellow citizens.’ ” *Id.*, at 215, n. 3 (quoting brief of the State of California). We think the Court’s focus in this second-hand dictum was not upon intimacy but upon otherwise-imperceptibility, which is precisely the principle we vindicate today.

types of information—whether the “homeowner would even care if anybody noticed,” *post*, at 10. The dissent offers no practical guidance for the application of this standard, and for reasons already discussed, we believe there can be none. The people in their houses, as well as the police, deserve more precision.⁶

We have said that the Fourth Amendment draws “a firm line at the entrance to the house,” *Payton*, 445 U. S., at 590. That line, we think, must be not only firm but also bright—which requires clear specification of those methods of surveillance that require a warrant. While it is certainly possible to conclude from the videotape of the thermal imaging that occurred in this case that no “significant” compromise of the homeowner’s privacy has occurred, we must take the long view, from the original meaning of the Fourth Amendment forward.

“The Fourth Amendment is to be construed in the light of what was deemed an unreasonable search and seizure when it was adopted, and in a manner which will conserve public interests as well as the interests and rights of individual citizens.” *Carroll v. United States*, 267 U. S. 132, 149 (1925).

Where, as here, the Government uses a device that is not in general public use, to explore details of the home that would previously have been unknowable without physical intrusion, the surveillance is a “search” and is presumptively unreasonable without a warrant.

Since we hold the Thermovision imaging to have been an unlawful search, it will remain for the District Court to determine whether, without the evidence it provided, the search warrant issued in this case was supported by probable cause—and if not, whether there is any other basis for supporting admission of the evidence that the search pursuant to the warrant produced.

* * *

The judgment of the Court of Appeals is reversed; the case is remanded for further proceedings consistent with this opinion.

It is so ordered.

Justice Stevens, with whom **The Chief Justice**, **Justice O’Connor**, and **Justice Kennedy** join, dissenting.

There is, in my judgment, a distinction of constitutional magnitude between “through-the-wall surveillance” that gives the observer or listener direct access to information in a private area, on the one hand, and the thought processes used to draw inferences from information in the public domain, on the other hand. The Court has crafted a rule that purports to deal with direct

⁶ The dissent argues that we have injected potential uncertainty into the constitutional analysis by noting that whether or not the technology is in general public use may be a factor. See *post*, at 7-8. That quarrel, however, is not with us but with this Court’s precedent. See *Ciraolo, supra*, at 215 (“In an age where private and commercial flight in the public airways is routine, it is unreasonable for respondent to expect that his marijuana plants were constitutionally protected from being observed with the naked eye from an altitude of 1,000 feet”). Given that we can quite confidently say that thermal imaging is not “routine,” we decline in this case to reexamine that factor.

observations of the inside of the home, but the case before us merely involves indirect deductions from “off-the-wall” surveillance, that is, observations of the exterior of the home. Those observations were made with a fairly primitive thermal imager that gathered data exposed on the outside of petitioner’s home but did not invade any constitutionally protected interest in privacy.¹ Moreover, I believe that the supposedly “bright-line” rule the Court has created in response to its concerns about future technological developments is unnecessary, unwise, and inconsistent with the Fourth Amendment.

I

There is no need for the Court to craft a new rule to decide this case, as it is controlled by established principles from our Fourth Amendment jurisprudence. One of those core principles, of course, is that “searches and seizures *inside a home* without a warrant are presumptively unreasonable.” *Payton v. New York*, 445 U. S. 573, 586 (1980) (emphasis added). But it is equally well settled that searches and seizures of property in plain view are presumptively reasonable. See *id.*, at 586-587.² Whether that property is residential or commercial, the basic principle is the same: “What a person knowingly exposes to the public, even in his own home or office, is not a subject of Fourth Amendment protection.” *California v. Ciraolo*, 476 U. S. 207, 213 (1986) (quoting *Katz v. United States*, 389 U. S. 347, 351 (1967)); see *Florida v. Riley*, 488 U. S. 445, 449-450 (1989); *California v. Greenwood*, 486 U. S. 35, 40-41 (1988); *Dow Chemical Co. v. United States*, 476 U. S. 227, 235-236 (1986); *Air Pollution Variance Bd. of Colo. v. Western Alfalfa Corp.*, 416 U. S. 861, 865 (1974). That is the principle implicated here.

While the Court “take[s] the long view” and decides this case based largely on the potential of yet-to-be-developed technology that might allow “through-the-wall surveillance,” *ante*, at 11-12; see *ante*, at 8, n. 3, this case involves nothing more than off-the-wall surveillance by law enforcement officers to gather information exposed to the general public from the outside of petitioner’s home. All that the infrared camera did in this case was passively measure heat emitted from the exterior surfaces of petitioner’s home; all that those measurements showed were relative differences in emission levels, vaguely indicating that some areas of the roof and outside walls were warmer than others. As still images from the infrared scans show, see Appendix, *infra*, no details regarding the interior of petitioner’s home were revealed. Unlike an x-ray scan, or other possible “through-the-wall” techniques, the detection of infrared radiation emanating from the home did not accomplish “an unauthorized physical penetration into the premises,” *Silverman v. United States*, 365 U. S. 505, 509 (1961), nor did it “obtain information

¹ After an evidentiary hearing, the District Court found:

“[T]he use of the thermal imaging device here was not an intrusion into Kylo’s home. No intimate details of the home were observed, and there was no intrusion upon the privacy of the individuals within the home. The device used cannot penetrate walls or windows to reveal conversations or human activities. The device recorded only the heat being emitted from the home.” Supp. App. to Pet. for Cert. 40.

² Thus, for example, we have found consistent with the Fourth Amendment, even absent a warrant, the search and seizure of garbage left for collection outside the curtilage of a home, *California v. Greenwood*, 486 U. S. 35 (1988); the aerial surveillance of a fenced-in backyard from an altitude of 1,000 feet, *California v. Ciraolo*, 476 U. S. 207 (1986); the aerial observation of a partially exposed interior of a residential greenhouse from 400 feet above, *Florida v. Riley*, 488 U. S. 445 (1989); the aerial photography of an industrial complex from several thousand feet above, *Dow Chemical Co. v. United States*, 476 U. S. 227 (1986); and the observation of smoke emanating from chimney stacks, *Air Pollution Variance Bd. of Colo. v. Western Alfalfa Corp.*, 416 U. S. 861 (1974).

that it could not have obtained by observation from outside the curtilage of the house,” *United States v. Karo*, 468 U. S. 705, 715 (1984).

Indeed, the ordinary use of the senses might enable a neighbor or passerby to notice the heat emanating from a building, particularly if it is vented, as was the case here. Additionally, any member of the public might notice that one part of a house is warmer than another part or a nearby building if, for example, rainwater evaporates or snow melts at different rates across its surfaces. Such use of the senses would not convert into an unreasonable search if, instead, an adjoining neighbor allowed an officer onto her property to verify her perceptions with a sensitive thermometer. Nor, in my view, does such observation become an unreasonable search if made from a distance with the aid of a device that merely discloses that the exterior of one house, or one area of the house, is much warmer than another. Nothing more occurred in this case.

Thus, the notion that heat emissions from the outside of a dwelling is a private matter implicating the protections of the Fourth Amendment (the text of which guarantees the right of people “to be secure *in* their...houses” against unreasonable searches and seizures (emphasis added)) is not only unprecedented but also quite difficult to take seriously. Heat waves, like aromas that are generated in a kitchen, or in a laboratory or opium den, enter the public domain if and when they leave a building. A subjective expectation that they would remain private is not only implausible but also surely not “one that society is prepared to recognize as ‘reasonable.’” *Katz*, 389 U. S., at 361 (Harlan, J., concurring).

To be sure, the homeowner has a reasonable expectation of privacy concerning what takes place within the home, and the Fourth Amendment’s protection against physical invasions of the home should apply to their functional equivalent. But the equipment in this case did not penetrate the walls of petitioner’s home, and while it did pick up “details of the home” that were exposed to the public, *ante*, at 10, it did not obtain “any information regarding the *interior* of the home,” *ante*, at 6 (emphasis added). In the Court’s own words, based on what the thermal imager “showed” regarding the outside of petitioner’s home, the officers “concluded” that petitioner was engaging in illegal activity inside the home. *Ante*, at 2. It would be quite absurd to characterize their thought processes as “searches,” regardless of whether they inferred (rightly) that petitioner was growing marijuana in his house, or (wrongly) that “the lady of the house [was taking] her daily sauna and bath.” *Ante*, at 10-11. In either case, the only conclusions the officers reached concerning the interior of the home were at least as indirect as those that might have been inferred from the contents of discarded garbage, see *California v. Greenwood*, 486 U. S. 35 (1988), or pen register data, see *Smith v. Maryland*, 442 U. S. 735 (1979), or, as in this case, subpoenaed utility records, see 190 F. 3d 1041, 1043 (CA9 1999). For the first time in its history, the Court assumes that an inference can amount to a Fourth Amendment violation. See *ante*, at 8.³

³ Although the Court credits us with the “novel proposition that inference insulates a search,” *ante*, at 9, our point simply is that an inference cannot *be* a search, contrary to the Court’s reasoning. See *supra*, at 4-5. Thus, the Court’s use of *United States v. Karo*, 468 U. S. 705 (1984), to refute a point we do not make underscores the fact that the Court has no real answer (either in logic or in law) to the point we do make. Of course, *Karo* itself does not provide any support for the Court’s view that inferences can amount to unconstitutional searches. The illegality in that case was “the monitoring of a beeper in a private residence” to obtain information that “could not have been obtained by observation from outside,” *id.*, at 714-715, rather than any thought processes that flowed from such monitoring.

Notwithstanding the implications of today's decision, there is a strong public interest in avoiding constitutional litigation over the monitoring of emissions from homes, and over the inferences drawn from such monitoring. Just as "the police cannot reasonably be expected to avert their eyes from evidence of criminal activity that could have been observed by any member of the public," *Greenwood*, 486 U. S., at 41, so too public officials should not have to avert their senses or their equipment from detecting emissions in the public domain such as excessive heat, traces of smoke, suspicious odors, odorless gases, airborne particulates, or radioactive emissions, any of which could identify hazards to the community. In my judgment, monitoring such emissions with "sense-enhancing technology," *ante*, at 6, and drawing useful conclusions from such monitoring, is an entirely reasonable public service.

On the other hand, the countervailing privacy interest is at best trivial. After all, homes generally are insulated to keep heat in, rather than to prevent the detection of heat going out, and it does not seem to me that society will suffer from a rule requiring the rare homeowner who both intends to engage in uncommon activities that produce extraordinary amounts of heat, and wishes to conceal that production from outsiders, to make sure that the surrounding area is well insulated. Cf. *United States v. Jacobsen*, 466 U. S. 109, 122 (1984) ("The concept of an interest in privacy that society is prepared to recognize as reasonable is, by its very nature, critically different from the mere expectation, however well justified, that certain facts will not come to the attention of the authorities"). The interest in concealing the heat escaping from one's house pales in significance to the "the chief evil against which the wording of the Fourth Amendment is directed," the "physical entry of the home," *United States v. United States Dist. Court for Eastern Dist. of Mich.*, 407 U. S. 297, 313 (1972), and it is hard to believe that it is an interest the Framers sought to protect in our Constitution.

Since what was involved in this case was nothing more than drawing inferences from off-the-wall surveillance, rather than any "through-the-wall" surveillance, the officers' conduct did not amount to a search and was perfectly reasonable.⁴

II

Instead of trying to answer the question whether the use of the thermal imager in this case was even arguably unreasonable, the Court has fashioned a rule that is intended to provide essential guidance for the day when "more sophisticated systems" gain the "ability to 'see' through walls and other opaque barriers." *Ante*, at 8, and n. 3. The newly minted rule encompasses "obtaining [1] by sense-enhancing technology [2] any information regarding the interior of the home [3] that could not otherwise have been obtained without physical intrusion into a constitutionally protected area...[4] at least where (as here) the technology in question is not in general public use." *Ante*, at 6-7 (internal quotation marks omitted). In my judgment, the Court's new rule is at once too broad and too narrow, and is not justified by the Court's explanation for its adoption.

⁴ This view comports with that of all the Courts of Appeals that have resolved the issue. See 190 F. 3d 1041 (CA9 1999); *United States v. Robinson*, 62 F. 3d 1325 (CA11 1995) (upholding warrantless use of thermal imager); *United States v. Myers*, 46 F. 3d 668 (CA7 1995) (same); *United States v. Ishmael*, 48 F. 3d 850 (CA5 1995) (same); *United States v. Pinson*, 24 F. 3d 1056 (CA8 1994) (same). But see *United States v. Cusumano*, 67 F. 3d 1497 (CA10 1995) (warrantless use of thermal imager violated Fourth Amendment), vacated and decided on other grounds, 83 F. 3d 1247 (CA10 1996) (en banc).

As I have suggested, I would not erect a constitutional impediment to the use of sense-enhancing technology unless it provides its user with the functional equivalent of actual presence in the area being searched.

Despite the Court's attempt to draw a line that is "not only firm but also bright," *ante*, at 12, the contours of its new rule are uncertain because its protection apparently dissipates as soon as the relevant technology is "in general public use," *ante*, at 6-7. Yet how much use is general public use is not even hinted at by the Court's opinion, which makes the somewhat doubtful assumption that the thermal imager used in this case does not satisfy that criterion.⁵ In any event, putting aside its lack of clarity, this criterion is somewhat perverse because it seems likely that the threat to privacy will grow, rather than recede, as the use of intrusive equipment becomes more readily available.

It is clear, however, that the category of "sense-enhancing technology" covered by the new rule, *ante*, at 6, is far too broad. It would, for example, embrace potential mechanical substitutes for dogs trained to react when they sniff narcotics. But in *United States v. Place*, 462 U. S. 696, 707 (1983), we held that a dog sniff that "discloses only the presence or absence of narcotics" does "not constitute a 'search' within the meaning of the Fourth Amendment," and it must follow that sense-enhancing equipment that identifies nothing but illegal activity is not a search either. Nevertheless, the use of such a device would be unconstitutional under the Court's rule, as would the use of other new devices that might detect the odor of deadly bacteria or chemicals for making a new type of high explosive, even if the devices (like the dog sniffs) are "so limited in both the manner in which" they obtain information and "in the content of the information" they reveal. *Ibid*. If nothing more than that sort of information could be obtained by using the devices in a public place to monitor emissions from a house, then their use would be no more objectionable than the use of the thermal imager in this case.

The application of the Court's new rule to "any information regarding the interior of the home," *ante*, at 6, is also unnecessarily broad. If it takes sensitive equipment to detect an odor that identifies criminal conduct and nothing else, the fact that the odor emanates from the interior of a home should not provide it with constitutional protection. See *supra*, at 7-8. The criterion, moreover, is too sweeping in that information "regarding" the interior of a home apparently is not just information obtained through its walls, but also information concerning the outside of the building that could lead to (however many) inferences "regarding" what might be inside. Under that expansive view, I suppose, an officer using an infrared camera to observe a man silently entering the side door of a house at night carrying a pizza might conclude that its interior is now occupied by someone who likes pizza, and by doing so the officer would be guilty of conducting an unconstitutional "search" of the home.

⁵ The record describes a device that numbers close to a thousand manufactured units; that has a predecessor numbering in the neighborhood of 4,000 to 5,000 units; that competes with a similar product numbering from 5,000 to 6,000 units; and that is "readily available to the public" for commercial, personal, or law enforcement purposes, and is just an 800-number away from being rented from "half a dozen national companies" by anyone who wants one. App. 18. Since, by virtue of the Court's new rule, the issue is one of first impression, perhaps it should order an evidentiary hearing to determine whether these facts suffice to establish "general public use."

Because the new rule applies to information regarding the “interior” of the home, it is too narrow as well as too broad. Clearly, a rule that is designed to protect individuals from the overly intrusive use of sense-enhancing equipment should not be limited to a home. If such equipment did provide its user with the functional equivalent of access to a private place—such as, for example, the telephone booth involved in *Katz*, or an office building—then the rule should apply to such an area as well as to a home. See *Katz*, 389 U. S., at 351 (“[T]he Fourth Amendment protects people, not places”).

The final requirement of the Court’s new rule, that the information “could not otherwise have been obtained without physical intrusion into a constitutionally protected area,” *ante*, at 6 (internal quotation marks omitted), also extends too far as the Court applies it. As noted, the Court effectively treats the mental process of analyzing data obtained from external sources as the equivalent of a physical intrusion into the home. See *supra*, at 4-5. As I have explained, however, the process of drawing inferences from data in the public domain should not be characterized as a search.

The two reasons advanced by the Court as justifications for the adoption of its new rule are both unpersuasive. First, the Court suggests that its rule is compelled by our holding in *Katz*, because in that case, as in this, the surveillance consisted of nothing more than the monitoring of waves emanating from a private area into the public domain. See *ante*, at 7-8. Yet there are critical differences between the cases. In *Katz*, the electronic listening device attached to the outside of the phone booth allowed the officers to pick up the content of the conversation inside the booth, making them the functional equivalent of intruders because they gathered information that was otherwise available only to someone inside the private area; it would be as if, in this case, the thermal imager presented a view of the heat-generating activity inside petitioner’s home. By contrast, the thermal imager here disclosed only the relative amounts of heat radiating from the house; it would be as if, in *Katz*, the listening device disclosed only the relative volume of sound leaving the booth, which presumably was discernible in the public domain.⁶ Surely, there is a significant difference between the general and well-settled expectation that strangers will not have direct access to the contents of private communications, on the one hand, and the rather theoretical expectation that an occasional homeowner would even care if anybody noticed the relative amounts of heat emanating from the walls of his house, on the other. It is pure hyperbole for the Court to suggest that refusing to extend the holding of *Katz* to this case would leave the homeowner at the mercy of “technology that could discern all human activity in the home.” *Ante*, at 8.

Second, the Court argues that the permissibility of “through-the-wall surveillance” cannot depend on a distinction between observing “intimate details” such as “the lady of the house [taking] her daily sauna and bath,” and noticing only “the nonintimate rug on the vestibule floor” or “objects no smaller than 36 by 36 inches.” *Ante*, at 10-11. This entire argument assumes, of course, that the thermal imager in this case could or did perform “through-the-wall surveillance” that could identify any detail “that would previously have been unknowable without physical intrusion.” *Ante*, at 11-12. In fact, the device could not, see n. 1, *supra*, and did not, see

⁶ The use of the latter device would be constitutional given *Smith v. Maryland*, 442 U. S. 735, 741 (1979), which upheld the use of pen registers to record numbers dialed on a phone because, unlike “the listening device employed in *Katz* ... pen registers do not acquire the *contents* of communications.”

Appendix, *infra*, enable its user to identify either the lady of the house, the rug on the vestibule floor, or anything else inside the house, whether smaller or larger than 36 by 36 inches. Indeed, the vague thermal images of petitioner’s home that are reproduced in the Appendix were submitted by him to the District Court as part of an expert report raising the question whether the device could even take “accurate, consistent infrared images” of the *outside* of his house. Defendant’s Exhibit 107, p. 4. But even if the device could reliably show extraordinary differences in the amounts of heat leaving his home, drawing the inference that there was something suspicious occurring inside the residence—a conclusion that officers far less gifted than Sherlock Holmes would readily draw—does not qualify as “through-the-wall surveillance,” much less a Fourth Amendment violation.

III

Although the Court is properly and commendably concerned about the threats to privacy that may flow from advances in the technology available to the law enforcement profession, it has unfortunately failed to heed the tried and true counsel of judicial restraint. Instead of concentrating on the rather mundane issue that is actually presented by the case before it, the Court has endeavored to craft an all-encompassing rule for the future. It would be far wiser to give legislators an unimpeded opportunity to grapple with these emerging issues rather than to shackle them with prematurely devised constitutional constraints.

I respectfully dissent.

APPENDIX

(Images and text reproduced from defendant’s exhibit 107)

Top left: Infrared image of a video frame from the videotape submitted as evidence in this case. The thermogram indicates the suspect house as it appeared with the Gain and contrast in its default setting. Only the outline of the house is visible. The camera used was the Thermovision 210.

Top Right: Infrared image of a subsequent video frame taken from the videotape. The gain and contrast settings have been increased in order to make the walls and roof of the structure appear hotter than what it actually is.

[Graphic Image omitted; see printed opinion.]

Bottom Left: Infrared image of the opposite side of the suspects house. The thermogram is also taken from the same videotape. The camera settings are in the default mode and the outline of the house is barely visible. Only the hot electrical transformer and the street light are identifiable.

Bottom Right: The same image, but with the gain and contrast increased. This change in camera settings cause any object to appear hotter than what it actually is. The arrow indicates the overloading of a area immediately around a hot object in this case the electrical transformer and the streetlight. This overloading of the image is a inherent design flaw in the camera itself.