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Bethany L. Dickman

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Untying Knotts: The Application of Mosaic Theory to GPS Surveillance in
UNITED STATES V. MAYNARD

NOTE

UNTYING *KNOTTS*: THE APPLICATION OF MOSAIC THEORY TO GPS SURVEILLANCE IN *UNITED STATES V. MAYNARD*

BETHANY L. DICKMAN*

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INTRODUCTION

A recent Time article warned readers that “[g]overnment agents can sneak onto your property in the middle of the night, put a GPS device on the bottom of your car and keep track of everywhere you go.”¹ While this may strike some as Orwellian alarmism, the article was reporting on a Ninth Circuit decision, *United States v. Pineda-Moreno*,² in which a three judge panel held that evidence obtained from a GPS device that government agents had secretly installed on the defendant’s car was admissible at trial.³ In his outraged dissent, Chief Judge Kozinski declared

* Executive Editor, *American University Law Review*, Volume 60; J.D. Candidate, May 2011, *American University, Washington College of Law*; B.A., Philosophy, 2002, *George Washington University*. I would like to express my gratitude to Leslie Meredith for her helpful edits as well as her intelligent, cheerful guidance of the Law Review, Ian Spear for his careful, good-natured assistance with this piece and everything else, and Lauren Marsh and the Note & Comment board for their remarkable dedication to student writers. My thanks to Professor Stephen Vladeck for his guidance on this piece and to Professor Ira Robbins for his continued support of the Law Review. This effort, as with all others, is dedicated to my parents. Their constant love has given me the strength and character to find joy in life’s challenges and to follow my own path, wherever it may lead.

1. Adam Cohen, *The Government Can Use GPS to Track Your Moves*, TIME.COM (Aug. 25, 2010), <http://www.time.com/time/nation/article/0,8599,2013150,00.html>.

2. 591 F.3d 1212 (9th Cir. 2009), *reh’g denied*, 617 F.3d 1120 (9th Cir. 2010).

3. *Id.* at 1215.

that “1984 may have come a bit later than predicted, but it’s here at last.”⁴ The majority, however, held that the defendant, Juan Pineda-Moreno, had no reasonable expectation of privacy in his driveway, rendering a warrant unnecessary.⁵

Individual expectations of privacy have for many years provided the doctrinal foundation of Fourth Amendment search analysis.⁶ These expectations shift with one’s location and activity;⁷ similarly, societal expectations of privacy have shifted with changes in technology.⁸ Consequently, the use of GPS tracking devices⁹ has raised sharp questions about what level of privacy one might reasonably expect in the movements of a car traveling on public roads;¹⁰ questions that go to the heart of any debate on privacy, law enforcement, and government intrusiveness. The debate promises to keep raging as highly invasive technologies become widely adopted by both law enforcement and the public.¹¹

4. *United States v. Pineda-Moreno*, 617 F.3d 1120, 1121 (9th Cir. 2010) (Kozinski, C.J., dissenting).

5. *See United States v. Pineda-Moreno*, 591 F.3d 1212, 1215 (9th Cir. 2010) (declining to find a reasonable expectation of privacy in a driveway, thereby denying Fourth Amendment protection).

6. *See Katz v. United States*, 389 U.S. 347, 360–61 (1967) (Harlan, J., concurring) (explaining that, as part one of a two-part analysis, a person must exhibit a subjective expectation of privacy for Fourth Amendment protections to apply).

7. *See Hester v. United States*, 265 U.S. 57, 59 (1924) (stating that there is no reasonable expectation of privacy in movements in “open fields”).

8. *See, e.g., City of Ontario v. Quon*, 130 S. Ct. 2619, 2632–33 (2010) (holding that a cell phone user had no reasonable expectation of privacy in text messages sent from government-issued phone); *California v. Ciraolo*, 476 U.S. 207, 213–15 (1986) (noting that in this “age where private and commercial flight in public airways is routine” the defendant had no reasonable expectation of privacy because anyone flying in the airspace above the defendant’s home could have seen marijuana plants); *Smith v. Maryland*, 442 U.S. 735, 744–46 (1979) (holding that warrantless use of a pen register attached to a phone in order to record phone numbers dialed and calls received did not constitute a search because the user of the phone assumed the risk when he voluntarily conveyed information to the phone company). *But see Kyllo v. United States* 533 U.S. 27, 37–38 (2001) (holding that use of a thermal imaging device constituted a search because the information was unavailable outside the home and therefore offended society’s expectation of privacy in the home); *United States v. Karo*, 468 U.S. 705, 715 (1984) (holding the same for a beeper used to reveal information inside the home).

9. *See, e.g., Ben Hubbard, Police Turn to Secret Weapon: GPS Device*, WASH. POST, Aug. 13, 2008, at A1 (describing how police tracked a suspected rapist using a GPS device, ultimately leading to his arrest when he was about to attack another victim); Stephen Williams, *Student Says He Found an FBI Tracking Device on His Car*, *Automobiles: Wheels Blog*, N.Y. TIMES (Oct. 8, 2010, 6:03 PM), <http://wheels.blogs.nytimes.com/2010/10/08/student-says-he-found-an-fbi-tracking-device-on-his-car/> (describing how FBI agents retrieved a GPS device from a Muslim college student after a mechanic found a suspicious wire during routine maintenance, and noting that federal authorities may secretly plant GPS devices on cars in California).

10. *See, e.g., California v. Carney*, 471 U.S. 386, 390–91 (1985) (holding that an automobile’s ready mobility creates a sufficient exigency to justify a warrantless search); *United States v. Knotts*, 460 U.S. 276, 281 (1983) (stating that a person traveling in a vehicle on a public road has no reasonable expectation of privacy in his or her movements).

11. Cellular phones, for example, allow fairly accurate tracking of the phone’s location via triangulation. *See Adam Koppel, Note, Warranting a Warrant: Fourth Amendment Concerns Raised by Law Enforcement’s Warrantless Use of GPS and Cellular Phone*

In addition to the Ninth Circuit, the Seventh and Eighth Circuits have explicitly held that tracking a vehicle's movements using a GPS device is not a search for Fourth Amendment purposes.¹² The Court of Appeals for the District of Columbia Circuit, however, came to the opposite conclusion in its recent decision in *United States v. Maynard*,¹³ holding that the warrantless use of a GPS device to continuously track a suspect for nearly a month constituted a search.¹⁴ In a novel opinion, the court invoked the mosaic theory,¹⁵ more often used in national security law, to determine whether the defendant had a reasonable expectation of privacy in the aggregate of his movements over an extended period of time.¹⁶

This Note will analyze the *Maynard* decision, describing the facts and procedural history of the case, then examining the court's analysis of precedent and its application of mosaic theory to GPS surveillance. It will focus on the utility of mosaic theory as an addition to Fourth Amendment doctrine, and suggest that courts continue to use the theory and develop refinements for the GPS context as they continue to wrestle with the reconciliation of technology and the Fourth Amendment.¹⁷

I. FACTS AND PROCEDURAL HISTORY

Antoine Jones and Lawrence Maynard were charged with conspiracy to distribute and possession with intent to distribute cocaine and cocaine base.¹⁸ At trial, the government used tracking information obtained from a

Tracking, 64 U. MIAMI L. REV. 1061, 1068 (2010) (explaining that triangulation works through cellular towers sending signals to a user's cell phone and measuring elements of the response).

12. See *United States v. Marquez*, 605 F.3d 604, 609-10 (8th Cir. 2010) (concluding that placing a tracking device on the vehicle "merely allowed the police to reduce the cost of lawful surveillance"); *United States v. Pineda-Moreno*, 591 F.3d 1212, 1216 (9th Cir. 2010) (stating that placing a tracking device on a vehicle is simply a substitute for police following the vehicle), *reh'g denied* 617 F.3d 1120 (2010); *United States v. Garcia*, 474 F.3d 994, 997 (7th Cir. 2007) (analogizing GPS tracking with surveillance cameras and satellite imaging to determine that it is not a search as defined by the Fourth Amendment).

13. 615 F.3d 544 (D.C. Cir. 2010) *reh'g denied* 625 F.3d 766 (D.C. Cir. 2010).

14. *Id.* at 555-56.

15. Mosaic theory describes the concept that individual actions may not rise to the level of a search in and of itself, but may constitute a search when aggregated. Orin Kerr, *D.C. Circuit Introduces "Mosaic Theory" Of Fourth Amendment, Holds GPS Monitoring a Fourth Amendment Search*, THE VOLOKH CONSPIRACY (Aug. 6, 2010 2:46 PM), <http://volokh.com/2010/08/06/d-c-circuit-introduces-mosaic-theory-of-fourth-amendment-holds-gps-monitoring-a-fourth-amendment-search/>.

16. *Maynard*, 615 F.3d at 558. The court determined that although Jones's individual movements were exposed to the public, what the whole of those movements revealed was not exposed, thus giving rise to an expectation of privacy. *Id.*

17. See, e.g., *United States v. Comprehensive Drug Testing, Inc.*, 579 F.3d 989, 1006 (9th Cir. 2009) (describing the difficulty for courts in striking a fair balance for searches of electronic records when precedent addresses only searches of paper documents, which are necessarily more limited in the amount of information that can be obtained) *aff'd in part rev'd in part en banc* 621 F.3d 1162 (9th Cir. 2010).

18. *Maynard*, 615 F.3d at 548-49.

GPS device placed on Jones's vehicle to establish a pattern in his activity¹⁹ that, when combined with his cell phone records, "paint[ed] a picture of Jones's movements that made the allegation that he was involved in drug trafficking" credible.²⁰ The sequence of Jones's movements revealed more than what a few individual movements could have shown; taken together, the movements created a picture of his drug trafficking operation.²¹

Although the police had obtained a warrant to install the GPS device in the District of Columbia, they actually installed it in Maryland after the warrant had expired.²²

Jones and Maynard jointly appealed several issues, none of which the court found merited reversal of the trial court's conviction.²³ Jones individually argued that the court erred in admitting the evidence acquired from the warrantless use of the GPS device for a period of four weeks.²⁴ The court agreed with Jones that the prolonged use of GPS surveillance violated his reasonable expectation of privacy and rose to the level of a search under the Fourth Amendment,²⁵ thereby requiring the reversal of Jones's conviction.²⁶

II. ANALYSIS

In *Maynard*, the court wrestled with an emergent tension in Fourth Amendment doctrine: although little or no expectation of privacy exists in public,²⁷ through technology, the government has the ability to monitor individuals in public continuously and indefinitely, a situation much

19. *Id.* at 562.

20. *Id.* at 567.

21. *Id.* at 567-68. To the court, the trial transcript was indicative of how the prosecution had used the GPS information:

They had to figure out where is he going? When he says ten minutes, where is he going? Again, the pattern developed. . . . And I want to . . . just show you an example of how the pattern worked. . . . The meetings are short. But you will again notice the pattern you will see in the coming weeks over and over again. *Id.* at 562 (quoting Transcript of Record at #, *United States v. Maynard*, 615 F.3d 544 (D.C. Cir. 2010) (No. #) . [OH: Please determine if the Trial Transcript can be found and fill in the appropriate information where # is indicated according to rule 10.8.3.]

22. *Id.* at 566. The decision does not address whether the search would have been constitutional if the officers had obtained a warrant after installing the GPS device, but before using it to track Jones. *But see* *United States v. Pineda-Moreno*, 591 F.3d 1212, 1215 (9th Cir. 2010) (implying that it is the installation of the device that raises the Fourth Amendment question rather than the tracking), *reh'g denied* 617 F.3d 1120 (9th Cir. 2010).

23. *Maynard*, 615 F.3d at 549.

24. *Id.* at 549, 555.

25. *See id.* at 563 ("Society recognizes Jones's expectation of privacy in his movements over the course of a month as reasonable, and the use of the GPS device to monitor those movements defeated that reasonable expectation.")

26. *Id.* at 568.

27. *See supra* note 8 and accompanying text (providing examples of the Court's delineation between public and private for purposes of determining whether a person has a reasonable expectation of privacy).

different from the kinds of monitoring courts grappled with as the doctrine developed.²⁸ Using the existing framework leads to the absurd result that even the most invasive monitoring technique would never rise to the level of a search, so long as it is used in public.²⁹

In addressing this problem, the *Maynard* court grounded its reasoning in the touchstone test of Fourth Amendment doctrine: the reasonable expectation of privacy analysis derived from *United States v. Katz*.³⁰ To the court, whether or not Jones exhibited an actual, subjective expectation of privacy turned on whether his movements were exposed to the public.³¹ The court found that although each trip in isolation was exposed to the public, the *entirety* of Jones's movements was not, since "[a] reasonable person does not expect anyone to monitor and retain a record of every time he drives his car, including his origin, route, destination, and each place he stops and how long he stays there; rather, he expects each of those movements to remain 'disconnected and anonymous.'"³² Therefore, the court found that because GPS surveillance reveals a more detailed picture of one's life than any one person would be expected to have, an expectation of privacy in the aggregate of one's public movements is reasonable.³³

28. This approach to analyzing reasonable expectation of privacy is deemed the "probabilistic model" and focuses on the likelihood that the information would be known, or become known, to the public or the police. If the likelihood is low, it is more likely that there is a reasonable expectation of privacy. See Orin S. Kerr, *Four Models of Fourth Amendment Protection*, 60 STAN. L. REV. 503, 506 (2007) (outlining various approaches to Fourth Amendment privacy analysis, noting that the Supreme Court often adopts a different model depending on the context); see also Kerr, *supra* note 15 (stating that the probabilistic model does not work in context of technological surveillance).

29. See, e.g., *United States v. Marquez*, 605 F.3d 604, 610 (8th Cir. 2010) (imagining that police could potentially attach surveillance devices to thousands of random cars and then analyze the data to seek out suspicious patterns of activity).

30. 389 U.S. 347 (1967); see *id.* at 360–61 (Harlan, J., concurring) (describing the inquiry for a defendant's reasonable expectation of privacy as, first, whether or not the defendant exhibited an actual, subjective expectation of privacy, and second, whether or not that expectation was reasonable); *Maynard*, 615 F.3d at 555 (stating that the government agreed that the *Katz* test applied).

31. See *Maynard* 615 F.3d at 558 ("This much is clear, however: Whether an expectation of privacy is reasonable depends in large part upon whether that expectation relates to information that has been 'expose[d] to the public.'" (quoting *Katz*, 389 U.S. at 351)); see also April A. Otterberg, Note, *GPS Tracking Technology: The Case For Revisiting Knotts and Shifting the Supreme Court's Theory of the Public Space Under the Fourth Amendment*, 46 B.C. L. REV. 661, 686 (2005) (noting that the Supreme Court's justification for limiting the Fourth Amendment's application in public—based on the rationale that an individual knowingly exposes themselves when in public—places significant limitations on the Fourth Amendment's reach).

32. *Maynard* 615 F.3d at 563 (quoting *Nader v. Gen. Motors Corp.*, 255 N.E.2d 765, 772 (N.Y. 1970)).

33. The court based its conclusion on two main points. First, the court determined that "unlike one's movements during a single journey, the whole of one's movements over the course of a month is not *actually* exposed to the public because the likelihood anyone will observe all those movements is effectively nil." *Id.* at 558. Second, the court reasoned that the "whole of one's movements is not exposed *constructively* even though each individual movement is exposed, because that whole reveals more—sometimes a great deal more—than does the sum of its parts." *Id.*; see also *supra* note 15 (describing mosaic theory);

The court likened the aggregate of Jones's movements to a mosaic,³⁴ where the whole is more than the sum of its parts. This theory was imported from national security cases in which courts grappled with determining what kinds of security-related documents could be subject to Freedom of Information Act ("FOIA") requests.³⁵ In the FOIA context, the mosaic theory addresses the fact that "[d]isparate items of information, though individually of limited or no utility to their possessor, can take on added significance when combined with other items of information."³⁶ The danger is that a potential adversary could use FOIA to gather individual items of information and piece them together to discover and exploit vulnerabilities.³⁷ In other words, the difference between the whole and its individual components "is not one of degree but of kind."³⁸

Similarly, in *Maynard*, although Jones did not have an expectation of privacy in any one of his individual journeys, the court found that he did have an expectation of privacy in the mosaic created over the course of the month-long surveillance.³⁹ The court explained how a privacy expectation arose from this picture of a series of activities, saying that:

Repeated visits to a church, a gym, a bar, or a bookie tell a story not told by any single visit, as does one's not visiting any of these places over the course of a month. The sequence of a person's movements can reveal still more; a single trip to a gynecologist's office tells little about a woman, but that trip followed a few weeks later by a visit to a baby supply store tells a different story. A person who knows all of another's travels can deduce whether he is a weekly church goer, a heavy drinker, a regular at the gym, an unfaithful husband, an outpatient receiving medical treatment, an associate of particular individuals or political groups—and not just one such fact about a person, but all such facts.⁴⁰

Indeed, for Jones, his isolated trips to different houses for varying periods of time gave rise to a picture that, in aggregate, told a different story than those actions viewed individually. The court's method of reaching its conclusion through use of the mosaic theory has been criticized as unpersuasive, implying that its use was entirely result oriented.⁴¹ The

supra note 28 (describing probabilistic model).

34. *Maynard*, 615 F.3d at 562.

35. *See, e.g., id.* (examining the justification for the mosaic theory in the national security context, and noting that "[w]hat may seem trivial to the uninformed, may appear of great moment to one who has a broad view of the scene" (internal quotation marks omitted)).

36. David E. Pozen, Note, *The Mosaic Theory, National Security, and the Freedom of Information Act*, 115 YALE L.J. 628, 630 (2005).

37. *See id.* (citing the government's use of mosaic theory to foreclose access to documents requested by the public).

38. *Maynard*, 615 F.3d at 562.

39. *Id.* at 563.

40. *Id.* at 562.

41. *See* Kerr, *supra* note 15 (arguing that the approach in *Maynard* is not persuasive in

importation of the concept, however, is a revolutionary addition to the Fourth Amendment jurisprudential framework and courts should develop the theory further in order to address some of the emerging legal questions arising from sophisticated, technologically-based surveillance.

A. *Mosaic Theory as an Analytical Tool in the Katz Framework*

The mosaic theory is a novel and much-needed addition to the traditional *Katz* framework.⁴² Most notably, the mosaic theory provides an elegant solution to the plain view doctrine's weakness in failing to meaningfully accommodate notions of privacy in public activity.⁴³ Courts' continued insistence that little or no expectation of privacy exists in plain view coupled with the development of advanced monitoring techniques threatens to turn the Fourth Amendment into an instrument of oppression by the government, rather than a protection against it.

As the Supreme Court noted in *Kyllo v. United States*,⁴⁴ "the [Fourth Amendment] rule we adopt must take account of more sophisticated systems that are already in use or in development."⁴⁵ The mosaic theory does not preclude the possibility that reasonable expectations of privacy could shift as GPS and other monitoring technologies become more pervasive.⁴⁶ Rather, it protects the Fourth Amendment from innocuous erosion by society's ready adoption of such technology since it recognizes that privacy may exist in the aggregate of one's movements, despite their inherently public character. This privacy expectation could still exist even as use of GPS devices becomes a social norm.⁴⁷

In setting out the foundation of its holding, the *Maynard* court was careful to address the plain view doctrine as it applies to vehicles traveling on public roads. In particular, the court focused on *United States v.*

part because of the challenge of defining the scope of the mosaic and the possibility of creating "retroactive unconstitutionality").

42. See, e.g., *United States v. Knotts*, 460 U.S. 276, 288 (1983) (Stevens, J., concurring) (stating that electronic surveillance techniques may implicate "especially sensitive" Fourth Amendment concerns); Renée McDonald Hutchins, *Tied Up in Knotts? GPS Technology and the Fourth Amendment*, 419 UCLA L. REV. 409, 421 (2007) (arguing that foreseeable advances in GPS technology must be considered in determining the limits of Fourth Amendment protection).

43. See *supra* text accompanying notes 28-30 (discussing inability of traditional Fourth Amendment jurisprudence to address changes in technology).

44. 533 U.S. 27 (2001).

45. *Id.* at 36.

46. See Hutchins, *supra* note 42, at 419 (noting that GPS technology has become a standard addition to cellular phones).

47. See, e.g., Orin S. Kerr, *Do We Need a Fourth Amendment?*, 107 MICH. L. REV. 951, 960 (2009) (reviewing CHRISTOPHER SLOBOGIN, *PRIVACY AT RISK: THE NEW GOVERNMENT SURVEILLANCE AND THE FOURTH AMENDMENT* (2007)) (stating that surveys indicate many people are comfortable with routine surveillance in commercial settings because they have experienced it firsthand).

Knotts,⁴⁸ an important precedent for the other circuits' holdings on GPS surveillance.⁴⁹ *Knotts* involved the use of a beeper to track a defendant suspected of drug trafficking; the court concluded that there was no reasonable expectation of privacy in the isolated act of driving from the chemical company to the cabin:

A person traveling in an automobile on a public thoroughfare[] has no reasonable expectation of privacy in his movements from one place to another. When [the defendant] traveled over public streets he voluntarily conveyed to anyone who wanted to look the fact that he was traveling over particular roads in a particular direction, the fact of whatever stops he made, and the fact of his final destination when he exited from public roads onto private property.⁵⁰

Notably, the *Knotts* court reserved the question of whether twenty-four hour surveillance in a similar manner would constitute a search.⁵¹

The characteristics of GPS and other similar monitoring techniques mandate a more nuanced approach than the public/private distinction drawn in *Knotts* and similar cases.⁵² Unlike the scenario in *Knotts*, where the use of the beeper augmented the police officers' sensory perceptions, GPS surveillance has the ability to completely replace human perception.⁵³ In

48. 460 U.S. 276 (1983).

49. See, e.g., *United States v. Pineda-Moreno*, 591 F.3d 1212, 1216 n. 2 (9th Cir. 2010) (applying *Knotts* despite the hesitancy of some state supreme courts to allow the use of tracking devices under state constitutions), *reh'g denied* 617 F.3d 1120 (9th Cir. 2010); *United States v. Garcia*, 474 F.3d 994, 998 (7th Cir. 2007) (relying on *Knotts* to support the proposition that the Fourth Amendment should not bar increased police efficiency created by technological advances).

50. *Knotts*, 460 U.S. at 281-82. Additionally, the court noted that the officers were not forbidden to "augment the sensory faculties" with technology. *Id.* at 282. See also *United States v. Sparks*, No. 10-10067-WGY, 2010 WL 4595522, at *7 (D. Mass. Nov. 10, 2010) (finding the reasoning in *Maynard* unconvincing because although GPS surveillance may allow law enforcement to capture a quantitatively greater amount of information, the quality of the information is the same).

51. Specifically, the Court said that "if such dragnet-type law enforcement practices as respondent envisions should eventually occur, there will be time enough then to determine whether different constitutional principles may be applicable." *Knotts*, 460 U.S. at 284. According to the *Maynard* court, "[t]he federal circuits that have held use of a GPS device is not a search were not alert to the distinction drawn in *Knotts* between short-term and prolonged surveillance." *United States v. Maynard*, 615 F.3d 544, 564 (D.C. Cir. 2010). This reading allowed the court to depart from the *Knotts* precedent and introduce mosaic theory into its Fourth Amendment analysis. See also Hutchins, *supra* note 42, at 457 ("According to the [Supreme] Court, its decision [in *Knotts*] should not be read to sanction 'twenty-four hour surveillance of any citizen of this country.'" (quoting *Knotts*, 460 U.S. at 283)).

52. *Supra* note 8 and accompanying text (delineating cases that reflect courts' recognition of modern technology in Fourth Amendment jurisprudence). See also Marc Jonathan Blitz, *Video Surveillance and the Constitution of Public Space*, 82 TEX. L. REV. 1349, 1419-20 (2004) (suggesting that many opportunities for privacy exist when one is in public space, such as, for example, merging into a crowd).

53. See *People v. Weaver*, 909 N.E.2d 1195, 1199 (N.Y. 2009) (stating that it would require "millions of additional police officers and cameras on every street lamp" for officers to actually see what the GPS "sees"). GPS technology uses satellites to precisely pinpoint the location, speed, and direction of a vehicle. The information is stored and can be

Knotts, the officers used the beeper as they attempted to maintain actual visual contact with the defendant's vehicle.⁵⁴ GPS, on the other hand, does not require the presence of an officer; rather, it replaces the officer's function entirely.⁵⁵

Freed from the physical constraints of the public/private distinction, courts applying a mosaic theory can deal more effectively with the far-reaching privacy concerns associated with GPS and other monitoring devices. In *Pineda-Moreno*, formalistic reliance on *Knotts* led the court to ask only if the defendant had a reasonable expectation of privacy in his driveway.⁵⁶ While a long line of cases holds that one does not,⁵⁷ courts need to ask if there is an expectation of privacy when the government's intrusion goes far beyond a few footsteps in the defendant's driveway.⁵⁸

The current plain view doctrine also raises the specter of equal protection: by the existing logic, people who park their cars in garages attached to their homes have a greater expectation of privacy than those who park their car in the street.⁵⁹ Mosaic theory has the potential to correct

automatically retrieved at a later time, and inputted into map and spreadsheets. Ramya Shah, *From Beeper to GPS: Can the Fourth Amendment Keep Up with Electronic Tracking Technology?* 2009 U. ILL. J.L. TECH. & POL'Y 281, 283-85 (2009).

54. *Knotts*, 460 U.S. at 278.

55. See *supra* note 30 and accompanying text (noting that GPS technology could track a person's entire travel pattern without any officer participation). Additionally, the beeper in *Knotts* was on a container purchased by the defendant and placed in the car by the defendant, debatably at his own risk, in contrast to the scenario in *Maynard*, where police officers planted the device on Jones's car. See Bennett L. Gershman, *Privacy Revisited: GPS Tracking as Search and Seizure*, 30 PACE L. REV. 927, 952-53 (2010) (arguing that it is unreasonable to assume that a person has voluntarily conveyed to technology the capacity to "see" him constantly, and that any assumption of risk is out of place when technology is used as a complete substitute for human senses). On the other hand, it may eventually become reasonable to assume that one has voluntarily conveyed to technology the capacity to "see" through the purchase of a phone or GPS device. However, it may be unreasonable to assume that one has also ceded procedural protections against the government's use of what that information reveals.

56. See *United States v. Pineda-Moreno*, 591 F.3d 1212, 1215 (9th Cir. 2010) (noting that *Pineda-Moreno* had done nothing to exhibit an expectation of privacy in his driveway, such as installing "No Trespassing" signs or erecting any barrier to prevent someone on the street from viewing his driveway), *reh'g denied* 617 F.3d 1120 (9th Cir. 2010).

57. See, e.g., *California v. Ciraolo*, 476 U.S. 207, 215 (1986) (finding no expectation of privacy for marijuana plants visible by the naked eye from 1,000 feet above); *Oliver v. United States*, 466 U.S. 170, 177 (1984) (holding that an individual has no expectation of privacy in an open field).

58. The *Pineda-Moreno* court refused to distinguish between the installation of the GPS device and the actual tracking of the suspect. To the court, the case ended when the device was installed. See *Pineda-Moreno*, 591 F.3d at 1217 ("We conclude that the police did not conduct an impermissible search of *Pineda-Moreno*'s car by monitoring its location with mobile tracking devices."). In his dissent from the D.C. Circuit's denial of rehearing en banc, Judge Kavanaugh indicated that a property-based assessment could be the appropriate lens with which to view cases like *Maynard*, and distinguished *Knotts* on the ground that the defendant did not own the containers where the beeper was installed. *United States v. Maynard*, 615 F.3d 544, 770 (D.C. Cir. 2010) (Kavanaugh, J., dissenting).

59. In his dissent to the Ninth Circuit's denial of a rehearing en banc, Chief Judge Kozinski recognized this inherent unfairness, attributing it in great part to a lack of economic diversity on the bench. "When you glide your BMW into your underground

this imbalance by allowing courts to recognize more robust privacy expectations even in plain view. In many senses, the theory provides a much needed conceptual expansion of traditional tests of privacy.

B. Determining When an Aggregate of Information is a Search

Naturally, the next question is “how do the police know when a mosaic has been created such that the sum of law enforcement techniques, when aggregated, amount to a search?”⁶⁰ Indeed, criticism of using mosaic theory for GPS surveillance has centered on the potential difficulty of applying the concept in future cases.⁶¹

The threshold test for invoking mosaic theory should be whether the technology is used by law enforcement to replace direct observation by humans. Once this threshold has been met, courts should develop specific factors derived from the traditional privacy analysis to determine when prolonged surveillance using technology creates a mosaic that constitutes a search. The *Maynard* court, for example, looked to whether the defendant’s activities had been actually or constructively exposed to the public.⁶² The length of the surveillance was also an important factor to the court in its holding.⁶³ Courts could look to the level of intrusiveness of the technology used;⁶⁴ what degree and extent that a technology replaces law enforcement’s direct observation (given that it does);⁶⁵ and, the level of detail the surveillance reveals.⁶⁶ Using mosaic theory gives courts the

garage or behind an electric gate, you don’t need to worry that somebody might attach a tracking device to it while you sleep.” *United States v. Pineda-Moreno*, 617 F.3d 1120, 1123 (9th Cir. 2010) (Kozinski, C.J., dissenting). Judge Kozinski further argued “the Constitution doesn’t prefer the rich over the poor; the man who parks his car next to his trailer is entitled to the same privacy and peace of mind as the man whose urban fortress is guarded by the Bel Air Patrol.” *Id.*

60. Kerr, *supra* note 15.

61. *See, e.g., id.* (arguing that the mosaic theory provides no clear standards for police to determine when the sum of their activities rises to a search).

62. *See supra* note 33 and accompanying text (describing the *Maynard* court’s reasoning).

63. *See Maynard*, 615 F.3d at 563-66 (referring to prolonged surveillance that lasted for a month repeatedly).

64. *See, e.g.,* Renée McDonald Hutchins, *The Anatomy of a Search: Intrusiveness and the Fourth Amendment*, 44 U. RICH. L. REV. 1185, 1188 (2010) (arguing that the Court should adopt intrusiveness as the benchmark for determining the existence of a search as examined by the functionality of a challenged form of surveillance and its potential for public disclosure).

65. *See* Gershman, *supra* note 52, at 953-60 (describing state cases in which courts distinguished GPS surveillance on the ground of its intrusiveness); *see also* *People v. Weaver* 909 N.E.2d 1195, 1199 (N.Y. 2009) (describing GPS as being able to reveal information of “breathhtaking quality and quantity”). *But see* Orin S. Kerr, *Searches and Seizures in a Digital World*, 119 HARV. L. REV. 531, 551 (2005) (arguing that a search occurs only at the moment “information from or about the data is exposed to possible human observation”).

66. *See, e.g.,* *Kyllo v. United States*, 533 U.S. 27, 38 n.5 (2001) (holding that thermal imaging of a suspect’s home amounted to a search because it revealed information that was “otherwise imperceptible” to the average person outside the home).

flexibility to look at many different factors, rather than requiring the existence of a search to turn on one factor. Similarly, the mosaic theory is not an overbroad solution because it does not preclude a court from finding that GPS surveillance constitutes a search since many factors can control the outcome.

Developing such standards should not prove impossible to the courts and to law enforcement. On the contrary, in the Fourth Amendment context, courts have always looked at the mosaics created by various factual situations and required that law enforcement officers assess an aggregate of activities and circumstances before acting. For example, courts have established flexible standards to determine probable cause⁶⁷ and reasonable suspicion.⁶⁸ Moreover, invoking mosaic theory when a technology replaces human observation gives the analysis far reaching application, allowing courts to address the difficult problems posed by GPS and other technologies, including mass surveillance by cameras, cell phones, and software.

CONCLUSION

The *Maynard* decision introduces a provocative analytical tool into the existing Fourth Amendment framework under *Katz*. When technology has the power to replace human beings in law enforcement, an individual's reasonable expectation of privacy requires a more nuanced analysis. There is certainly a need for an addition to the *Katz* test that recognizes the possibility of a reasonable expectation of privacy even when a technology has become so pervasive that a notion of privacy under the traditional test would be hard to discern, and even when the entire series of actions at issue occurred in public.

Moreover, Fourth Amendment protections should not be chipped away by society's acceptance of a particular technology. The mosaic theory provides a useful means for resolving these increasingly complex problems. Courts should develop and refine a test for when an aggregate of information becomes a mosaic that is a search, and continue to explore the application of mosaic theory to existing Fourth Amendment doctrine.

67. See *Illinois v. Gates*, 462 U.S. 213, 227, 230-31 (1983) (establishing a totality of the circumstances test in determining whether a letter sent to police by an anonymous informant provided the basis for finding probable cause to believe suspects' car and home contained contraband). In ruling that there was probable cause, the court considered the letter's accurate and detailed predictions about the suspects' travel plans. *Id.* at 244.

68. See *Terry v. Ohio*, 392 U.S. 1, 21 (1968) (stating that reasonable suspicion must be based on "specific and articulable facts . . . taken together with rational inferences from those facts"). Based on these standards, the Court in *Terry* held that an officer had reasonable suspicion to stop and frisk two men after observing them repeatedly peering into a store window and then conferring with one another. *Id.* at 22-23.