The Political Heart of Criminal Procedure

ESSAYS ON THEMES OF WILLIAM J. STUNTZ

Edited by

Michael Klarman
Harvard Law School

David Skeel
University of Pennsylvania Law School

Carol Steiker
Harvard Law School

(2012)

Why Courts Should Not Quantify
Probable Cause

Orin Kerr

INTRODUCTION

Probable cause is a basic tool of Fourth Amendment law. It appears prominently in the constitutional text: "no warrants shall issue, but upon probable cause."[1] Police power often depends on it. In a range of settings, searches and seizures are constitutional if the police have probable cause but unconstitutional if they don't. But just how "probable" is probable cause?

The Supreme Court has declined to say. The Supreme Court has described probable cause as a "nontechnical conception"[2] that requires proof of a "fair probability."[3] The Court has also said that probable cause exists when "a man of reasonable caution" would believe an offense has been committed.[4] But the Court has refused to quantify probable cause. "The probable-cause standard is incapable of precise definition or quantification into percentages," the Court recently declared, "because it deals with probabilities and depends on the totality of the circumstances."[5]

This is no explanation at all, of course. The fact that the standard deals with probabilities is exactly why it might be quantified. The question remains: What probability is a "fair" probability? Does it require 50 percent likelihood? Or perhaps 40 percent? Scholars and lower-court judges occasionally have tried to guess, without reaching a

---

This chapter honors the late Professor William Stuntz. It is dedicated to his memory.

[1] See U.S. Const. Amend. IV.

[2] Brinegar v. United States, 338 U.S. 160, 176 (1949).

[3] Illinois v. Gates 462 U.S. 213, 238 (1983).

[4] Safford Unified School Dist. No. 1 v. Redding 129 S. Ct. 2633, 2639 (2010), quoting Carroll v. United States, 167 U.S. 132, 262 (1925).

[5] Maryland v. Pringle, 540 U.S. 366, 371 (2003).

consensus.[6] The Supreme Court's refusal to quantify probable cause raises a puzzle. Why has the Court left the concept so vague? Are the Justices simply afraid of math? More broadly, should probable cause be quantified to help lower-court judges apply this foundational concept more accurately?

This chapter argues that courts should not quantify probable cause because quantification would lead to less accurate probable cause determinations. This sounds odd at first. It's natural to expect that judges will assess probable cause more accurately if they know more about it. But that is not true, because the warrant process is a fertile ground for cognitive biases. When judges apply the probable cause standard to review ex parte warrant applications, they know only the limited picture of the facts provided in the government's affidavit. Intuitions about unknown facts play a critical role in assessing probable cause. Quantification would block those intuitions and instead provide a fertile ground for cognitive biases that would distort the probable cause assessment. Leaving probable cause unquantified is therefore critical to ensuring accurate probable cause determinations.

The basic problem is that assessments of probable cause require information typically left out of warrant affidavits. Affidavits explain the officer's affirmative reasons to think probable cause exists. However, they exclude two critical pieces of information. They generally leave out what steps the police took that failed to provide evidence, and they always leave out what steps the police did not take and why they didn't take those steps. These excluded facts are often highly relevant to the likelihood that the government's affirmative evidence amounts to probable cause. In some cases, these facts are critical. Because affidavits generally don't report those facts, judges must make intuitive estimates of them to accurately assess probable cause. Qualitative legal standards such as "fair probability" let judges account for these missing facts intuitively.

Quantifying probable cause would eclipse those intuitions and instead facilitate distortions of probability resulting from cognitive biases. By reducing probable cause to numbers, quantification would allow the

[6] In one study, 166 federal judges were asked to quantify probable cause. Their answers ranged from 10 percent certainty to 90 percent certainty, with an average of 44.5 percent certainty. See C. M. A. McCauliff, *Burdens of Proof: Degrees of Belief, Quanta of Evidence, or Constitutional Guarantees?*, 35 Vand. L. Rev. 1293, 1327–1328 (1982). See also Christopher Slobogin, *Let's Not Bury Terry: A Call for Rejuvenation of the Proportionality Principle*, 72 St. John's L. Rev. 1053, 1082–1085 (1998), estimating probable cause at about 50 percent.

representativeness heuristic and anchoring effects to play a major role in assessing probabilities. The limited information in the affidavit would seem like the entire picture, allowing the government to make very-low-probability events appear to be very-high-probability events. In short, quantification would override the critical intuitions of judges about missing information in the affidavit that are critical to assessing probable cause accurately. The counterintuitive result is that judicial failure to quantify probable cause is a strength, not a weakness. Knowing less about the standard improves how the standard is applied.

I. UNKNOWNS AND THE WARRANT PROCESS

Imagine the police believe a crime has been committed. They have a suspect, so they try a range of investigative techniques to show the suspect committed the offense. Some of the techniques come up empty and provide no helpful information. Other techniques work, however, and they point to the suspect as the likely criminal. The police figure that whoever committed the crime likely stored evidence of the crime in his home. So when the police have enough evidence, they apply for a warrant to search the suspect's home for evidence of the crime.

The warrant application requires two documents. First, the police must write up a proposed warrant for the judge to sign allowing the police to search the suspect's home for the evidence described. Second, the police must write up an affidavit making the case for probable cause that the evidence described will be found in the home. The affidavit will explain the reasons why the government thinks the suspect committed the crime. That is, it will list the investigative steps that the government took that collectively might establish probable cause. The judge will then read the affidavit and decide whether the facts described in the four corners of the affidavit establish probable cause that the evidence will be found in the place to be searched. If the magistrate concludes that probable cause exists and the rest of the warrant application is satisfactory, the magistrate will sign the warrant.

Notably, the affidavit ordinarily provides only a very limited picture of the investigation. A complete picture of the investigation would include three sets of information: (1) an understanding of all the possible techniques that the police could have tried to gather evidence; (2) an understanding of which techniques the police actually tried, together with why they tried them and why they did not try the untried alternatives; and (3) an understanding of what techniques the police tried that actually
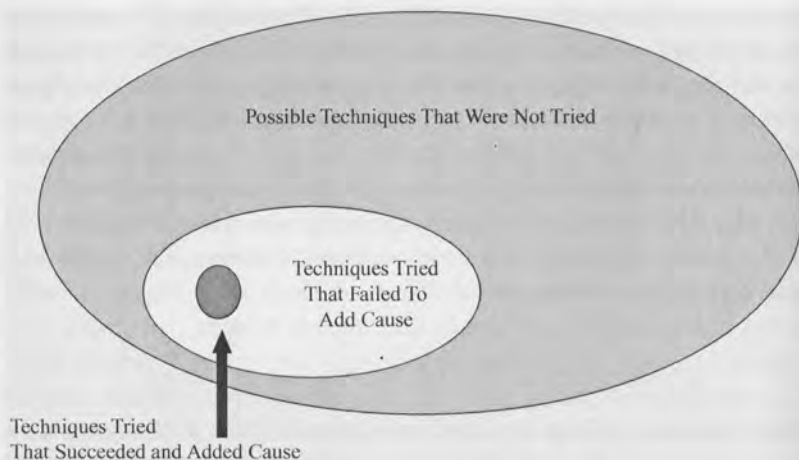
FIGURE 7.1. Visual conception of an affidavit.

worked. Importantly, however, the affidavit typically includes only the third item. The affidavit explains what steps the police took that helped show cause, but it does not say what techniques were never tried, why they weren't tried, or what techniques were tried but failed to yield any additional cause. We can see this visually in Figure 7.1.

To be sure, the law imposes some limits on excluding information from the affidavit. Under *Franks v. Delaware*,[7] the police cannot intentionally or recklessly misrepresent whether probable cause exists. Lower courts have held that this applies to withholding material facts from an affidavit: The police cannot intentionally or recklessly withhold exculpatory evidence from an affidavit that, if included, would establish that no probable cause existed.[8] But this standard is a high one that generally applies only to warrants obtained by fraud, as it applies only when the exculpatory evidence was so great that probable cause clearly would not have existed if it had been included. Further, this limitation arises only rarely because most victims of searches will not know when the police have exculpatory evidence: If they do not know the information, they cannot challenge the affidavit based on its absence. As a result, affidavits ordinarily will report only the limited subset of techniques that were tried and that helped establish cause to conduct the search.

---

[7] 438 U.S. 154 (1978).
[8] See, e.g., *Whitlock v. Brown*, 596 F.3d 406, 411 (7th Cir. 2010).

Why does this matter? It matters because the missing information can be critical to the probable-cause inquiry. Figure 7.1 hints at the reason why: The chances that evidence will be located in a particular place depend on more than what techniques were tried and worked. The limited nature of the facts in the affidavit allows the police to exclude facts that seem innocent in isolation but can lessen the likelihood of probable cause in context. If the police try other techniques that are potentially exculpatory, the judge probably won't know about that. And if the police decide not to try certain techniques that could be exculpatory, the judge will never know about that, either. Even worse, the judge won't know what he doesn't know: Just looking at the affidavit, the judge probably won't think about how small a picture of the facts appears within it.

The dynamic brings to mind the wisdom of the great legal mind Donald Rumsfeld:

> There are known knowns. These are things that we know we know. There are known unknowns. That is to say, there are things we know we don't know. But there are also unknown unknowns. These are things we do not know we don't know.[9]

In a warrant application, the fruits of techniques that were tried and provided cause are the "known knowns." The judge sees them and understands their scope in the four corners of the affidavit. The fact that some techniques were tried but failed to provide evidence will be the "known unknowns." Judges will know they might exist but not know exactly what they are. Finally, the techniques that were never tried are the "unknown unknowns." Judges won't know whether they exist, or why, or what choices the police made to try certain techniques and avoid others.

II. THE CASE OF THE HARVARD DORM SEARCH

We can see the importance of these unknowns by considering the following hypothetical. Imagine the police apply for a warrant to search a particular Harvard College dormitory room for marijuana. The case for probable cause consists solely of two pieces of information. First, the police offer a scientific study by top Harvard scientists showing that marijuana can be found in 60 percent of Harvard dormitory rooms. Second, the police provide proof that the room to be searched is a Harvard dormitory room. Assume, for the sake of argument, that the scientific

[9] Available at http://www.defense.gov/transcripts/transcript.aspx?transcriptid=2636.

study is widely acknowledged to be authoritative: The study conclusively establishes that 60 percent of Harvard dorm rooms contain marijuana. Now ask yourself, is there probable cause? Or more specifically, what are the chances that marijuana will be found in the dorm room?[10] Think carefully about it. Come up with your answer before continuing.

When you have your answer, let's next fill in some unknowns. The first unknown addresses the techniques that the police tried and that failed to provide evidence. Specifically, imagine that the local Cambridge police had conducted an undercover investigation into drug possession in Harvard dorms. The police investigation, which was independent of the study by Harvard scientists, involved a group of officers who posed as students and who mapped out the extensive network of drugs sales and use in the dorms. Exactly half of the dorm rooms were implicated in the investigation as rooms in which drugs were stored or sold. The dorm room to be searched in the warrant application was not one of them. Throughout the investigation, no evidence ever suggested that drugs would be found in that particular room.

Now let's add another unknown – the techniques that were never tried. Specifically, assume that the Cambridge police recently purchased a new high-tech surveillance device called the Potdetector 9000. The Potdetector 9000 detects trace amounts of marijuana in the air, and it can be used lawfully without a warrant to detect marijuana nearby. It is cheap and easy to use. If placed near the entrance of a dorm room, it can tell with 99 percent certainty if marijuana is inside the room. For reasons that remain unclear, however, the police decided not to use the Potdetector 9000 for this particular dorm room.

Ask yourself again: Does probable cause exist? What are the chances that marijuana will be found in the dorm room? Note how the picture has changed. Before I filled in the unknowns, you probably estimated the chance that drugs would be found in the dorm room at 60 percent. After all, that's what the scientific study showed. However, with the unknowns filled in, the odds drop considerably. First, you realize that there are really two sets of dorm rooms: The 50 percent of dorm rooms implicated by the investigation and the 50 percent of dorm rooms not implicated by the investigation. If 60 percent of the rooms have marijuana inside, and the rooms implicated by the investigation have a much higher

---

[10] This is a variation on the well-known "blue bus" hypothetical. See, e.g., Laurence H. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 Harv. L. Rev. 1329, 1372 (1971).

likelihood of having drugs inside, then the likelihood that drugs are in a room *not* implicated by the investigation is much lower than 60 percent.

Next consider the role of the Potdetector 9000. The police chose not to use it. But why? According to the hypothetical, the Potdetector 9000 provides a quick, easy, and extremely reliable way to determine if there are drugs in the room. If the Potdetector 9000 had been used, and it had signaled marijuana in the room, then that positive "hit" would have been featured prominently in the affidavit. The decision not to use the Potdetector 9000 suggests the significant possibility that the police had reason to think that the room did *not* contain drugs. That is, perhaps the police avoided using the Potdetector 9000 to maintain plausible deniability that they suspected the room was clean. If that is the case, the chance that drugs are in the room drops once more. Again, there are two sets of rooms, not one: The rooms for which the Potdetector 9000 was used, and the rooms for which it wasn't used. The room to be searched in our hypothetical was part of the latter group, for which there is a lesser chance than 60 percent that drugs will be found inside.

The affidavit in our hypothetical gave only generalized evidence: 60 percent of all Harvard dorm rooms contain marijuana. That means a Harvard dorm room picked at random would have a 60 percent chance of containing marijuana. But that doesn't mean the affidavit established a 60 percent chance that marijuana will be found in the specific room that the officers wanted to search. Places to be searched are not picked at random. To know the chances that marijuana would be found, a judge needs to know why the police submitted an affidavit consisting solely of statistical evidence to search that particular room. They need to know the back-story about how the investigation developed. Only a complete picture of the facts would allow a magistrate judge to accurately predict the likelihood that evidence will be found. But that won't happen, because such facts don't generally appear in the affidavit.

III. INTUITIONS OF PROBABLE CAUSE AND THE ROLE OF UNKNOWNS

Accurate determination of probable cause requires accurate assessments of unknowns. But how? The current definition of probable cause allows judges to assess unknowns intuitively. When the unknowns are likely to be significant, judges will get a feeling that something is amiss. They may not know exactly why something is wrong, but they will instinctively resist finding probable cause based only on the evidence in the affidavit.

In my view, these sorts of feelings are not only rational but necessary: The instinct that something is amiss reflects a "situation sense"[11] that we're not seeing the whole picture. They are intuitions of circumstances in which the unknowns are likely to bias the probable-cause determination. Because probable cause is a vague, unquantified concept, such instinctive judgments are permitted to influence determinations of probable cause.

Let's return to the affidavit to search a Harvard down room based only on a statistical study. When I first asked if probable cause existed, you probably felt instinctively uncomfortable about answering "yes." You probably wanted some sort of specific cause that linked the drugs to that particular apartment. You may have even felt that you were being irrational in your conclusion: After all, the statistics proved that the chances of drugs being in the room were 60 percent, and yet you fought that logical statistic because your brain wanted concrete evidence.[12] Surely this reflects your human irrationality, right? Not so, in my view. You were being quite rational. You were instinctively recognizing the unknowns, and you were instinctively factoring them into the probable cause determination.

Here's why: The instinct to want to see some sort of particularized evidence beyond the statistical study reflects the commonsense intuition that the officers must have picked that particular dorm room for a reason. If the officers are acting in good faith, we expect to see particularized evidence specifically tagging that room to the crime. Finding particularized evidence in the affidavit fulfills our expectation and calms any fears about the unknowns. It fills in the unknowns in a particular way. It suggests that this investigation was a typical investigation with no funny business that never made it into the affidavit.

However, if the affidavit does *not* link the statistical study to the room to be searched, we intuit that the government may be hiding something. The government isn't sharing why it picked that room. This triggers our concerns about the unknowns. What is the back-story, we wonder? The feeling that something is fishy reflects our sense that we're not getting the complete picture in the affidavit. We want to see particularized evidence in the affidavit because its absence suggests that there are unknowns that

[11] Karl Llewellyn referred to "situation sense" as a learned judicial intuition about accepted practices that allows judges to reach consistent results absent formal rules. See Karl Llewellyn, The Common Law Tradition: Deciding Appeals 268–285 (1960).

[12] See, e.g., Sherry F. Colb, *Probabilities in Probable Cause and Beyond: Statistical Versus Concrete Harms*, 73 Law & Contemp. Probs. 69 (2010).

render the evidence in the affidavit unreliable. In that setting, we intuit that probable cause is absent: The absence of expected information signals the likelihood of unknowns that alter whether probable cause exists.

Notably, all this proceeds by instinct. Indeed, because the instinct leads us to question statistical evidence, we may feel that we are being emotional and illogical. The opposite is true. We are using our situation sense to intuit that the facts in the affidavit are not telling us the whole story. We are filling in the unknowns needed to assess probable cause.

IV. QUANTIFICATION AND COGNITIVE BIAS

Let's return now to the problem of whether probable cause should be quantified. In my view, the problem with quantifying probable cause is that quantification blocks our essential intuitions about the unknowns. When we start thinking in terms of numbers, we focus on the numbers. Our intuitions take a backseat. This is no place for mere feelings, we think to ourselves. This is now a question of mathematics! The result is that we naturally downplay the significance of the unknowns. But ignoring unknowns introduces significant error: Downplaying the unknowns leads to less accurate probable cause determinations by effectively disabling the instincts that we rely on to determine probable cause accurately.

Two cognitive biases help explain the reason. The first is the representativeness heuristic.[13] The representativeness heuristic refers to the tendency to measure probability by reference to data that seem to resemble the probability to be estimated. Consider a well-known example introduced by Amos Tversky and Daniel Kahneman.[14] Imagine a taxi cab was involved in a hit-and-run traffic accident. There are two cab companies in the city. One company uses blue cabs and the other uses green cabs. An eyewitness saw the accident and agrees to testify. He takes the stand and testifies that the cab was blue. Let's further assume we know that the eyewitness's reliability is 80 percent. That is, the eyewitness can identify the color of a cab correctly 80 percent of the time. Now estimate the probability that the cab involved in the accident was actually blue. And let me add one more piece of information: 85 percent of the cabs in the city are green cabs and 15 percent are blue cabs.

[13] See generally Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 Science 1124, 1128–1130 (1974).
[14] See generally Amos Tversky & Daniel Kahneman, *On Prediction and Judgment*, Oregon Research Institute Bulletin 12 (4) (1972).

Many people conclude that the chances the cab was blue are 80 percent.[15] They focus on the established 80 percent reliability of the eyewitness. The eyewitness's reliability seems a lot like the problem at hand: It is an estimate of probability of a fact. But relying so heavily on eyewitness reliability leads to significant error. The actual probability is nowhere near 80 percent. It is only about half of that. To see why, step back and think about the possibilities. The eyewitness testified that the cab was blue. There are two logical possibilities: Either he correctly identified a blue cab or he incorrectly identified a green one. Because green cabs are much more common than blue cabs, the chances that the eyewitness wrongly identified a green cab are actually *higher* than the probability the eyewitness correctly identified a blue cab.

Think about why. If you don't know anything about the accident except for the statistics about witness reliability and the relative number of cabs, then there was a 15 percent chance that the cab was blue and an 80 percent chance the eyewitness would testify correctly. The overall probability of correct testimony that the cab was blue is 80 percent of 15 percent, for a total of 12 percent. In contrast, there was an 85 percent chance the cab was green, and a 20 percent chance the eyewitness testified incorrectly about its color and wrongly said the cab was blue. The overall probability of incorrect testimony that the cab was blue is 20 percent of 85 percent, for a total of 17 percent. The chance that the eyewitness testimony of a blue cab was accurate is therefore the chance of accurate testimony divided by the total probability of that testimony. That is, 12 percent divided by the sum of 12 percent and 17 percent, which is a total probability of 41 percent. The common guess of 80 percent is not just a little off. It's *way* off. And remember how the error occurred: The natural instinct was to rely on the readily available probability – that is, the known reliability of the eyewitness. That instinct proved extremely misleading.

Anchoring effects would also weaken probable-cause determinations if probable cause were quantified. Anchoring refers to the mind's tendency to make estimates of unknowns by starting from some point and then adjusting upwards or downwards to it.[16] If you ask people to estimate the average temperature in San Francisco, they will guess one number. If you ask them whether the average temperature in San Francisco is higher

[15] Maya Bar-Hillel, *The Base Rate Fallacy in Probability Judgements*, 44 Acta Psychologica 211, 220 (1980).
[16] See supra note 13.

or lower than 558 degrees, and then ask them to estimate that average temperature, their answers will on average be significantly higher simply because their minds started from the (obviously absurd) starting point of 558 degrees.[17] The key lesson is that the introduction of a number has an anchoring effect: The mind is influenced by the starting point, and it tends to bias estimates of probabilities and uncertainties by using whatever anchor was introduced.

These cognitive biases ensure that quantification of probable cause would create predictable errors. If the Supreme Court quantified probable cause, magistrate judges would begin to think in terms of numbers. They would scan affidavits for any numerical or probabilistic evidence, and any numerical or probabilistic evidence would take on a far greater role than it should. The new focus on numbers would limit the role of intuition, limiting the ability of judges to recognize when the information in the affidavit is only a part of the picture and that critical information is missing. Owing to cognitive biases, judges would follow the numbers to their detriment. It is strange but true: Knowing more about probable cause would make it harder to for judges to apply the standard accurately.

V. WORKING WITH A QUANTIFIED PROBABLE-CAUSE STANDARD

The Harvard dorm hypothetical again provides a helpful example. This time, assume the Supreme Court has quantified probable cause. Let's say it has declared that probable cause means exactly a 47 percent likelihood. If the chances that evidence will be found are at or above 47 percent, then probable cause exists; if they are below 47 percent, then probable cause does not exist. Now imagine you are a magistrate judge presented with the affidavit based on the Harvard study. The only evidence you have is the study showing that 60 percent of Harvard dorm rooms contain marijuana, plus proof that the room to be searched is a Harvard dorm room. Is there probable cause?

In all likelihood, you would answer that question by focusing on the numbers. Probable cause means exactly 47 percent. Does the affidavit satisfy that likelihood? You would start with 60 percent as your anchor. The study seems quite impressive, and it starts the probability at 60 percent. That probability closely resembles the probability you're trying to calculate, so it has a strong influence on your assessment. Focusing

[17] Scott Plous, The Psychology of Judgment and Decision Making 146 (1993).

on the numbers, you see that 60 percent is considerably more than 47 percent. A significant gap of 13 percent separates them. So the issue is whether anything in the case might lower the probability from 60 percent to 59 percent to 58 percent to 57 percent, and so on, all the way down to below 47 percent.

You probably will conclude the answer is "no," and therefore that probable cause has been established. Nothing in the case jumps out at you as sharply altering the probability from that 60 percent mark. When faced with the contrast between hard and definite numbers on the one hand, and fuzzy instincts on the other, the numbers will play an outsized role. The numbers will seem like everything, even though they are not. The 60 percent figure seems the right probability, just like the 80 percent figure seemed so significant in the case of the eyewitness who testified about the blue cab.

But let's reintroduce one of the unknowns in the hypothetical, this time with numbers, to see how easily unknowns can make a major difference in the probability. Recall the first unknown in the dorm hypothetical: Exactly half of the dorm rooms were implicated by the local police undercover investigation as rooms in which drugs were stored or sold, but the dorm room to be searched in the warrant application was not one of them. Let's further assume that 90 percent of the dorm rooms implicated in the investigation as rooms in which drugs were stored or sold do actually contain drugs.

Under these assumptions, the role of the unknown has a dramatic impact on the probability. The probability has dropped in half. Because the overall probability is 60 percent, and the Harvard dorm rooms are divided equally between rooms implicated in the investigation and rooms not so implicated, the 90 percent likelihood for dorm rooms implicated in the investigation must be balanced out by only a 30 percent likelihood of drugs in rooms not implicated. If probable cause means a 47 percent likelihood, the addition of the unknown has quietly but firmly shifted the probability from well above probable cause to well below it.

Further, slight differences in the unknown can have a major impact on the probability. Imagine that instead of the Harvard rooms implicated in the undercover investigation being divided 50/50, they were instead divided 60/40. That is, the undercover investigation pointed to drugs being sold from or stored in 60 percent of Harvard rooms, but the room to be searched is not one of them. If 90 percent of the implicated rooms contain drugs, then 56 percent of Harvard dorm rooms will be dorm rooms implicated by the study in which drugs are found (60 percent

of the rooms at a 90 percent probability). Because the Harvard study tells us that drugs will be found in 60 percent of Harvard dorm rooms overall, the 40 percent of dorm rooms not implicated in the undercover investigation should account for only 4 percent of the remaining Harvard dorm rooms containing drugs. The percentage likelihood of a typical room not implicated in the investigation containing drugs now drops to only 10 percent.

CONCLUSION

Understanding probable cause requires judgment and experience. Learning the standard requires reading the leading cases. Over time, experience teaches where the line should be drawn. Reducing probable cause to a number would bypass this time-consuming process. A quantified probable cause would take seconds, rather than many hours, to learn. For that reason, the instinct to quantify probable cause is understandable. It aims to simplify and explain a judgment that otherwise must be learned over time.

Although such a shortcut has obvious appeal, it is also unrealistic. Unknowns that do not appear in the affidavit play too critical a role in probable cause for the shortcut to work. Only an approach to probable cause steeped in learned judgment, based on intuition and situation sense, can accurately reflect the unknowns and ensure accurate probable cause determinations. By keeping probable cause vague, the Supreme Court has retained the role of intuition in assessing it. The fuzziness of the standard makes ample room for the learned intuition that is essential to incorporating unknowns. If probable cause were quantified, cognitive biases would make the numbers expressed in the affidavit seem far more important than they are. They would make the unknowns seem largely if not entirely irrelevant. The vagueness of probable cause is the key to applying it accurately. To ensure that courts continue to factor in unknowns, the courts should keep probable cause unquantified.