UNWARRANTED WARRANTS?
AN EMPIRICAL ANALYSIS OF JUDICIAL REVIEW IN SEARCH AND SEIZURE

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Abstract

Every year, police perform searches governed by the Fourth Amendment on hundreds of thousands of individuals and their property throughout the United States. Considerable ink has been spilt—by many of the academy's most decorated scholars—on the genesis and jurisprudential nature of the Fourth Amendment's warrant requirement. Surprisingly, we know almost nothing about how the Fourth Amendment regulates searchers and how searches actually work in practice.

In this Article, we pull back the curtain on the search and seizure process by presenting the largest quantitative study of warrants of any kind. We analyze over 33,000 warrant applications filed through Utah's "e-warrants" system over a three-year period. By utilizing the full texts of the warrant affidavits along with digital time-stamp metadata, we categorize warrants by type, length, and complexity and establish when and for how long judges review warrants. Our key findings demonstrate that the warrant review process is fast and nearly always results in approval. 98 percent of warrant reviews eventually result in an approval, and over 93 percent are approved on first submission. Further, we find that the median time for review is only three minutes, and that 1 out of every 10 warrants are opened, reviewed, and approved in 60 seconds or less. Our analyses that account for warrant complexity and length also suggest that many approved warrants are not read in full, and that there is no meaningful relationship between warrant length and review time. We also perform a qualitative analysis of a randomly selected sub-sample of warrants and find cases where the review process has clearly failed.

Taken together, our results have critical implications regarding the warrant review process that force us to reconsider the constitutional dictates about the nature of probable cause and the role that judicial review plays as a "check" on police searches. In light of these implications, we explore the political, economic, and logistical constraints that judges face when reviewing warrants and consider pathways to reform that are mindful of these factors.

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> "The point of the Fourth Amendment, which often is not grasped by zealous officers, is not that it denies law enforcement the support of the usual inferences which reasonable men draw from evidence. **Its protection consists in requiring that those inferences be drawn by a neutral and detached magistrate** instead of being judged by the officer engaged in the often competitive enterprise of ferreting out crime."
>
> Justice Robert H. Jackson in *Johnson v. United States*, 333 U.S. 10, 13-14 (1948) (emphasis added)

INTRODUCTION

On March 13, 2020, after breaking her door down with a battering ram, seven officers flooded Breonna Taylor's Louisville home and shot her five times.[2] Two years later, on February 2, 2022, SWAT officers from the Minneapolis Police Department entered an apartment where Amir Locke was staying, and when he emerged from under a blanket with a gun, an officer shot him twice in the chest, killing the 22-year-old only nine seconds after law enforcement set foot in the home.[3] Neither were named in the search warrants authorizing the raids of the locations where they were killed, nor were either of them suspects in the police investigations motivating the searches that led to their deaths.

Although stories of police shootings seem so common as to almost become unremarkable,[4] the Breonna Taylor and Amir Locke killings provoked a particularly strong outcry from the public due in large part to the fact that both deaths were not merely the result of spur-

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[2] Richard A. Oppel, Jr., et al. *What to Know About Breonna Taylor's Death,* N.Y. TIMES, https://www. nytimes.com/article/breonna-taylor-police.html.

[3] Holly Bailey, *What to Know About the Police Shooting of Amir Locke,* THE WASHINGTON POST, (Apr. 6, 2022), https://www.washingtonpost.com /nation/2022/02/15/amir-locke-police-shooting-explainer/.

[4] Indeed, some data indicate that as the frequency of police shootings increase, the rates at which those incidents are reported goes down. *See* Andrew Ba Tran, et al. A*s Fatal Police Shootings Increase, More Go Unreported*, THE WASHINGTON POST (Dec. 6, 2023), https://www.washingtonpost.com/ investigations/interactive/2022/fatal-police-shootings-unreported/.

of-the-moment decisions by law enforcement. On the contrary, the factual background and legal basis for each of these fatal entries were preceded by a formal, judicial review that could have—and arguably should have—identified the various errors that served as the basis for the initial warrants. Indeed, subsequent investigations into both incidents showed that the submitting officers perjured themselves and the reviewing judges (or magistrates) essentially rubber-stamped the warrant approvals[5]—the precise kinds of behavior that constitutionally-prescribed judicial warrant review is designed to curb.[6]

The little existing information we have on the repercussions of search warrants suggests a broader problem. Between 2010 and 2016, at least 81 civilians and 13 officers died in no-knock raids alone, a death toll that is undoubtedly higher when one includes raids and searches based on the entire universe of warrants.[7] More commonly, serious injuries and property damage result from searches, requiring millions of dollars of litigation and payouts from police departments.[8] Even if no death, injury, or property damage results from a warrant, nearly all warrant-based searches impose significant privacy costs, as officers enter homes, search and detain individuals, and examine digital items like cell phones and computers that contain troves of particularly personal information. And ignoring the individualized costs, the invasiveness of searches inevitably undermines the trust in

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[5] According to reports, the presiding judge who reviewed the warrant affidavit seeking to enter Taylor's home with immediate force (a "no-knock" warrant) read, reviewed, and signed five such warrants in the span of 12 minutes. Tessa Duval & Ben Tobin, *Louisville Detective Who Obtained No-Knock Warrant for Breonna Taylor's Apartment Reassigned*, USA TODAY (Jun. 16, 2020), https://www.usatoday.com/story/news/nation/2020/06/16/breonna-taylor-louisville-detective-joshua-jaynes-no-knock-warrant-reassigned/3200277001/.

[6] The incident prompted the Department of Justice and U.S. Attorney's Office in Western Kentucky to perform an investigation where they found systematic problems with search warrants that lacked probable cause. *Investigation of the Louisville Metro Police Department and Louisville City Government*, U.S. DEPARTMENT OF JUSTICE CIVIL RIGHTS DIVISION AND U.S. ATTORNEY'S OFFICE, WESTERN DISTRICT OF KENTUCKY CIVIL DIVISION, https://www.justice.gov/opa/press-release/file/1573011/dl (last accessed June 28, 2024).

[7] *See* Kevin Sack, *Door Busting Drug Raids Leave a Trail of Blood*, N.Y. TIMES (Mar. 18, 2017), https://www.nytimes.com/interactive/2017/03/18/us/forced-entry-warrant-drug-raid.html.

[8] *See* Keith L. Alexander, Steven Rich, and Hannah Thacker, *The Hidden Billion-dollar Cost of Repeated Police Misconduct*, WASH. POST (Mar. 9, 2022) (documenting the rising costs of litigation for police misconduct, including police searches).

law enforcement, especially in overpoliced, marginalized communities.[9]

Recognizing the immense scale of police searches and seizures in the United States (U.S.)—with hundreds of thousands, and possibly millions, of searches being performed on individuals and their property—the conventional wisdom in Fourth Amendment jurisprudence and much of the academic literature is that the warrant requirement serves as a necessary and legitimate check on the police power.[10] But warrants function as a check in large part (if not exclusively) because the law enforcement officer must submit an affidavit under oath, to be vetted by a "neutral and detached magistrate" who can narrow the scope or deny it.[11]

The doctrine surrounding search and seizure has been subject to significant examination by judges and scholars,[12] but the aspects of how warrant review actually works on the ground has received remarkably little attention, leaving critical questions unanswered. Consistent with the constitutional requirements in the Fourth Amendment, we know that neutral judges are required in warrant review, but what role do these judges *actually* play in such a determination—how are such decisions made in practice, and to what extent do judges actually function as a "neutral and detached" check against "officer[s] engaged in the enterprise of ferreting out crime?"[13]

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[9] *See*, *e.g.,* Magnus Lofstrom, et al., *Racial Disparities in Law Enforcement Stops*, PUBLIC POLICY INSTITUTE OF CALIFORNIA, Policy Report (Oct. 2021), https://www.ppic.org/publication/racial-disparities-in-law-enforcement-stops/ (finding that black individuals in California are twice as likely to be searched during a stop as white individuals—20.5 percent of all stops compared to 8.2 percent, respectively).

[10] A rich debate, which is beyond the scope of this Article, exists about the extent to which the warrant requirement stems from the original meaning of the Fourth Amendment. *See* David A. Sklansky, *The Fourth Amendment and Common Law*, 100 COLUM. L. REV. 1740 (2000) ("the warrant and probable cause requirements are today defended on grounds of pragmatism rather than fidelity to tradition"). *See also* U.S. Supreme Court decisions like *Missouri v. McNeely*, 569 U.S. 141 (2013); and *Birchfield v. North Dakota,* 579 U.S. 438 (2016) (both emphasizing the importance of the warrant requirement for obtaining blood for alcohol testing).

[11] *Johnson v. United States*, 333 U.S. 10, 13-14 (1948).

[12] *See, e.g.,* Orin S. Kerr, *An Equilibrium-Adjustment Theory of the Fourth Amendment*, 125 HARV. L. REV. 476 (2011); David Gray, *Fourth Amendment Remedies as Rights: The Warrant Requirement,* 96 BOSTON U. L. REV. 425 (2016); and Richard M. Re, *Fourth Amendment Fairness*, 116 MICHIGAN L. REV. 1409 (2018).

[13] Justice Robert H. Jackson in *Johnson v. United States*, 333 U.S. 10, 13-14 (1948).

Are the failures demonstrated in the Breonna Taylor and Amir Locke events tragic but unavoidably random anecdotes, or are they the product of systematic institutional failures? And how do the answers to these questions color our understanding of the extent to which a warrant requirement truly matters at all? Finally, do these searches actually work in practice?

The public's underlying concern with the warrant process has borne an influx of critical reforms designed to increase accountability, particularly in the wake of the deaths of Breonna Taylor and Amir Locke. Five states—Connecticut, Florida, Oregon, Tennessee, and Virginia—banned no-knock warrants in their entirety, and as of April 2023, 30 states and 25 cities have enacted some form of restrictions on no-knock raids.[14] Utah (the venue of this Article's empirical study) requires police officers to audibly identify themselves when using no-knock warrants and bans their use entirely for misdemeanor crimes as of 2022.[15] Some three years earlier, in March 2019, Utah also enacted the Electronic Information or Data Privacy Act (H.B. 57) which required law enforcement to obtain a warrant when requesting information from electronic mail providers, wireless phone companies, search engine firms, and social media companies.[16]

But while the national appetite for warrant reform has arguably never been higher, actual data on warrants is incredibly scarce. To the best of our knowledge, there have been only four empirical studies on the warrants process conducted in the last 45 years.[17] Three of these

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[14] *See*, *e.g.,* End All No-Knocks, *Nationwide Campaign Impact Map*, https://endallnoknocks.org/ (accessed Jan. 24, 2024).

[15] Ashley Imlay, *Utah Legislature Passes Bill Outlining when Police Can Use 'No-knock,'* KSL.COM (Feb. 14, 2022), https://www.ksl.com/article/50348507/utah-legislature-passes-bill-outlining-when-police-can-use-no-knock-warrants.

[16] Electronic Information or Data Privacy, Utah H.B. 57, 2019 General Session (2023). The law passed the state legislature in the wake of *Carpenter v. U.S.* 138 S.Ct. 2206 (2018), which held that the government needs a warrant to access cell-site location information.

[17] Around the middle of the 20th Century, there were a bundle of empirical projects that used warrant data from an American Bar Foundation survey. *See*, *e.g.*, NATIONAL LAWRENCE P. TIFFANY, DONALD M. MCINTYRE, JR., & DANIEL L. ROTENBURG, DETECTION OF CRIME 99-120 (LITTLE, BROWN AND COMP., 1967); SHELDON KRANTZ, ET AL., POLICE POLICYMAKING: THE BOSTON EXPERIENCE, 99-147 (LEXINGTON BOOKS, 1979); and James E. Spiotto, *Search and Seizure: An Empirical Study of the Exclusionary Rule and Its Alternatives*, 2 J. LEG. STUD. 243 (1973).

More recently, there have also been some limited, small-scale efforts by governments to mandate data reports that provide a peek into the empirical reality behind certain types of search warrants. *See*, *infra*, note 183 and accompanying text.

were done prior to the arrival of smartphones and the broad proliferation of electronic warrants, and all of them relied on relatively limited datasets. The seminal 1986 study by Van Duizend et al. observed 84 warrant proceedings and found that 65 percent of the warrant applications were decided in 2.5 minutes or less, with a median time of 2 minutes and 12 seconds.[18] Two studies stemming from the San Diego Search Warrant Project were similarly discouraging, finding probable cause violations and racial disparities among nearly 250 drug-related search warrants issued in 1998.[19] Much more recently, the *Salt Lake Tribune* evaluated a smaller and more limited version of the dataset we are utilizing in this Article (their exposé was the inspiration for our study), analyzing 844 warrants approved in Utah over the course of one month in 2017.[20] The report accused the judiciary of being "too hasty" with warrant review and sometimes even "rubber stamping" approvals when the content of the affidavit did not meet the standards of probable cause.[21]

All three of these studies raised concerns about the speed in which warrants were reviewed and the high rates at which they were approved, questioning whether "the suppositions regarding the Fourth Amendment warrant requirement may not be borne out in practice."[22]

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[18] Richard Van Duizend et al., *The Search Warrant Process: Preconceptions, Perceptions, Practices*, NATIONAL CENTER FOR STATE CT. (1986). The broader project analyzed data beyond just the in-person hearing observations, including a sample of 844 archival warrant files and field interviews in seven pseudonymous U.S. cities during a six-month period in 1980.

[19] Laurence A. Benner & Charles T. Samarkos, *Searching for Narcotics in San Diego: Preliminary Findings from the San Diego Search Warrant Project*, 36 CAL. W. L. REV. 223 (2000) (finding that probable cause descriptions conformed to boilerplate, rather than fact-specific and concrete, narratives; only a few judges approved the vast majority of warrants; and the body of drug warrants reflected high frequencies and racial disparities); Laurence A. Benner, *Racial Disparity in Narcotics Search Warrants*, 6 J. GENDER, RACE, & JUST. 101, 105 (finding that "Black and Hispanic communities in San Diego County were significantly over-represented as targets of narcotics search warrants.").

[20] Jessica Miller & Aubrey Wieber, *Warrants Approved in Just Minutes: Are Utah Judges Really Reading Them Before Signing Off?*, SALT LAKE TRIB. (Jan. 14, 2018), https://www.sltrib.com/news/2018/01/14/warrants-approved-in- just-minutes -are-utah-judges-really-reading-them-before-signing-off/.

[21] *Id*.

[22] VAN DUIZEND et al., *supra* note 18 at *x*. *See also* Wayne R. LaFave & Frank J. Remington, *Controlling the Police: The Judge's Role in Making and Reviewing Law Enforcement Decisions*, 63 MICH. L. REV. 987, 988 (1965) (observing, even in the middle of the 20th century, that problems with warrant review and use "often has a destructive rather than a constructive impact on law enforcement practice.")

However, relying on the conclusions drawn from such small samples (and old data) may paint a picture that is incomplete and potentially misleading. Context is important, and some may argue that the inherently hurried environment in which warrants are sought, combined with the low standard of review, creates a system in which swift reviews and approvals are both expected, necessary, and ultimately adequate. Similarly, warrant affidavits are short and only require the officer to establish a reasonable basis for believing that evidence for a crime exists,[23] so the necessary time for review might be less than critics believe. Furthermore, judges, especially state trial-level judges, are under-resourced, face a growing backlog of potentially more critical matters, and may be incentivized to maintain a positive relationship with law enforcement.[24]

This Article seeks to fill this empirical lacuna (at least in part) by analyzing previously untapped statewide data from Utah's "e-Warrant" system,[25] constituting the largest and most comprehensive quantitative study of warrants of any kind. The dataset includes the affidavits of every electronic warrant submission during a three-year period (March 2017 through January 2020),[26] totaling 33,488 warrant applications filed by more than 3,200 law enforcement officers and reviewed by nearly 120 judges and magistrates. Even more, the dataset includes metadata captured by the e-Warrant system that chronicles the timing of every important stage of the warrant review process, including when the officer submits the warrant affidavit; when the reviewing judge first opens the submission; the amount of time the judge spends reading the warrant affidavit; and the moment the judge makes their legal determination. By combining the warrant affidavit texts with digital timestamps and situating that data in the legal and extra-legal context of judicial warrant review, we provide the most expansive and comprehensive view into the search and seizure process.

Our findings suggest that the on-the-ground reality of warrant review is often not meeting the robust assumptions that are baked into

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[23] *See Stacey v. Emery*, 97 U.S. 642 (1878); *Brinegar v. U.S*, 338 U.S. 160, 175-76 (1949).

[24] *See, e.g.* William Raftery, *State Courts Brace for Budget Hit*, 105 JUDICATURE 2 (2021).

[25] As we discuss in Section II.B, *infra*, Utah is one of 44 states that currently utilize some form of e-warrants system. *See National Drunk Driving Statistics Map*, Responsibility.org, https://www.responsibility.org/alcohol-statistics/state-map/issue/electronic-warrants-e-warrants-authorization/ (accessed Jan 24, 2024).

[26] One caveat that merits early mention is that though our universe of time stamps is complete, we lack a small percentage of sealed warrants. We have a longer time series of affidavit, warrant, and return pdfs that date back to December 2012.

the Fourth Amendment jurisprudence and scholarship. But the results are also not fully consistent with the skeptical position that judges are not actually reviewing the warrants at all. On the one hand, some (albeit very few) warrants go through multiple revisions before being approved and we identify moderate correlations between a judge's professional background and review outcomes—observations that run counter to the proposition that all warrants are simply "rubber stamped." On the other hand, our key findings demonstrate that 93.5 percent are approved on the first attempt; over 98 percent of all warrants are eventually approved; and the median time for a warrant affidavit to be opened, read, analyzed, and (in the case of approval) sent back to the officer in the form of a judicial warrant is only three minutes. Furthermore, 1 out of every 10 warrants are read, analyzed, and responded to in a minute or less.

Accounting for warrant complexity and length, we determine that at least half of all approved warrants are either not read in full or skimmed by the reviewing judges. We also find no meaningful correlation between warrant length and review time. These results are consistent even when accounting for the most common explanations for rapid review, including legal contexts that arguably require less stringent analysis (*e.g.*, DUI warrants), identical intra-warrant content, the existence of "unnecessary" language, and warrant resubmissions. We also perform a qualitative analysis of a randomly selected sub-sample of the affidavits and find several troubling examples of questionable judicial review. This includes cases where approved warrants were unconstitutionally vague, lacked corroboration of evidence used as the basis for probable cause, or failed to catch important errors in the affidavit.

Taken together, this empirical and qualitative evidence has novel, critical implications for both the theory and praxis of warrant review and execution.

* * *

This Article proceeds as follows: Part I provides a brief background on the current state of warrant jurisprudence and practice and maps out an informal behavioral mapping of the extra-legal factors that likely influence judicial warrant review. Part II discusses the institutional setting for our empirical study and the nature of the datasets we employ. Parts III and IV present our central empirical analyses, focusing on the time it takes Utah judges to review warrants, the resulting approval rates, and the warrant- and judge-level characteristics that best predict those outcomes. Part V describes a small but in-depth review of individual warrants that provides

qualitative evidence of inadequate judicial review. Part VI concludes by discussing the implications of our findings and exploring potential legal, policy, and institutional reforms that address the problems identified in our empirical analyses.

I. THE FOURTH AMENDMENT, WARRANTS, & JUDICIAL REVIEW

This paper is not focused on the debates regarding when and to what extent (or at all) the warrant requirements of the Fourth Amendment take effect.[27] Instead, we address the current role and nature of judicial warrant review via an empirical exploration of the on-the-ground practice of warrant-seeking officers and reviewing judges.[28] Thus, a comprehensive review of search and seizure jurisprudence is not necessary here. Nonetheless, a basic background on the Fourth Amendment, the warrant requirement, and the probable cause standard is critical to understanding and contextualizing the legal constraints judges face when evaluating a warrant request.

But we argue that the warrant review process is influenced by more than just legal factors. Judicial review satisfies the constitutional dictates of the Fourth Amendment only insomuch as the judge can serve as a legitimate and neutral check on police and prosecutorial intervention. Whether, in practice, reviewing judges are able to—or should even be expected to—be that neutral check is not clear. Consequently, identifying and acknowledging the extra-legal factors at play in the decision-making process is also essential.

To these ends, Part I.A briefly discusses the history of the Fourth Amendment, focusing on its protections against search and seizure and the recent developments regarding the warrant requirement; Part B outlines the basics of probable cause in warrant review, emphasizing its nature as a nebulous, discretionary standard; Part C highlights the "stickiness" of warrant approvals and why mistakes in initial review are rarely remediated through the existing legal framework; and Part D outlines the extra-legal, pragmatic factors that likely influence the warrant review process.

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[27] *See, e.g.,* Akhil Reed Amar, *Fourth Amendment First Principles*, 107 HARVARD. L. REV. 757 (1994) (arguing that the jurisprudence is clearly broken, going as far as to argue that warrant requirement does not actually exist, at least not as commonly understood); and David Gray, *Fourth Amendment Remedies as Rights: The Warrant Requirement*, 96 BOS. U. L. REV. 425 (2016).

[28] We also briefly discuss the role that prosecutors play in some cases, most often when their review is requested by officers.

A. Search and Seizure Protections in the Fourth Amendment

Our modern Fourth Amendment was based on similar provisions in several states' constitutions, but its philosophical roots at least go back to underpinnings that begin in the English common law tradition. Seminal in this doctrinal evolution was Semayne's Case, where Sir Edward Coke articulated the now-venerated principle that "the house of every one [sic] is to him as his castle and fortress." This historical impetus led to the eventual adoption of the Fourth Amendment, enshrining the constitutional sanctity of one's home and possessions.[29] The jurisprudential expedition to refine and delineate the contours of this right has been a protracted one, marked by sporadic expansion and enhancement.

In landmark, early twentieth-century cases such as *Weeks v. United States,* the U.S. Supreme Court introduced the exclusionary rule, barring unlawfully seized evidence from federal court proceedings.[30] This principle was subsequently applied to the states in *Mapp v. Ohio*,[31] thereby fortifying the foundational precept that lawful searches and seizures—including lawfully obtained warrants—were an important part of investigatory criminal procedure. Subsequently, with *Katz v. United States*,[32] later modified by *Jones v. United States*,[33] the Court decidedly shifted the paradigm to protect "people, not places," emphasizing a "reasonable expectation of privacy" that individuals have in their activities and property.

The more modern evolution of Fourth Amendment jurisprudence, particularly in the context of the search and seizure process, has seen the introduction and solidification of various exceptions to the warrant requirement.[34] These exceptions, derived from Supreme Court rulings over the last forty years, point towards an

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[29] Note, however, that the negative sentiments regarding the government's ability to search and/or seize *at all* was so strong that some advocated for a ban on all warrants during the ratification debate of the Constitution. William J. Cuddihy, *The Fourth Amendment: Origins and Original Meaning*, 757, 888 (1990) (unpublished Ph.D. dissertation, Claremont Graduate School).

[30] *Weeks v. U.S.*, 232 U.S. 383 (1914).

[31] *Mapp v. Ohio*, 367 U.S. 643 (1961).

[32] *Katz v. U.S.*, 289 U.S. 347 (1967).

[33] *U.S. v. Jones*, 132 U.S. 945 (2012).

[34] The Fourth Amendment's warrants clause states that "no warrants shall issue, but open probable cause, supported by Oath and affirmation, and particularly describing the place to be searched, and the persons or things to be seized." While we recognize there is a vigorous debate about whether there should be a warrant requirement, we feel these discussions are beyond the scope of this Article.

erosion of the warrant paradigm that historically served as a bulwark against unreasonable intrusions by the state.

An early harbinger of this change can be seen in *Terry v. Ohio*, which marked the boundaries of reasonable searches by finding that "stop and frisk" procedures were constitutionally viable.[35] *Smith v. Maryland* then formalized the move towards a weaker Fourth Amendment when the Court carved a substantial exception with its third-party doctrine, mitigating the warrant requirement in cases where individuals willingly ceded information to third parties.[36] Quickly following *Smith*, the plain view doctrine, adopted by the U.S. Supreme Court in *Texas v. Brown*,[37] allowed officers to seize (and later use in adjudication) evidence that was "in plain view," even in the absence of a warrant-authorized search. Similarly, the good faith exception allows evidence obtained by law enforcement officers with a search warrant that is later found to be invalid to be used in court if the officers acted in good faith and relied on the warrant in good faith.[38]

Legal scholars have extensively critiqued this trend, deploying a range of academic perspectives that question both the legality and effectiveness of warrant exceptions.[39] Less frequently discussed, however, is the converse relationship between diminishing legal protections against intrusive warrants and the importance of the initial (often brief) process that determines whether the warrants sought by law enforcement is constitutionally viable. As exceptions to the warrant requirement expand, the role of judicial warrant review has become an important lynchpin upon which the jurisprudence and practical application of the Fourth Amendment's search and seizure protections rely. Consequently, if warrant review does not function as the jurisprudence assumes it to, neither does much of the Fourth Amendment's protection.

B. Warrant Review and The Probable Cause Standard

As a legal process, warrant review is defined almost exclusively by the judge's probable cause determination vis-à-vis the warrant affidavit. Despite this centrality in effectuating the warrant requirement, the probable cause standard is challenging to precisely

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[35] *Terry v. Ohio*, 392 U.S. 1 (1968).

[36] *Smith v. Maryland*, 422 U.S. 735 (1979).

[37] *Texas v. Brown*, 460 U.S. 730 (1983).

[38] *U.S. v. Leon*, 468 U.S. 897 (1984).

[39] *See*, *e.g.*, Amar, *supra* note 26; and Gray, *supra* note 26.

define, much less operationalize. In the late nineteenth century, in *Stacey v. Emery*, the Court defined probable cause as the extent to which "the facts and circumstances before the officer are such to warrant a man of prudence and caution in believing that the offense had been committed."[40] For the purposes of searches, this standard extends to the probability that evidence of a suspected crime will be found in the location where the search is executed.[41]

While probable cause mirrors the reasonable person standard that exists in other domains, courts and legal scholars acknowledge the amorphous and discretionary nature of the standard.[42] For example, in *Illinois v. Gates*, the majority described probable cause as "a fluid concept—turning on the assessment of probabilities in particular factual contexts—not readily or even usefully, reduced to a neat set of legal rules."[43] However, there is near universal agreement that the "certainty requirement" of probable cause—the confidence level required that the search or seizure is successful—involves more than reasonable suspicion. It consists of a totality of the circumstances approach that goes beyond a "mere hunch" or pure conjecture.[44]

That courts are resistant to precisely defining probable cause might be explained by approaches varying greatly from judge to judge.[45] The sparse empirical work attempting to obtain judges' perspectives on the certainty needed for probable cause determinations demonstrates this variation. In a 1982 survey, 166 judges were asked to assign a percentage of certainty to various burdens of proof, including the concept of probable cause.[46] Respondents had a mean of 44.52 percent, with a modal answer of 50 percent.[47] There was a large range of total responses (from 10 to 90 percent), and even the bulk of the views were from as low as 30 to as high as 60 percent. A similar,

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[40] *Stacey v. Emery*, 97 U.S. 642 (1878).

[41] *Brinegar v. U.S*, 338 U.S. 160, 175-76 (1949).

[42] *See, e.g.*, Christopher Slobogin, *The World Without a Fourth Amendment*, 39 UCLA L. REV. 3 (1991-1992); and Van Duizend et al., *supra* note 18, at 51-53.

[43] *Illinois v. Gates*, 462 U.S. (1983).

[44] *See, e.g.*, Slobogin, *supra* note 40, at 38-43; *Terry v. Ohio*, 392 U.S. 1, 21, 27 (1968); and *Ybarra v. Illinois*, 444 U.S. 85, 91 (1979).

[45] *See, e.g.*, *Maryland v. Pringle*, 540 U.S. 366, 371 (2003).

[46] C.M.A. McCauliff, *Burdens of Proof: Degrees of Belief, Quanta of Evidence, Or Constitutional Guarantees*, 35 VAND L. REV. 1293, 1327 (1982).

[47] *Id*. at 1327.

more recent (2016) survey of 124 judges by Hansberry et al. found a mean of 49.7 percent certainty with a high standard deviation of 16.6.[48]

Warrants are also subject to a particularity requirement where the scope of the search must be commensurate with the probable cause, guarding against the risk of warrants being too general.[49] In practical terms, this means that the place, person, or thing which is to be searched or seized must be described with and supported by factual allegations with specificity. For example, if the warrant application establishes that there is probable cause for only a large stolen television in the house, a warrant granting law enforcement officers the authority to search smaller drawers or compartments within the home would be unconstitutional. Nevertheless, despite these constraints on the standard, the application of probable cause has always been fact-specific, and much of its application involves a totality of the circumstances approach, affording judges significant discretion.[50] In addition, the resistance of courts to apply brightline rules to the reasonable person standard amounts to a relatively low bar to meet the standard.

C. The Stickiness of Warrant Review Decisions

A warrant approval, like all decisions made by a judge of first appearance, is subject to review. Indeed, because the warrant decision is made before formal adjudication begins, the outcome of a warrant determination can be reviewed by the trial judge—usually a different judge than the one who reviewed the warrant—and preserved as an issue reviewable on appeal. In theory, these procedural "second chances" provide a backstop for front-end mistakes and, as a consequence, arguably lower the stakes of the initial review process. Taken to an extreme, this may even influence the approach the judge takes to that initial warrant determination: "The police have the best knowledge of the facts of the case. If brought to trial, the judge will try the case on its merits. Therefore, the magistrate should generally issue the warrant."[51]

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[48] Heidi L. Hansberry, Russell F. Canan, Molly Cannon, & Richard Seltzer, *Legal Standards by the Numbers: Quantifying Burdens of Proof or a Search for Fools Gold?* 100 JUDICATURE 59, 62 (2016).

[49] *Maryland v. Pringle*, 427 U.S. 463 (1976).

[50] *Id. Illinois v. Gates*, 462 U.S. 213 (1983).

[51] These were observations made by judges about warrant review as part of a 1979 survey regarding a number of judicial responsibilities. NATIONAL CENTER FOR STATE COURTS, VIRGINIA COURT ORGANIZATION STUDY, Chap. 11, at 16 (1979),

But the practical realities of criminal adjudication and the relevant standard of review make the outcome of the initial warrant review process much stickier than these positions reflect. Exclusionary rule challenges to warrants present an ex-post check on the warrant approval process, but the empirical reality is that they are rarely used with success. A nine-county study where data was collected from three states (Illinois, Michigan, and Pennsylvania) involving 7,500 cases showed that motions to suppress evidence were made in fewer than five percent of cases, and those cases overwhelmingly involved drugs and weapons. More serious motions to suppress physical evidence only took place in 0.69 percent of the cases, with low success rates.[52] With such a low rate for initial challenges, subsequent appeals for suppression hearings are inevitably even less common.

While considering the efficacy of challenging an initial warrant review, it is also important to acknowledge that institutional feedback mechanisms are particularly weak in this area. Judges are generally unaware of warrant "hit rates"— whether the items listed in a warrant they approved are actually found—and thus are not able to update their priors on the probability of any given search or seizure being successful. Similarly, judges are likely less aware of successful exclusionary rule challenges to their initial warrant decisions than they are to one of their determinations made during adjudication being overturned on appeal. Without that feedback loop, their conception of probable cause lacks a nexus to real-world downstream outcomes and more fully relies on the framing provided by the submitting officer.[53]

D. The Role of "Extra-legal" Factors in Warrant Review

Although it often plays second fiddle to the law itself in the extensive literature exploring the origins, nature, and purpose of the warrant requirement, the existence of a neutral, detached judge is a lynchpin in both the jurisprudential underpinnings and practical

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quoting from the Magistrate Utilization Study, an internal report of the Office of the Executive Secretary of the Supreme Court of Virginia, at B-3.

[52] P. F. Nardulli, *Societal Cost of the Exclusionary Rule: An Empirical Assessment*, 1983 AM. B. FOUND. RES. J. 585 (1983).

[53] Presumably, this feedback loop issue is attenuated with warrants seeking information from third parties (*e.g.*, a cell phone or internet service provider), because the targets of such searches rarely, if ever, know their information is being searched.

process of warrant review.[54] It is important, then, to reflect on the role of the judge and whether an assumption of *true* neutrality is reasonable, or even expected, in the warrant review context.[55]

To this end, we emphasize the legal realist arguments that have been made by many judicial scholars, including ourselves: that the decisions a judge makes and the manner in which they make them are not simply determined by the facts and relevant law, but are instead best understood when considering the personal, professional, economic, and cognitive factors at play in a given judicial environment.[56] Most judges "derive considerable intrinsic satisfaction from their work and want to regard themselves and be regarded by others as good judges."[57] But nearly all judges also face time constraints and deadline pressures resulting from large dockets[58] and may be under increased stress due to external forces such as reputational pressures and politics.[59]As judicial behaviorist (and federal Circuit Court Judge) Richard Posner aptly put it, "[b]ecause behavior is motivated by desire, we must consider what judges want."[60]

In considering the potential influence of these extra-legal factors, we caution against the temptation to always see anything short of a perfect and anodyne application of the law to the facts as judicial

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[54] The judge must be more than just an extra step in the approval process: the protections of the Fourth Amendment "consists in requiring that those inferences [necessary to approve a warrant] be drawn by a neutral and detached magistrate." *Johnson,* 333 U.S. at 13-14.

[55] In one early example of scholars recognizing that judicial review is not necessarily neutral, LaFave and Remington observe that "[a]s revealed by observation of current practice, judicial participation [in warrant review] is often perfunctory…." LaFave & Remington, *supra* note 22, at 988.

[56] *See, e.g.,* RICHARD A. POSNER, HOW JUDGES THINK 62 (HARVARD UNIV. PRESS, 2010) (one of the fundamental texts outlining the various theories of judicial behavior, including legal realism). *See also* Dane Thorley, *The Failure of Judicial Recusal and Disclosure Rules: Evidence from a Field Experiment*, 117 NW. UNIV. L. REV. 1277 at 1281 (which explores "the social, institutional, and behavioral incentives at play in judges' recusal decisions").

[57] POSNER, *supra* note 54 at 62. Judges also want to avoid having their decisions overturned. *See also*, LEE EPSTEIN, ET AL., THE BEHAVIOR OF FEDERAL JUDGES 223 (HARV. UNIV. PRESS, 2013) (finding that "district judges adapt…to minimize the likelihood of being reversed").

[58] *See*, *e.g.*, Marin Levy, *Judicial Attention as a Scarce Resource: A Preliminary Defense of How Judges Allocate Time Across Cases in the Federal Courts of Appeals*, 81 GEO. WASH. L. REV. 401 (2013).

[59] Charles P. Edwards, et al. *Judges and Stress: An Examination of Outcomes Predicted by the Model of Judicial Stress*, 102 JUDICATURE 50 (2018).

[60] POSNER, *supra* note 54 at 11.

malfeasance or subpar performance. "[T]he fact that judicial decisions are sometimes influenced by the race, religion, gender, or other personal characteristics of the judge need not be a consequence of disloyalty."[61] We posit that a similar sentiment is appropriate when discussing the influence of the institutional and professional context in which the decisions are made. While it is important to be able to attribute judicial outcomes and their consequences to the judges themselves (something we do not avoid in this Article), recognizing the mechanisms behind *why* these outcomes happen and maybe why they are largely unavoidable will paint a clearer picture of reality and uncover better avenues for reform.

In the case of warrant review, we argue that five extra-legal considerations are especially relevant: (1) the motivations of law enforcement; (2) the nature of *ex-parte* review and likelihood of repeat play; (3) the resource constraints of judges and the primacy of expediency in warrant determinations; (4) the cognitive difficulties of reading complex but repetitive documents; and (5) the need for elected judges to signal to the voting public and other constituencies.

1. The Motivations of Law Enforcement: While judges are expected to be neutral arbiters when it comes to warrants, submitting law enforcement officers (and cooperating prosecutors) are under no such obligation.[62] The jurisprudence surrounding the warrant requirement transparently recognizes that the "officer [is] engaged in the often competitive enterprise of ferreting out crime."[63] While law enforcement's objectives and incentives are ostensibly independent of the judge's probable cause determination, judges are aware of those motivations, which likely influences how they approach review. Presumably, this recognition usually serves to reinforce the importance of the judge's position as the neutral arbiter. However, it may move judges into a position defensive of the rights of the subject of the

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[61] POSNER, *supra* note 54, at 126.

[62] *See Wong Sun v. United States*, 371 U.S. 471, 482 (1963) (where Justice Brennan balked at the concept of "hold[ing] that an officer may act in his own, unchecked discretion upon information too vague and from too untested a source to permit a judicial officer to accept it as probable cause for an arrest warrant…").

[63] *Johnson,* 333 U.S. at 13-14. *See also Arizona v. Gant*, 129 S. Ct. 1710, 1720 (2009) (observing that one purpose of the Fourth Amendment is to address "the concern about giving police officers unbridled discretion to rummage at will among a person's private effects.").

search,[64] or—for reasons we discuss later in this section—law enforcement's motivations may bleed into the judge's decision.

But an officer's "zealous"[65] nature does not necessarily mean she will not be incentivized to submit high-quality warrant affidavits or ignore the key legal standards.[66] Indeed, law enforcement is pragmatically not in the business of requesting warrants that are not going to be granted or will be later overturned.[67] Consequently, if they believe the reviewing judge is going to genuinely scrutinize their submission, officers will tend to request warrants only when they believe a potential argument for probable cause exists. Similarly, if the officer is interested in a quick approval (which they almost certainly are), they will be motivated to write up their warrants in a manner that minimizes the time required to review them.

2. *Ex-Parte* and Repeat-Play: It is also critical to recognize that the makeup and balance of the actors at play in the warrant review process differ from those involved in most adjudicative contexts. Normally, judges are asked to referee criminal disputes between two informed and legally represented parties, both of whom can provide input and arguments to bolster their interests. Due to the nature of a search warrant, however, warrant review is necessarily conducted *ex-parte*, with the subject of the search warrant almost always unaware of the pending police action and given no legal avenues for disputing the warrant before it is served.[68] This lack of adversarial feedback might create an environment where the "judiciary does not always take seriously its commitment to make a 'neutral and detached' decision as

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[64] It may be tempting to believe that the jurisprudence actually requires that judge abandon neutrality and lean into preemptively defending the subject of the warrant, but the "Fourth Amendment has interposed a magistrate between the citizen and the police. . . not to shield criminals nor to make the home a safe haven for illegal activities." *McDonald*, 335 U.S. at 455 (1948).

[65] *Id.*

[66] *See* David E. Steinberg, *Zealous Officers and Neutral Magistrates: The Rhetoric of The Fourth Amendment*, 43 NEB. L. REV. 1019, 1020 (2022) (arguing that the Fourth Amendment's rhetoric describing law enforcement officers as zealous "not account for the training and accountability of law enforcement…").

[67] This is especially true for those warrants in which the officers received assistance or approval from local prosecutors–these attorneys are most likely to bear the brunt of a warrant that is later overturned, so they are particularly motivated to draft a request that ostensibly meets the probable cause standard.

[68] We acknowledge that individuals can seek civil damages for improperly approved searches, but this process is exceedingly rare and is unlikely to affect judicial officials, since they have immunity, and claims are mainly made against the police or cities.

to whether there exists grounds for a search."[69] A 1979 survey of judges and magistrates who reviewed warrants illustrates the danger of only being exposed to one perspective during the review process: some judges felt that, "[t]he police have the best knowledge of the facts of the case... [t]herefore, the magistrate should generally issue the warrant."[70]

Furthermore, the inevitability of "repeat play"—where the actors in a given event are likely to be the same for similar events in the future—may influence the manner in which officers write their warrant requests and the approach judges take regarding those requests. Game theorists have consistently found that when actors are familiar with each other and know they will be participating in future events together, they begin to create reputations based on past behavior *and* consider the effect that their current actions will have on the nature and outcome of future interactions.[71] In other words, relationships matter.

We can reasonably posit that this is true in the context of warrant review, where judges are presented with multiple submissions from the same officer, sometimes over the course of a single week or day. Judges may develop expectations regarding the reliability and sufficiency of the factual claims in the warrant based on who submitted it. Certain officers who have a history of quality submissions may garner a sense of trust with a judge, whereas officers who have a pattern of attempting searches or seizures when not warranted may find that judges are reading their submissions with greater scrutiny. Judges might also be inclined to consider the effect that a denial will have on their relationship with the officer and the broader law enforcement community going forward.

3. Judicial Resource Constraints and Expediency: Judges are busy, and empirical work have shown that the weight of their dockets influences how they approach decision making.[72] One study that used

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[69] LAWRENCE TIFFANY, ET AL. DETECTION OF CRIME 120 (1967).

[70] Virginia Court Organization Study, NATIONAL CENTER FOR STATE COURTS, 16 (1979), quoting from the Magistrate Utilization Study, an internal report of the Office of the Executive Secretary of the Supreme Court of Virginia, at B-3.

[71] Paul Milgram & John Roberts, *Predation, Reputation, and Entry Deterrence*, 27 J. ECON. THEORY 280, 304 (one of the foundational texts on repeated games and reputation building in economics, which states "the value of reputation and the extent of reputation building (will) increase with the frequency and opportunities for its use.").

[72] *See* Brian Sheppard, *Judging under Pressure: A Behavioral Examination of the Relationship Between Legal Decisionmaking and Time*, 39 FLA. STATE UNIV. L. REV. 931 (2011-2012) (reviewing the state of judicial resource constraints and

the unexpected and significant rise in immigration cases that resulted from post-9/11 deportation policies found that the federal circuits that experienced the greatest increase in docket loads were significantly less likely to overturn lower court decisions, ostensibly because they had less capacity for judicial scrutiny.[73] Another study (also of federal judges) found that busy judges tend to make decisions that take the path of least resistance (e.g., fewer dissents and more conformity to precedence), even at the cost of a full-throated analysis of the issues.[74]

The effects of resource limitations are almost certainly amplified when the judicial decision has built-in time constraints. Two recent empirical studies have demonstrated that when judges face impending deadlines, they make decisions more quickly and appear to make more mistakes.[75] Warrant review is, by its nature, one in which expediency is of prime concern and the luxury of contemplative examination is rare. In the case of warrants for suspected DUI offenses, for example, the relevant evidence is literally disappearing as a consequence of biological metabolism.[76] And with the lower administrative barriers that come with the increasing prevalence of electronic warrant systems, the expectation that a judge reviews the warrant anywhere at any time only serves to increase the sense of urgency. Within this high-pressure context, judges are potentially more susceptible to the extra-legal factors we have outlined in this section,

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employing an experimental simulation to test the effect of those constraints on decision making (law students making judicial decisions)).

[73] Bert I. Huang, *Lightened Scrutiny*, 124 HARV. L. REV. 1109, 1137 (2011) ("The evidence suggests that the studied appeals courts began to call out fewer problems in trial court rulings, in civil cases, when they became overburdened by a wholly separate set of cases.").

[74] William M. Landes & Richard A. Posner, *Rational Judicial Behavior: A Statistical Study*, 1 J. LEGAL ANALYSIS 775, 820 (2009) ("the heavier workload in the [federal] courts of appeals [as opposed to the Supreme Court] makes the cost of a dissent greater" and "increases the benefits of decision according to precedent, which greatly reduces the time and effort involved in a decision. . .").

[75] *See* Miguel F. P. de Figueiredo, et al. *The Six-Month List and the Unintended Consequences of Judicial Accountability*, 105 CORNELL L. REV. 363. *See also* Jonathan B. Petkun, N*udges for Judges: An Empirical Analysis of the "Six-Month List*," Working Paper. https://jbpetkun.github.io/pages/working_papers/Petkun_JMP_20210806.pdf (last accessed July 8, 2023).

[76] Blood alcohol levels peak about an hour after consumption and subsequently decreases at about 10-15 percentage points her hour. Alex Paxton, *Alcohol in the Body*, NAT'L LIBR. OF MED. (Jan 8, 2005), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC543875/.

such as internalizing the motivations of the submitting officers or using relationships with those officers as heuristics for warrant quality.[77]

4. The Cognitive Difficulty of Reviewing Warrants: Although the exact task of judges reviewing warrants has not been studied in research on reading, the nature of reading has been extensively examined, and much is known about reading speed and the cognitive load that comes with reading complex but also short and repetitive documents that arguably generalize to the warrant review context. Despite the fact that reading can feel somewhat effortless, it is an incredibly complex cognitive process that consists of several interacting stages, including eye movement control, word identification, syntactic parsing, semantic processing, discourse representations, and situational contextualization.[78] Reading is also affected by a huge number of factors ranging from the layout and presentation of the text,[79] size and type of font,[80] age and eyesight ability of the reader,[81] and the nature of the complexity of the language of the text itself, including factors such as the length and of the text; its lexical, syntactic, and discoursal complexity; and many other textual, psychological, and linguistic factors.[82]

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[77] Studies in the context of medical decision making show that greater reliance on "fast thinking" results in greater vulnerability to biases and heuristics. *See* Anne Preisz, *Fast and Slow Thinking; And the Problem of Conflating Clinical Reasoning and Ethical Deliberation in Acute Decision-making*, 55 J. PAEDIATRICS & CHILD HEALTH 621, 621-22 (2019). *See also* DANIEL KAHNEMAN, THINKING FAST AND SLOW (FARRAR, STRAUS & GIROUX, 2013) (identifying "type 1" and "type 2" cognitive processes and their respective advantages and disadvantages).

[78] Keith Rayner & Erik D. Reichle, *Models of the Reading Process*, 1 WILEY INTERDISCIPLINARY REVIEWS: COGNITIVE SCI. 787-799 (2010).

[79] Mary C. Dyson, *How Physical Text Layout Affects Reading from Screen*, 23 BEHAVIOUR & INFO. TECH. 377-393 (2004); Mary C. Dyson & Gary J. Kipping, *Exploring the Effect of Layout on Reading from Screen*, INT'L CONFERENCE ON RASTER IMAGING AND DIGITAL TYPOGRAPHY 294-304 (1998); Heidelberg Berlin, et al. *Towards Individuated Reading Experiences: Different fonts Increase Reading Speed for Different Individuals*, 29 ACM TRANSACTIONS ON COMP.-HUM. INTERACTION 1-56 (2022).

[80] Gregor Franken, et al. *Eye-Tracking Study of Reading Speed from LCD Displays: Influence of Type Style and Type Size*, 8 J. OF EYE MOVEMENT RSCH. 1, 4-5 (2015).

[81] Sofie Beier & Chiron A. Oderkerk, *The Effect of Age and Font on Reading Ability* 53 VISIBLE LANGUAGE (2019); MiYoung Kwon, et al. *Slow Reading in Glaucoma: Is it Due to the Shrinking Visual Span in Central Vision?*, INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCI. 5810-5818 (2017).

[82] Scott A. Crossley, et al. *Moving Beyond Classical Readability Formulas: New Methods and New Models*, 42 J. OF RSCH. IN READING, 541-561 (2019); S. Crossley, et al. *A Large-Scaled Corpus for Assessing Text Readability* 55 BEHAV. RSCH.

The reading speed of judges has not been completely established, but it has been shown that law students read an average of about 465 words per minute (WPM) when reading through a court opinion,[83] which was far faster than lay readers. Lawyers and judges employ different reading strategies than law students or other more novice readers, using more of their background knowledge, reading with more intentional purpose, skimming irrelevant language, and re-reading complex material.[84] All of these studies were only able to incorporate relatively small sample sizes ($n < 40$), but together they indicate that lawyers and judges likely read legal texts differently and probably more quickly than the average adult reader.

However, the judges who are reviewing warrants are doing something even more specific than in a typical reading task. They are reviewing materials that are highly formulaic, which results in information that is the same or at least highly similar from document to document. They are also likely not attending to every word of the text equally because certain aspects are centrally important, and some are less critical in helping them make a decision on whether a warrant affidavit meets the threshold for approval. Thus, we might expect judges to "skim" the warrant affidavit, scanning it for specific information rather than reading it line-by-line, word-by-word. Research has consistently shown that reading types of documents with which one has a high degree of familiarity can greatly increase reading speed.[85]

METHODS 491-507 (2023); Mihai Dascalu, *ReaderBench: Automated Evaluation of Collaboration Based on Cohesion and Dialogism*, 10 INT'L J. OF COMP.-SUPPORTED COLLABORATIVE LEARNING 395-423 (2015).

[83] Catherine J. Cameron, *In the Eyes of the Law Student: Determining Reading Patterns with Eye-Tracking Technology*, RUTGERS L. REC. 45, 39 (2017).

[84] Leah M. Christensen, *The Paradox of Legal Expertise: A Study of Experts and Novices Reading the Law*, BYU EDUC. & L.J. 53 (2008). *See also* Mary A. Lundeberg, *Metacognitive Aspects of Reading Comprehension: Studying Understanding in Legal Case Analysis*, READING RSCH. Q. 22, 407 (1987); and Laurel Currie Oates, *Beating the Odds: Reading Strategies of Law Students Admitted Through Alternative Admissions Programs*, 83 IOWA L. REV. 119, 119-140 (1997).

[85] Todd A. Shimoda, *The Effects of Interesting Examples and Topic Familiarity on Text Comprehension, Attention, and Reading Speed*, 61 THE J. OF EXPERIMENTAL EDUC. 93-103 (1993); Keith Rayner, et al. *Psychology of Reading*, PSYCH. PRESS (2012); Keith Rayner, et al. *So Much to Read, so Little Time: How Do We Read, and Can Speed Reading Help?*, 17 PSYCH. SCI. IN THE PUB. INT. 174-34 (2016). *See also* the following meta-analysis for a summary W. J. Therrien, *Fluency and Comprehension Gains as a Result of Repeated Reading: A Meta-Analysis*, 25 REMEDIAL AND SPECIAL EDUC. 252-261 (2004).

Other studies have shown, though, that increase in reading speeds correlates negatively with reading comprehension, even in skimming/scanning tasks.[86] This research suggests that "speed reading" does not lead to any meaningful degree of comprehension, even of main ideas.[87] Additionally, the extant research supports the idea that how fast a judge feels they can or must move through a warrant is likely influenced by many of the extra-legal factors we have already discussed. For example, a judge may feel comfortable in reading a warrant submission from a familiar and previously reliable officer more quickly than they would other warrants.[88]

5. Elections and Politics: If context is important, then it is also worth highlighting that most judges who are in charge of warrant review at the state level are subject to the ever-looming presence of elections. The potential "anticipatory" effect of elections on judicial behavior is particularly well-studied in the context of criminal justice, where studies most often show that elected judges (even those with more liberal constituencies) feel compelled to be more tough on crime, especially at the end of their terms.[89]

Inasmuch as that influence pushes a judge to be more trusting of police or provide them more latitude in the context of search and seizure, this is a problem. Nonetheless, in the context of warrant review, we suspect that the election influence is fairly limited. While the tendency to be tough on crime is almost certainly correlated with

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[86] Rayner et al., 2012, *supra* note 78. *But see* R. P. Carver, *Reading Rate: Theory, Research, and Practical Implications*, 36 JOURNAL OF READING 84-95 (1992) (claiming that reading speeds can read up to 650 WPM while retaining the relevant information).

[87] Rayner et al., 2012, *supra* note 78.

[88] Scott A. Crossley, et al. *Moving Beyond Classical Readability Formulas: New Methods and New Models*, 42 J. OF RSCH. IN READING, 541-561 (2019); S. Crossley, et al. *A Large-Scaled Corpus for Assessing Text Readability* 55 BEHAV. RSCH. METHODS 491-507 (2023); Mihai Dascalu, *ReaderBench: Automated Evaluation of Collaboration Based on Cohesion and Dialogism*, 10 INT'L J. OF COMPUTER-SUPPORTED COLLABORATIVE LEARNING 395-423 (2015).

[89] *See*, *e.g.*, David Abrams, et al. *Electoral Sentencing Cycles*, 39 J. L. ECON. & ORG. 350 (2023) (finding that judges show cyclical effects in their sentencing behavior, with judges approaching reelection more likely to give higher sentences in felony cases); Carlos Berdejó & Noam Yuchtman, *Crime, Punishment, and Politics: An Analysis of Political Cycles in Criminal Sentencing*, 95 REV. ECON & STAT. 741 (2013) (finding that criminal sentences in Washington state courts are roughly ten percent longer at the end of election cycles); Sanford C. Gordon & Gregory Huber, *The Effect of Electoral Competitiveness on Incumbent Behavior*, 2 Q. J. POL. SCI. 107 (2007) (finding that "judges in partisan competitive systems sentence significantly more punitively than those in retention systems.").

an inclination to be supportive of law enforcement and the prosecutor's office, the decision to grant or deny a search warrant is unlikely to be salient enough to garner any attention, let alone to a degree that it would be something an elected judge would intentionally (or even unintentionally) use to garner broader support. This is particularly true in the context of this Article's empirical study, Utah, where judges retain their seat on the bench through non-partisan, unopposed retention elections,[90] which virtually always result in reappointment.[91]

II. THE DATASET AND INSTITUTIONAL SETTING

Given the weight of the empirical claims made in this Article, it is critical to understand both the nature of the data that was collected and the institutional setting in which the study occurred. To those ends, Section II.A describes the characteristics of the various datasets we utilize in this study, how we sourced and cleaned them, and why the resulting dataset is so novel; Section B attempts to justify Utah's warrant review regime as sufficiently representative of broader national processes, while acknowledging its idiosyncrasies; Section C outlines the key limitations inherent in our study (and empirical studies of warrant review more broadly); and Section D sets the stage for our empirical analyses by discussing trends in warrant submissions in Utah over the time period for which we have data.

A. The Warrant Review Dataset

To carry out our study, we primarily rely on two data sources: PDF images of approved warrants from the Utah Administrative Office of the Courts (AOC) and electronic warrants administrative metadata from the Utah Department of Public Safety (DPS). We supplemented these core sources with machine-learning algorithms, imputed judge shifts, and hand-coded data on judicial demographic information. We

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[90] Utah Code § 20A-2 -201.

[91] At the same time, a recent report by Utah's Judicial Performance Evaluation Commission (JPEC) indicates that judges who are less popular (as reflected by lower judicial performance evaluation scores) were 15-30% more likely to step down, which may be a pre-election selection mechanism that functions in the same way as losing a retention vote (*JPEC 2024 Report to the Community*, UTAH JUD. PERFORMANCE EVALUATION COMM., (Jan. 16, 2024) https://judges.utah.gov /2024/01/16 /jpec-2024-report-to-the-community/).

briefly describe the sourcing and cleaning process here and provide a more detailed account in the Appendix.[92]

Using Utah's Xchange database, we individually downloaded PDF images of every unsealed digital affidavit, warrant, and return that was submitted and approved from December 1, 2013 to January 29, 2020. Critically, the PDFs of denied and retracted warrants are not available.[93] Xchange provided us with bulk metadata that included some basic information on each warrant (*e.g.*, submitting officer name, law enforcement agency, court location, and the dates of the affidavit, warrant, and return). For all other PDF-derived data, including judge name, warrant length, crime type, and substantive content, we utilized a series of natural language processing methods and machine learning algorithms to extract the data.

We also procured time-stamp metadata from the DPS that spanned from March 28, 2017 to January 29, 2020. Critically, for our study (and the element that makes our dataset so novel), Utah's e-Warrant system records time stamps at the millisecond level for when (1) the officer submitted the affidavit, (2) the judge first viewed the affidavit, (3) the judge made a decision on the warrant application (approval denial) or the warrant was withdrawn, and (4) the officer served the warrant. Universal warrant identification numbers then allowed us to merge the time-stamp data with the approved warrant PDFs, resulting in a dataset of roughly 33,500 observations.

We supplemented this core dataset with two sources of custom, hand coded information that were critical to our analyses. First, because our dataset only includes PDF images for approved affidavits, it was necessary to impute the reviewing judge for the denied and retracted affidavits by reconstructing the district-specific shifts at the day level. We did this by matching schedules provided to us by county administration with the reviewing-judge patterns that existed in the scraped PDF image data. This process provided us with clear shift data in all but two of Utah's judicial districts (Districts 2 & 5).[94] Second, we used some basic information from Utah's Judicial Performance Evaluation Commission (JPEC)[95] as a starting point to collect a rich set of biographical variables on each judge, including their gender, race/ethnicity, legal education, professional experience (whether they

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[92] *See* Appendix C: Detailed Description of Dataset Sourcing and Cleaning.

[93] We discuss the limitations this imposes on our analysis in Section II.D, *infra*.

[94] As a consequence, these districts are excluded from much of our analysis on judge-level approval rates in Parts IV.B and IV.C, *infra*.

[95] *About Us*, UTAH JUD. PERFORMANCE EVALUATION COMM'N, https://judges.utah .gov/about-us/ (last accessed June 21, 2024).

were formerly a prosecutor or a criminal defense attorney), and the time and manner of appointment.

We conclude our discussion of our dataset by emphasizing how valuable and unique it is. According to our research efforts, no state systematically records the substantive matter of warrants, so the length, complexity, facts, and legal content of the warrants can only be derived through the text of the warrants themselves. As a result, access to digital versions of the warrants is essential. To know how long judges spent reviewing warrant requests, we also needed precise timestamps for the relevant events in the review process—information that is even less common than PDF images. While many states will record either the time at which a warrant affidavit is submitted (generally in the form of a digital signature or court record) or the time at which a review determination is made by the judge, knowing only these two data points would not allow for an accurate (or even serviceable) analysis of the amount of time the actual review process took. This is because we can make no reliable assumptions regarding the moment when the judge first begins reading the content of the affidavit, and so a gap between submission and first viewing must necessarily be attributed to the total review time. As far as we know, the ability to pinpoint the moment the warrant is first opened by the judge is unique to Utah's data retention system. We also needed the ability to reliably connect all of the relevant datasets, something that should not be taken for granted.

B. Utah's Warrant Regime as a Representative Venue

In the near absence of any systematic empirical studies on the warrant review process, any information is better than nothing. It is nonetheless important to outline whether our venue state, Utah, produces results that can be generalized to other parts of the U.S. We argue that while Utah certainly differs from many states in terms of its population and politics, its laws and judicial infrastructures—particularly those relevant to warrant submission and review—are quite similar to the vast majority of venues in the United States.

Utah's population of 3.27 million ranks thirtieth among the states, placing it close to the median in terms of overall size.[96] While it is the youngest state in the U.S. with a median age of 31.2, this is

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[96] *Change in Resident Population of the 50 States, the District of Columbia, and Puerto Rico: 1910 to 2020*, U.S. CENSUS BUREAU (2020), https://www2.census.gov/programs-surveys/decennial/2020/data/apportionment/population-change-data-table.pdf.

primarily driven by its outsized population of children (~29% are under 18 years old). The population most likely subject to search and seizure (*i.e.*, adults) is much more proximate to the national average.[97]

Racially and ethnically, Utah has the 18th highest White population (76.7%) among U.S. states, although its Hispanic/Latino (15.1%) and Native Hawaiian and Polynesian (1.2%) populations are higher than all but twelve and two states, respectively. It has the 5th lowest percentage of Blacks/African Americans (1.6% versus 13.5%, respectively), but is roughly average in terms of its Asian population (31st, with 2.8%).[98]

Utah stands as an outlier in terms of the religious affiliation of its population. The Church of Jesus Christ of Latter-Day Saints (LDS or Mormon Church) is headquartered in Salt Lake City, and according to the Pew Research Center's Religious Landscape Study, some 55% of the adult population identifies as LDS. The Christian population is 73% of the state, while non-Christian faiths (including Jewish, Muslim, Buddhist, and Hindu religions) only comprise 4% of the adult population. Those who do not identify with any religion are 22% of the Utah population. These figures compare with a national adult population that is 1.6% LDS, 70.6% Christian, 5.9% non-Christian, and 22.8% unaffiliated.[99] While there is heterogeneity among LDS members, on average, LDS membership is correlated with more conservative political views.[100]

Utah's crime rate relative to other states paints a somewhat mixed picture. Nationwide crime data from 2020 places Utah as the 12th lowest in terms of violent crime rate, with 261 incidents per 100,000 people (Maine and the District of Columbia have the lowest and highest rates, at 109 and 1,000, respectively).[101] However, that same data places Utah as the 12th *highest* in regard to non-violent crime rate, with 4,929 per 100,000 (Massachusetts and DC are the

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[97] Median Age by State 2024, WORLD POPULATION R., https://worldpopulationreview.com/state-rankings/median-age-by-state (last accessed June 18, 2024).

[98] *2023 U.S. Census Estimates*, U.S. CENSUS BUREAU, https://www.census.gov/quickfacts/fact/table/UT/RHI225222 (last accessed June 18, 2024).

[99] Religious Landscape Study, Pew Research Center, https://www.pewresearch.org/religious-landscape-study/database/ (last accessed July 12, 2024).

[100] Jacob Robertson & Stephanie Cardon, *Political Perceptions Among A Peculiar People: Conservatism in Committed vs. Less Committed Latter-day Saints*, 21 SIGMA: J. POL. & INT. STUD. 71 (2003).

[101] Crime Rate by State 2024, WORLD POPULATION R., https://worldpopulationreview.com/state-rankings/crime-rate-by-state (last accessed June 18, 2024).

lowest and highest, with 2,106 and 6,986, respectively).[102] Combined metrics—which are weighted heavily by the higher number of non-violent crimes—put Utah at 13th highest overall.[103] The 2021 incarceration rate in Utah of 435 individuals per 100,000, which is likely a better indicator of police investigation and prosecution rates, is the 10th lowest in the country.[104]

The state court system in Utah is structured around county geography, with the 29 counties divided into 8 judicial districts (*see* Figure 1, below). For the most part, Utah's (sub)urban-rural divide is reflected in the makeup of these districts, with Districts 2, 3, and 4 including the largest counties in the state (Davis/Weber, Salt Lake, and Utah Counties, respectively) and more than 50% of the total population.[105] As we demonstrate in our county- and judge-level analyses in Parts III.C and IV.B, the distinctions between urban and rural counties play into the number of warrant decisions and the manner in which those warrants are reviewed.

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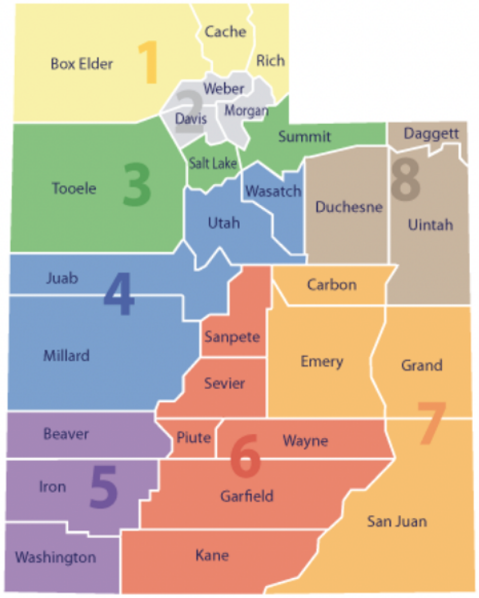
[102] *Id*. Historical data on violent crime rates that better cover the period of our empirical study show similar relative placements (roughly 11th lowest from 2018-2022). *See* FED. BUREAU OF INVESTIGATION'S CRIME DATA EXPLORER, https://cde.ucr.cjis.gov/LATEST/webapp/#/pages/downloads (last accessed Jun. 18, 2024).

[103] FED. BUREAU OF INVESTIGATION, *supra*, note 105.

[104] *States of Incarceration: The Global Context*, PRISON POL'Y INITIATIVE, https://www.prisonpolicy.org/global/2021.html (last accessed June 18, 2024).

[105] *Utah Counties by Population*, UTAH DEMOGRAPHICS BY CUBIT, www.utah-demographics.com/counties_by_population (last accessed April 3, 2024).

Figure 1: Map of Utah's Counties and Judicial Districts



Criminal matters for adults, including warrant review, fall under the jurisdiction of both Utah's District and Justice Courts, which have roughly 200 judges/magistrates in total. This appears to be slightly smaller than the average judge-population ratio in the U.S.[106] While we do not have even basic data on the quantity of national-level warrant review and approval, we suspect that Utah has a similar relative warrant-population ratio to the broader U.S. (i.e., slightly lower than average) but a warrant-judge ratio that puts it near a median position in terms of economic and logistical demands on the judiciary.

Legally, the search warrant process in Utah is primarily governed by Utah Rule of Criminal Procedure 40.[107] Pragmatically, the warrant process is run through Utah's electronic warrants (e-Warrants) system, which launched in December 2007. The change was prompted by a Utah Supreme Court decision where the court determined that a warrantless search was justified because the state could demonstrate the exigency of collecting blood alcohol evidence before dissipation—a circumstance that likely would not have existed but for the onerous nature of in-person warrant submission and review.[108] Following this decision, Utah state officials joined many other states around the nation

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[106] U.S. Department of Justice, *State Court Organization, 2011* (Nov. 2013) https://bjs.ojp.gov/content/pub/pdf/sco11.pdf.

[107] Utah R. Crim Pro. 40, Search Warrants.

[108] *State v. Rodriguez*, 156 P.3d 771 (2007).

by implementing an electronic warrants system to address the time-sensitive nature of evidence like DUIs.[109] Today, Utah is one of 44 states to utilize electronic warrant software at some level.[110]

For the submitting law enforcement officers and reviewing judges, this e-Warrants system is simple and streamlined. The officer logs on to the system and chooses from a list of affidavit templates, which pre-populate the affidavit draft with commonly used (but non-substantive) language.[111] The officer then completes the rest of the warrant by filling out "fields" regarding the circumstances that lead to the warrant; the officer's qualifications (called the "Hero Statement"); the facts establishing the grounds for issuing the warrant; and the persons, locations, and items to be searched and/or seized. Upon completion, the officer can seek prosecutorial review, which is essentially required in some districts but only sometimes done in others.

Upon submission by the officer, the on-call District or Justice Court judge is notified via email, pager, or text message. The judge logs onto the system, views the warrants currently in their queue, and clicks on the PDF of the warrant they want to view. We have included some sample warrants in Appendix A, which match what the judge views except that they are also given a "Warrant Summary" bar that includes basic information on the submission.[112] At that point, the system begins recording the review time. The clock when the judge

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[109] Elain Borokove & Rey Banks, *A Guide to Implementing Electronic Warrants*, JUST. MGMT. INST. 7 https://www.responsibility.org/wp-content/uploads/2018/04/FAAR_3715-eWarrants-Interactive-PDF_V-4.pdf?pdf=eWarrants_Implementation_Guide (last accessed Jan. 25, 2024).

[110] *See* Responsibility.org, *National Drunk Driving Statistics Map* https://www.responsibility.org/alcohol-statistics/state-map/issue/electronic-warrants-e-warrants-authorization/ (last accessed June 25, 2024).

[111] The list of pre-populated template types that we have been provided with cover the following circumstances: alcohol restricted driver, DUI blood draw, electronic service provider, emergency personnel blood draw, GPS electronic monitoring, unmanned aircraft system, a warrant with a 30-day seal, and a generalized form for other warrants. We have included two examples of these templates (the "general" form and one for a DUI blood draw) in Appendix A (*see* Figures A.2 and A3).

[112] This information is also included on the "splash page" that lists outstanding warrant submissions. Both the splash page and the summary provide some basic data for each of the warrants listed in their system, including the warrant number, whether there is a request to seal, whether an affidavit has previously been viewed, the user ID of the submitting officer, and in some specific cases (correlating with the pre-populated template types listed in note 114, *supra*) the warrant type (generally, warrants are listed simply as "Search Warrant").

either denies the affidavit and provides the reason for denial or approves and then submits the mostly pre-populated warrant back into the system. Critically, the electronically signed approved warrants are stored in the court's data systems, but the denied affidavits are not (although the reason for the denial is sent to the officer). We detail why that distinction is important in our discussion of limitations in Section II.C.

Judge assignment to warrant review is determined by a shift-based system, which varies from county to county. Four districts have week-long shifts, generally starting and ending at 8am on Mondays; one has two-week shifts; and three have month-long shifts. Judges occasionally take back-to-back shifts, especially in the more rural districts or those where the number of reviewing judges is small. While we have been told that all districts have backup judges, the data indicate that some use those backups much more regularly than others.[113] It is also important to know that when most of the Utah Judges featured in this Article's data are assigned to the warrant review shift, they are also assigned to a host of other "snap decision" duties as part of what is informally called "Signing Week." In addition to reviewing search warrants, they review arrest warrants, protective orders, stocking orders, attend first appearances, and sign off on initial probable cause and bail decisions. In this context, warrant review only constitutes a portion of the late-night requests and time-sensitive decisions which face the judge.

In discussing the judges who were assigned to review warrants during the period analyzed in this study, we feel compelled to highlight that our findings—while indicative of systematic shortcomings in the warrant review process—should not be directly attributed to "poor" judging. As we highlighted in Section I.D, we believe that much of the current state of warrant review is the inevitable result of the jurisprudential nature of warrant review and extra-legal factors such as institutional, political, and social influences. Utah's legal system and judges are certainly not immune to those influences. Indeed, we suspect that the quality of judging (including their legal and professional training, court infrastructure, resources, and personnel) in Utah is at least comparable with most states. In some ways, Utah has demonstrated a lead-out approach to warrant reform, recently being the first to institute regulations on the use of warrants to procure cell phone tracking data to "geofence" criminal suspects.[114] To the extent this is

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[113] *See* Section II.C.3, *infra*, for our discussion of shifts in.

[114] *Electronic Information or Data Privacy*, H.B. GEN. SESSION 57 (2019). *See*

true, our empirical results represent a best- or better-case scenario, meaning the state of warrant review more broadly is even more disconcerting.

As a final note concerning the external applicability of our data and analyses, we acknowledge that while our description of the process above has remained largely unchanged over the last decade, our dataset, which runs from mid-2017 to early-2020, reflects only the judicial behavior and review outcomes during that period. It is possible that warrant practices have changed over the course of the intervening four years, especially during the COVID-induced disruptions in police investigation and criminal adjudication that lasted the better part of two years.

C. Key Limitations

In addition to understanding the legal and administrative context of the review process and the nature of the data used, it is also critical to recognize the limitations inherent in our empirical study. To this end, this section highlights and explains the four limitations that we think are most important. We also reiterate them, when relevant, throughout the rest of the Article.

1. Only approved warrant PDFs: The administrative time-stamp metadata we procured from the DPS covers nearly every electronically submitted warrant affidavit and subsequent warrants and returns.[115] The PDF images from the AOC, however, only come from warrant affidavits that were approved—affidavits that are initially rejected or retracted are not systematically recorded by the system. We have inquired about the possibility of accessing the images of denied and retracted warrant affidavits, but DPS only retains those documents for 20 days after they have been submitted. We were told that the submitting agencies (county sheriff's offices and prosecutor's offices)

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also Leslie Corbly, *Utah Law Would Strike a Balance Between Public Safety and Digital Privacy*, SALT LAKE TRIB. (Mar. 13, 2023), https://www.sltrib.com/opinion/commentary/2023/03/13/ leslie-corbly-utah-law-would/.

[115] Our dataset does not include warrants that were sealed at the time we downloaded the warrant PDFs. Given the nature of sealed documents, we have no way of knowing how many of these warrants were not available, although we suspect it is a very small percentage of the overall sample. Sealing warrants is somewhat common, but they tend to only stay sealed for 30 days or less. Similarly, we have been told that an exceedingly small number of warrants are still filed in person, which warrants would not be included in our dataset. Based on conversations with judges and prosecutors, this practice is more common in the more rural districts and tends to be for more complex, high-profile investigations.

might have kept records of these warrants, but all the offices we contacted either do not do so or were not willing to work with us on a data transfer.

Any holes in a dataset will constrain an analysis at some level, but the lack of denied and retracted affidavit PDFs creates some particularly unfortunate limitations. Although these affidavits constitute less than ten percent of all warrant submissions (see our analysis in Part IV, below), they serve as the counterfactual group against which the data on the approval process can be compared. In some cases, we were able to impute information using the approved warrants (*e.g.*, imputing reviewing judge from shift data). But without the PDF images, we are ultimately not able to know (or even approximate) the length, complexity, and "type" of those submissions. Not knowing the characteristics of these missing affidavits prevents us from estimating the predictive effect that those characteristics have on review time and approval likelihood.

2. No True Baseline Standard: Another significant limitation is our inability to create a true baseline standard against which the results of our analysis can be measured. We do not know how long judges *should* take to review a given warrant, so our observations on review time largely rely on contextual information and data we gather. Likewise, without the ability to read and evaluate every warrant in our dataset (and assuming our own review process would be subject to errors regardless), we do not know what percentage of warrant affidavits *should* meet the probable cause standard. While there are aspects of probable cause that are objective, there are many parts that are discretionary. Unfortunately, creating a reliable indicator for probable cause is both legally and linguistically complex and is therefore beyond the scope of this Article (it would also require access to the language of the denied warrants). While we do conduct an in-depth qualitative analysis of individual approved warrants (see Part V, below) this process was time intensive and is therefore unavailable for the wider dataset.

Of course, these limitations do not prevent us from measuring the on-the-ground reality: we can know how quickly judges review warrants, how often they approve them, and what factors are related to speed and likelihood of approval. Using word counts derived from the PDF images of the approved warrant affidavits, we can also calculate whether the warrants were read in full and whether there are disparities among reviewing judges in average review time and review outcomes. At the same time, making normative claims (which we do in this

Article) based on average review time and approval rate are unavoidably based, at least in part, on theory and expectation.[116]

3. Overestimating Review Time: The most novel element of our dataset is the existence of timestamp data on the moment the reviewing just first opens a warrant affidavit. While other states have data that would ostensibly allow us to determine the time between submission and decision, knowing only these two data points would not allow for an accurate (or even serviceable) analysis of the amount of time the actual review process took. This is because we can make no reliable assumptions regarding the moment when the judge first begins reading the content of the affidavit, so the gap between submission and first viewing must necessarily be attributed to the total review time. We need not make such an assumption in our analyses.

That being said, our dataset does not provide a *perfect* view into the review process either. Defining the review time for a given warrant as the period between when a judge first opens an affidavit and when the decision is made will sometimes provide an overestimated measure. Consequently, the total review time for a given warrant is best understood as a top-end measure of the total possible time a judge could have spent reviewing that affidavit.

4. Possible Errors in the Underlying Datasets: We will end by raising the always present possibility that there are errors in the underlying datasets that we are using in this study.[117] In this Article, we can report only the reality that the data allow, meaning that our results must inherently reflect any flaws in that data. Certain data points might be missing or inaccurate, both of which would impact our findings, especially if those errors are common and/or nonrandom. These flaws could be the results of human mistake on the front end of collection, glitches within the electronic systems that collect the data (*e.g.* Utah's e-Warrant system), or electronic transposition errors in the data retention or provision programs.

Even if there *are* errors in the data, we are not, of course, absolved of the responsibility to make efforts to identify them. For this

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[116] *See* Section I.D.1, *supra,* for our discussion regarding the motivations of law enforcement officers and how it informs our expectation of the underlying quality of submitted warrants.

[117] In discussing this, we draw a distinction between errors in the data itself and errors or mistakes we made in the process of cleaning and analysis. While we cannot guarantee that the latter category of errors have not occurred (we are not immune to human error), mistakes and oversights in how the data were cleaned, combined, analyzed, and presented are squarely within our control, and we feel we have been especially careful in this regard.

project, we feel we have done our due diligence in this regard via two primary methods. First, we have looked for inconsistencies and unexpected patterns in the data itself. For example, each warrant submission should have a decision outcome, and each decision outcome should have a prior submission.[118] Likewise, each warrant submission should only have one judicial review and one outcome.[119] Second, we have had many dozens of discussions with Utah court administrators and judges about the data and our findings. In addition to providing essential contextual guidance and insights for the broader projects, potential problems with the data were occasionally highlighted. While we cannot be certain that those issues did not exist, we spent considerable resources exploring them and did not find any evidence of serious problems.

D. Yearly Trends in Warrant Submission Rates

Before we begin the key empirical analyses of this Article, we first examine the trends warrant submission rates in the years our data covers. The flow of warrant applications provides one important input into the context for understanding their workload pressure.

Figure 2 (below) shows the submissions by year for 2017 to 2020, the four years for which we have time stamp data. Overall, there were roughly 33,500 submissions to 119 judges during that period, resulting in an average review rate per judge of 281.28 warrant applications.[120] 2017 and 2020 have far fewer warrants than 2018 and 2019 because our timestamp dataset does not begin until March 28, 2017 and ends on Jan 29, 2020. Accounting for these abridged dates, the average per-day submissions for each of the four years (2017-2020) is 26.85, 31.34, 36.56, and 43.71, respectively. This is an average increase per year of 16-17 percentage points.

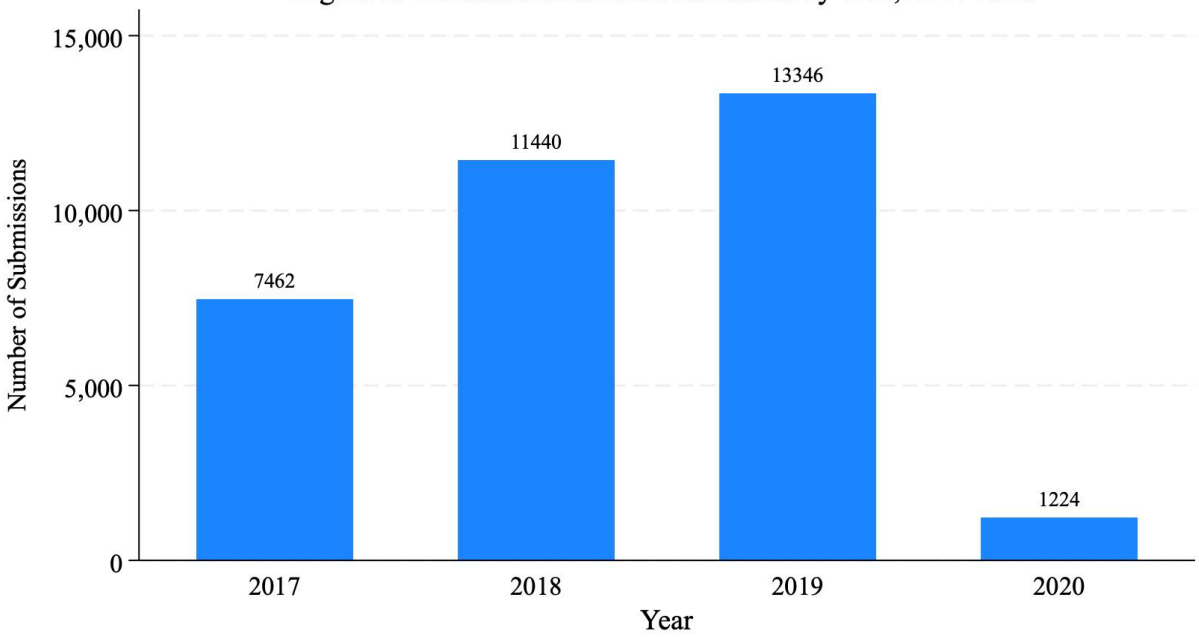
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[118] While we did find some warrant submissions without outcomes, these occurred at the very end of our dataset, which is almost certainly the result of the warrant affidavit having been submitted but not reviewed before our dataset ended.

[119] We also found warrants with multiple reviews or outcomes, but there were only a dozen out of nearly 33,500 total warrants. This suggests a data error but one that would have no substantive impact on our analyses.

[120] This average does not reflect the fact that some judges, due to differences in either district-level submission rates or time as a reviewing judge, received far more (or fewer) in total. We discuss these disparities in Section III.C, *infra*.

Figure 2: Warrant Submissions in Dataset by Year, 2017-2020



Notes: The sample includes all warrant submissions 2017 and 2020 had only 278 and 28 days of data, respectively.

We suspect there are at least three explanations for this trend. First, with the arrival of digital devices, social media and other online platforms, officers have had more evidence that can be sought through warrants. Second, with the rise of only a few third parties such as mobile phone providers such as AT&T, Sprint, T-Mobile, Verizon; internet service providers like AT&T, Comcast, Cox, and Frontier; email and cloud services providers like Amazon, Apple, Google, Microsoft, and Yahoo; and social media and messaging platforms like Facebook, and WhatsApp; officers can easily go to only a few providers requesting information without needing to confront the individual(s) being searched, which courts and legislatures have increasingly required warrants for.[121] Finally, electronic warrant systems like the one deployed in Utah have reduced the time and cost of applying for warrants.

[121] *See*, *e.g.*, *Carpenter v United States*, 138 S.Ct. 2206 (2018) (which found that the Fourth Amendment's warrant requirement extends to obtaining cell site location information records from a person's cell phone service provider); Utah's HB 57, "Electronic and Data Privacy Act" (2019) (which extended the statutory requirement to cover evidentiary requests to third-party electronic service providers).

III. HOW LONG DO JUDGES TAKE TO REVIEW WARRANTS?

In this Part, we commence our formal empirical investigation by describing and analyzing the amount of time that judges and magistrates spend in the warrant review process. Our analysis yields four key empirical findings: First, looking at all warrants submitted during the period in which the full set of timestamps were recorded (March 28, 2017 – Jan 29, 2020), the median time for review is just over 3 minutes. In other words, half of all warrant applications are opened, read, evaluated, and then (if approved) compiled and sent back to officers as a judicial warrant in 183 seconds or less. Second, more than 10 percent (3,684 total warrants) were reviewed in a minute or less. Third, there is no meaningful correlation between the length of a warrant (in words) and the amount of time a judge spends reviewing that warrant. Fourth, even when we account for the individual circumstances and substantive characteristics of a warrant, such as legal type, existence of non-substantive text, submission history, and repetitive language, the above results remain largely unchanged.

Section III.A presents descriptive findings on warrant review time for the entire sample of warrants and analyzes the general relationship between review time and warrant length. Section B conducts a series of "robustness checks," with Section B.1 examining differences in warrant content and review time across crime categories; B.2 calculating review time after removing potentially "unnecessary" text and/or "boilerplate language" from the affidavits; B.3 excluding warrants that are nearly identical to previously submitted affidavits; and B.4 excluding affidavits that have previously been denied or retracted. Section C explores disparities in review time across districts and individual judges, and Section D identifies the warrant- and judge-level characteristics that are predictive of review time.

In presenting these results and discussing their implications, we continue to emphasize that we do not have a perfect baseline measure for how long the warrant review process *should* take in the abstract.[122] However, even accounting for reasonable economies of scale and the content of the submissions, our general findings that the majority of warrant affidavits are fully reviewed in three minutes and a substantial number are reviewed in less than a minute provide strong evidence that the review process is often much more brief than the generally accepted understanding of the constitutional warrant requirement would anticipate.

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[122] *See* our discussion of this limitation in Section II.D.4, *supra*.

A. Review Time and Affidavit Length

We start by examining the time that judges spend on determining whether a warrant should be approved or denied. Table 1 (below) shows descriptive statistics for the time that judges spend on the full set of warrant applications, presenting the 10th percentile, first quartile (25th percentile), third quartile (75th percentile), and two calculations of the mean. We have separated out the affidavits by decision/outcome type (approval, denial, or retraction) but also include descriptive statistics aggregating all outcomes.

The substantial difference between mean and median review times reflects underlying distributions that are severely right-skewed, due in large part to (1) a low-end limit of review time (approaching zero) with no such limit on the top end and (2) the existence of outlier review time data. To account for some of this, we removed 17 extreme outliers where the review time was more than 7,200 minutes (5 days) and used the resulting dataset for the remainder of our analysis in this paper. The adjusted means in the rightmost column of Table 1 (below) demonstrate the disproportionate impact these extreme outliers played in the unadjusted average review time (Column 9), reducing it by over 90 percent in the case of denials. For these reasons, we argue that median review time is a more appropriate measure. Additionally, by focusing on percentile divisions, we can have a clearer sense of how many warrants are approved in a given timeframe.

Table 1: Warrant Decision Time (Minutes)

Decision Type	Obs.	Min	Max	10th %tile	First Quart.	Median	Third Quart.	Mean	Adj. Mean*
Approval	29,817	0:01	84,698:39	0:57	1:37	2:50	5:13	14:22	6:46
Denial	2,195	0:01	181,774:48	2:33	4:15	6:54	11:58	108:49	20:52
Retraction	1,476	0:01	8,208:02	0:30	1:32	6:25	18:40	63:33	38:04
All	33,488	0:01	181,774:48	0:57	1:41	3:03	5:54	22:44	9:03

Notes: Minutes are reported as Minutes:Seconds.
*Adjusted Mean reflects the average warrant decision time in minutes once outliers are removed, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours.

The median approval time is under three minutes (2 minutes and 50 seconds, 2:50). In that time, the judge ostensibly reads the affidavit, determines the veracity of the facts, evaluates whether probable cause has been met for a stated crime, and issues the re-written warrant itself. Approvals comprise the lion's share of the decisions—as we demonstrate later in Part IV, 93.5 percent of warrant

applications are approved on the first submission and over 98 percent of warrants are eventually approved upon resubmission—so it is not surprising that the median time irrespective of the decision outcome (3:03) is close in proximity to the median approval time.

We also see that a substantial portion of warrants are approved even more quickly. Twenty-five percent of all warrant reviews were concluded in 1:41 or less, and the same proportion of approvals were made in 1:37 or less. Furthermore, roughly one out of every ten approved warrants (3,370 in total) were reviewed in less than 57 seconds, an astounding finding given that the approval process involves a number of steps beyond simply reading the warrant affidavit (*e.g.*, populating the resulting warrant and even clicking the various buttons required to make the final decision).[123] While some of these are explained by resubmissions and group warrants, many appear to simply be very rapid reviews. We explore these "minute warrants" more fully in Part V.

Potentially surprising is the observation that the judges spend more than twice as long on denials (a median of 7:11) than approvals. While a discussion of the directional nature of judicial review in the context of constitutional rights is beyond the scope of this Article, we find the disparity between time to approve and time to deny to be expected from a pragmatic point of view but in sharp contrast to the traditional notion of how a rights review is theoretically conducted.[124] Our data is consistent with the understanding that judges go into the warrant review process *expecting* to approve the warrant, quickly completing the process if everything looks normal.

To better understand the implications that these findings have on the question of how closely judges scrutinize warrants during the review process, Figure 3 (below) maps the review time for approved warrants against the word count for those warrant affidavits that were scraped from the PDF images.[125] As a reference point, a double-spaced

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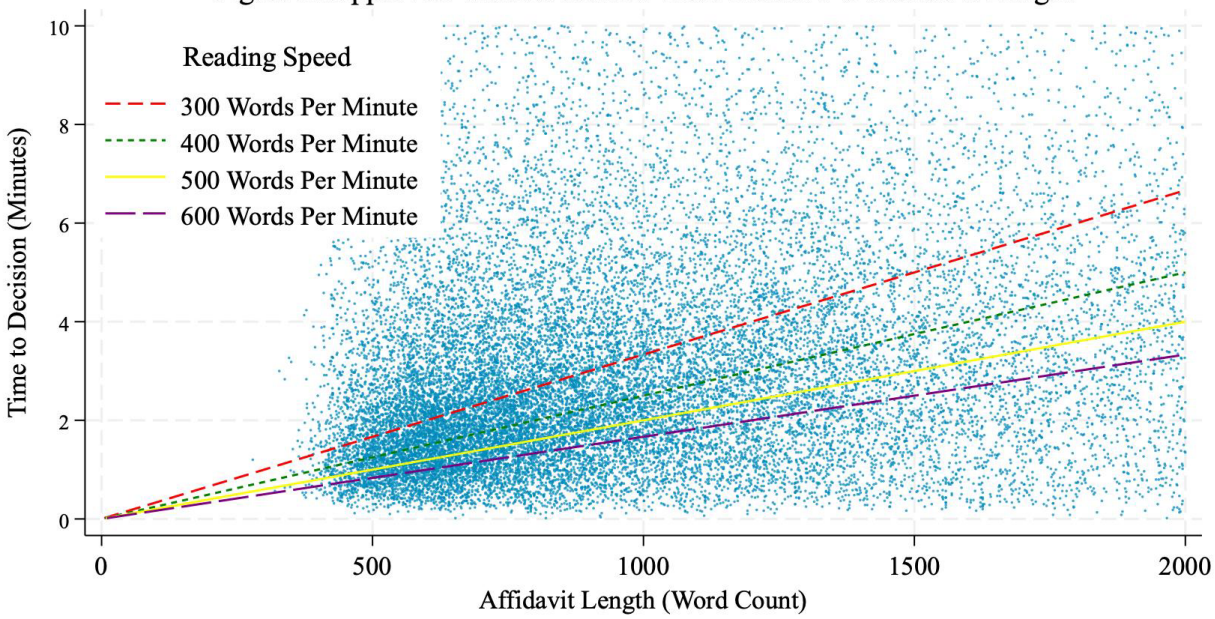
[123] None of these non-evaluative steps need take much time at all (although drafting the warrant might be an involved process if the judge wishes to change the language that the officer used), but in the context of a minute, even 10 seconds is substantial.

[124] If the purpose of a rights review is to ensure that the necessary elements for a government intrusion exist—say elements A, B, and C—then one might reasonably expect the process of denial to take less time, as the absence of any one of those elements immediately constitutes a failure to meet the standard. An approval, on the other hand, would require a judge to read through the entire warrant affidavit until all three elements are demonstrated.

[125] As a reminder, we do not have the PDF images for denied and retracted warrants, so any analysis incorporating word counts will only be on approved

page in Microsoft Word with one-inch margins and 12-point font is around 250 words, and a recent meta-analysis found that the average (silent) reading speed of the English language for adults reading non-fiction is 238 words per minute (WPM).[126] As we posited in our discussion of the cognitive difficulties of reading documents like warrants, however, law students tend to read considerably faster (465 WPM in one study) and judges may read at even higher speeds.[127] If judges employ "skimming" techniques—where the intention is to understand general themes—they could reach speeds of up to 650 WPM, although likely with a heavy cost to comprehension, especially regarding technical information and small details.[128]

Figure 3: Approved Warrant Review Time Relative to Affidavit Length



Notes The sample only includes approved warrant affidavits less than or equal to 2,000 words and durations of 10 minutes or less in order to highlight patterns in the bulk of warrant reviews.

To visualize the range of possible speeds, Figure 3 (above) plots warrant approval time relative to length (word count). It also includes four colored lines representing 300, 400, 500, and 600 WPM. At any given speed, all of the points that fall below the respective curve

warrants.

[126] Marc Brysbaert, *How Many Words Do We Read Per Minute? A Review and Meta-Analysis of Reading Rate*, 109 J. MEMORY AND LANG. (Table 1) (2017) (combining 190 studies of 18,73 participants).

[127] Cameron, *supra*, note 83, at 39.

[128] Rayner et al., 2012, *supra*, note 84.

represent an affidavit that a judge working at that reading speed would not have read in its entirety. The share of such reviews is significant, even under the most conservative reading speed assumptions of 500 to 600 words per minute. We speak to possible explanations for this (*i.e.*, judges intentionally skipping over entire, less essential portions of the affidavit) in our robustness checks below.

Finally, one would expect that word count would correlate with the time it would take to make the decision to approve or deny an individual warrant application. Yet, the distribution of points in Figure 3 do not reflect any strong central tendency towards a given time-to-length ratio. When confirming this through formal empirical tests, we also find that the correlation is incredibly weak. The correlation coefficient (r) between word count and time spent for approved warrants for the full dataset is 0.069. As a baseline, a weak positive correlation is generally considered to be at least 0.3, while a stronger positive correlation would start around 0.7.[129] A correlation coefficient of 0.069 is effectively zero, meaning that there is no meaningful relationship between the length of a warrant affidavit and the time the judge spends reviewing it (at least on average). As we discuss in Section III.D, we do find that word count is statistically significant in regressions that control for other factors, but the magnitude of the resulting coefficient is not substantively meaningful.

B. Alternative Datasets and Robustness Checks

As we presented preliminary versions of the key results in the previous section to judges, attorneys, and academics (both in and outside of Utah), many—correctly, in our estimation—pointed out that a generalized analysis of warrant review that includes every type of warrant submitted under all circumstances will necessarily miss the nuance and context that actual warrant review entails. Not every warrant requires the same level of scrutiny, so providing only generalized statistics is potentially misleading.

For example, DUI warrants (i.e. those warrants seeking permission to run blood sobriety tests) are among the most common of warrant types included in our dataset and tend to be quite similar to one another. Indeed, based on our qualitative review of affidavits in our dataset, most DUI warrants are remarkably similar, with some only varying on the name of the officer, the location of the traffic stop, the

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[129] *See, e.g.,* DAVID FRIEDMAN, ET AL. STATISTICS 126 (4th Ed. 2007) (stating that "[w]eak associations are common in social science studies, 0.3 to 0.7 being the usual range for *r* in many fields.").

name of the subject, and the date. It stands to reason that the time required to review these warrants might be much lower than, say, a warrant to search a residential home. Consequently, excluding DUI warrants from the analysis might provide a clearer picture of the "true" review process. Similarly, many judges have posited that the time required to review warrants that have already been submitted but initially denied is significantly less than the initial look because a secondary (or in some cases, tertiary) review need only to identify the previously inadequate content and ensure that it has been resolved.

In this subpart, we address these concerns by conducting a series of what we refer to as "robustness checks," where we analyze subgroups of approved warrants in our dataset based on warrant affidavit type, complexity, and similarity.[130] We also attempt to identify and remove non-essential language from word counts totals to see if that helps explain our previous results. These robustness checks do, indeed, show that the judicial attention that some warrants demand is lower or higher than with others. By excluding those types from our generalized analysis, the median review time changes. Nonetheless, as we demonstrate below, these resulting differences are (with a few exceptions) not particularly significant, further bolstering our overall conclusions that warrant review is fast and that many warrants of all types are not being read in full.

Robustness Check 1: Differences Across Crime Categories

One might reasonably expect heterogeneity in time spent across different categories of warrant crime types, which reflect both varying complexity in their facts needed to make a probable cause determination and the stakes involved in the broader investigation. For example, warrants dealing with the acquisition of illicit digital images or evidence relating to violent crime likely require greater detail in the affidavit and may garner more critical evaluation from the judge. On the less complex end of the spectrum, a warrant required for a blood draw of an individual suspected of driving under the influence (DUI)

[130] Again, we remind the reader that any analysis that requires knowing the content of the affidavits must necessarily be limited to approved warrants, as this information is derived from the text of the PDF data. Also note that while our PDF analysis was quite accurate when compared against hand-coded training sets (*see* our description of the process in Appendix C.1), it was not able to identify crime types in all affidavits. As a result, the sample size of included affidavits in this subsection is lower than the total number of affidavits.

almost certainly involves more formulaic language and a more straight-forward review process.[131]

Table 2: Approved Warrant Review Time (Minutes)
Without and Only Including DUI Warrants

DUI Included?	Obs.	Min.	Max.	10th %tile	First Quart.	Median	Third Quart.	Mean
Only DUI	6,256	0:01	133:20	0:47	1:13	1:58	3:09	2:47
DUI Excluded	23,553	0:03	2,581:37	1:02	1:45	3:11	5:54	7:50
All Approvals	29,809	0:01	84,698:39	0:57	1:37	2:50	5:13	6:46

Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Minutes are reported as Minutes:Seconds.

Given how common this latter view regarding DUI warrants was in our conversations with judges, we begin this first set of robustness checks by dropping all approved warrant affidavits with PDF texts coded to include DUI offenses. Row 1 in Table 2 (below) presents data from a subgroup that only includes DUI affidavits and shows that such warrants are, indeed, approved at a much faster clip. The median duration for warrant approval of DUI warrants (1:58) is nearly a minute lower than the approval time for the full dataset (2:50). That said, the data does not provide strong support for the position that the fast review times we identified in the full dataset are driven by the inclusion of DUI warrants. Looking at a subset of full data that excludes such warrants (row 2 in Table 2) shows that the median review time only increases by 21 seconds relative to the full dataset. While this difference is not negligible, it is also not particularly notable.

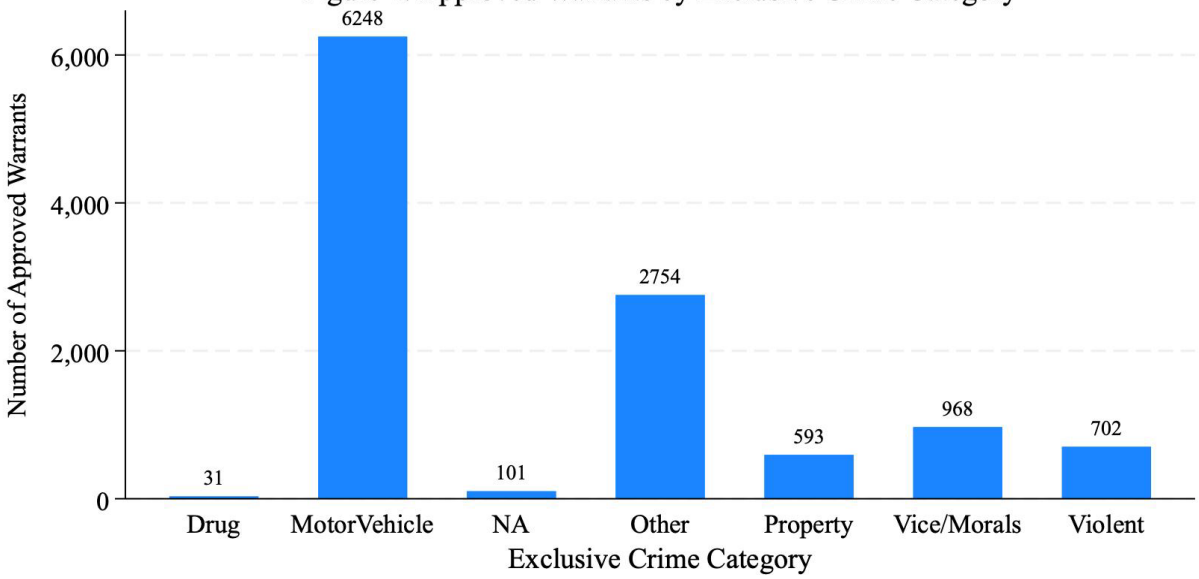
Moving beyond DUI warrants, Figure 4 (below) shows the variation in the number of warrant submissions by the five most common exclusive crime categories (*i.e.*, those warrants that had only one crime category identified by our machine learning algorithm).[132] The number of warrants within each exclusive crime category provides some important context for understanding the subsequent analysis. Note, for example, that although there are more than 1,200 warrants in

[131] We have included an example of a formulaic DUI warrant as well as the DUI "form" warrant that officers use in Appendix A (*see* Figures A.2 and A.3).

[132] We chose to present results for warrants that only have one crime category to make the comparisons across types cleaner. We include tables that mirror those in this Section but present speed and word count for a categorization that "double counts" warrant by including all crime categories that apply to a warrant in Appendix B (*see* Tables B.1(a) and B.1(b)).

our dataset that include mention of drug-related crimes (*see* Appendix B: Table B.1(a)), only 31 were "pure" drug warrants. Conversely, nearly all of the 6,500 warrants that involved motor vehicle crimes (*see* Appendix B: Table B.1(a)) are exclusively motor vehicle warrants. Also note that our machine learning algorithm failed to identify crime types for some of the warrants affidavits.[133]

Figure 4: Approved Warrants by Exclusive Crime Category



Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Warrants were categorized into exclusive crime categories if the affidavits were coded to only reference a single crime category. 18,420 approved warrants had mixed crime categories.

Turning to the review time data, if the warrant crime type was predictive of review time, one would see differences in the time judges take across categories of offenses. Crime categories with greater factual and evidentiary complexity would likely take much more time than types that are less labor-intensive in evaluating probable cause. Table 3(a) (below) shows that there is little substantive difference in the time judges take to approve warrants based on the crime category of a given submission. While, as we highlighted above, the median time for motor vehicle warrant review is distinctively shorter than it is for other categories (anywhere from 50 seconds to 1.6 minutes less), the difference between drug warrants (which have the second shortest

[133] In some cases (although not many) this appears to be due to the fact that the warrant affidavits themselves did not actually reference the suspected crime or relevant criminal statute.

median duration) and vice/moral crimes (*e.g.*, sex crimes, which have the longest median duration) is a mere 46 seconds.

Table 3(a): Approved Warrant Review Time (Minutes) by Exclusive Crime Category

Exclusive Crime Type Category	Obs.	Min.	Max.	10th %tile	First Quart.	Median	Third Quart.	Mean
Violent	702	0:10	721:31	1:08	1:55	3:17	6:28	9:14
Property	593	0:19	1,058:03	1:16	1:56	3:22	5:46	8:39
Drug	31	0:19	16:02	1:00	1:41	2:08	3:13	3:01
Vice/Morals	968	0:10	1,150:30	1:11	2:13	3:49	7:36	10:40
Motor Vehicle	6,246	0:10	133:20	0:47	1:13	1:58	3:09	2:47
Other Crimes*	2,754	0:07	1,109:13	1:06	1:55	3:25	6:20	7:17
All Approvals	29,809	0:01	84,698:26	0:57	1:37	2:50	5:13	14:22

Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Minutes are reported as Minutes:Seconds.
*Other Crimes were those warrants that were coded to crime types other than the five main categories included above.

The lack of separation in review time across these categories might be partially explained by the fact that the length of affidavits submitted across crime type are also not particularly distinct from each other. This observation runs against our priors and narrative suggested by some judges we spoke with. While motor vehicle warrants (mostly DUI warrants) are substantially shorter than the average warrant (a median of only 662 words), the intra-type differences across the other categories are not particularly large.

Table 3(b): Approved Warrant Affidavit Length (Words) by Exclusive Crime Category

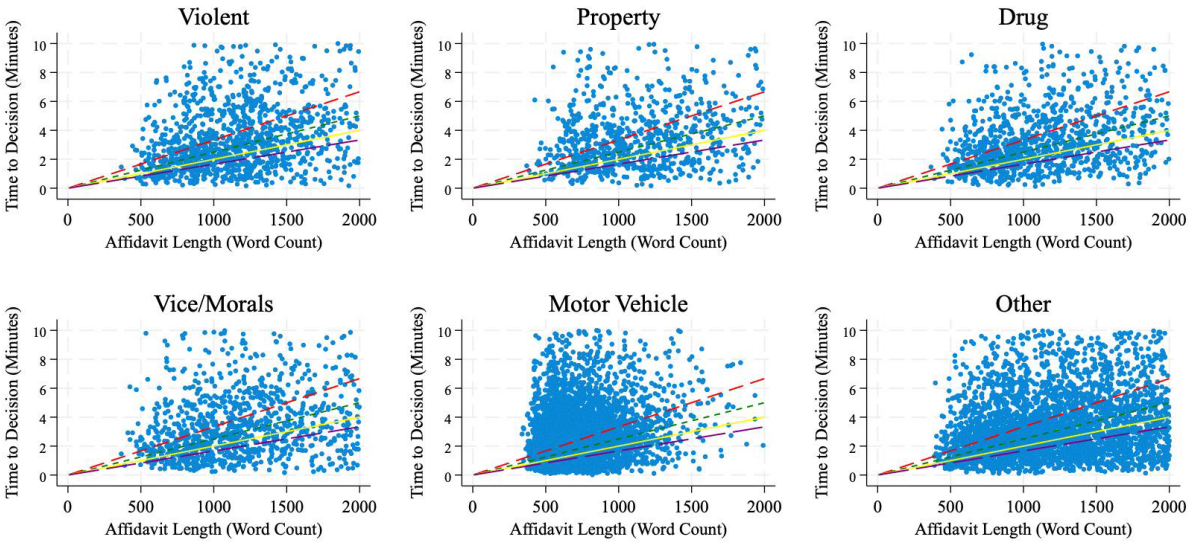
Crime Category	Obs.	Min	Max	First Quart.	Median	Third Quart.	Adj. Mean*
Violent	702	462	8,849	873	1,190	1,550	1,339.16
Property	593	370	4,677	886	1,149	1,502	1,259.81
Drug	31	480	2,503	716	852	1,350	1,063.29
Vice/Morals	968	411	18,000	969	1,416	2,559	2,494.62
Motor Vehicle	6,246	338	3,642	566	659	798	705.03
Other Crimes*	2,754	389	6,402	956	1,403	1,8943	1,514.44
All Approvals	29,809	279	18,511	698	979	1,489	1,264.74

Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours.
*Other Crimes were those warrants that were coded to crime types other than the five main categories included above.

In addition to review time and word count medians, we also examine the visual distributions of warrants that fit into the various crime categories.[134] Much like Figure 3 (*see* Section III.A), Figure 5 (below) maps the review time for approved warrants against the word count for those warrant affidavits, except that it breaks down the presentation by crime type. Recall that the colored lines reflect varying WPM reading speeds and that any point that falls below a given line represents a warrant affidavit that was not read in its entirety at that reading speed. While there are some differences in the spread of the observations across the various crime types—again, with motor vehicle warrants being the most obvious—the overall shape of the distributions (very little central tendency) is similar across crime type and each type has a substantial proportion of warrants that fall below the various WPM curves.

[134] For this portion of the analysis, we code a warrant to a given crime type if the affidavit references that type, even if there was more than one type identified (whereas the previous discussion covered only warrants with a single, exclusive type). For example, if a warrant affidavit was coded by our machine learning algorithm to include a discussion of a drug crime *and* a violent crime, it would be represented in the sub-figured for both crime types. As a result, these figures "double count" warrants when appropriate.

Figure 5: Approved Warrant Review Time Relative to Affidavit Length Across Crime Categories



Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Warrants were categorized into crime categories if the affidavits were coded to reference that crime category, even if the affidavit referenced multiple categories.

Taken together, the word count data and visualizations of the time-to-length distributions within specific warrant crime types do little to change our key observations of the broader dataset.

Robustness Check 2: Removing "Unnecessary" Language

Our second robustness check accounts for the common refrain—raised by both judges and academics who have reviewed our initial empirical findings—that not all the language in a warrant affidavit is necessary to read or review to meet the probable cause standard. While this line of reasoning certainly has its limits (practical and constitutional), the idea that some of the language in a warrant does not directly address the questions of whether a crime has been committed and whether evidence of that crime will be found is likely true. If judges can identify and then skip the "unnecessary" portions of the warrant affidavit—or alternatively only target only the most essential—they would almost certainly work through the warrant review process more quickly.

Each warrant affidavit in our dataset generally contains five constituent parts: (a) an introduction with the jurisdiction, law enforcement officer information, and alleged crime(s), (b) a

description of the property to be seized and its location, (c) the "hero statement" (the officer's history and qualifications), (d) the facts and justification for probable cause, and (e) the prayer for relief.[135] The likelihood of repetition in some of these portions across many—if not most—affidavits likely have a cognitive effect on the reviewing judge. Additionally, although all sections are important parts of the affidavit, they are arguably less substantively critical and much less complex than the facts and the prayer for relief.

Consequently, this robustness check removes the parts of an affidavit that are most likely to be skipped or skimmed over by judges, as defined in two ways. First, we use warrant affidavits forms used by submitting officers to identify the language that is included in every warrant affidavit, independent of the specific facts or circumstances underlying the request (what we call boilerplate language). Second, we attempt to isolate just the facts from the warrant, thereby removing all arguably unnecessary language. We do this utilizing a large language model trained on a hand coded sample of affidavits. We then calculate word counts only for the remaining content.

Similar to what the empirical literatures in contracts and securities regulation have shown, the existence of "boilerplate" language—true recitations of text—in the warrant affidavits may result in faster review times but lower reading comprehension, whether or not the judges intentionally speed up when encountering such texts.[136] In the context of a warrant affidavit, boilerplate language could be defined in several ways, but we have elected to designate it as language that is included in (nearly) every submission and carries no factually- or legally-substantive weight. Instead of calculating the amount of boilerplate language in each individual warrant, we use a universal word count based on the "form" warrant for general warrant submissions.[137] As a result, we simply reduce the word count in each warrant in our sample by 188 words.

Our word count data that includes only the factual information from the affidavits was more complicated to create. To detect this

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[135] We have included an example of a warrant that demonstrates this basic structure in Appendix A (*see* Figure A.1).

[136] *See*, *e.g.*, Jeremy McClane, *Boilerplate and the Impact of Disclosures in Securities Dealmaking*, 72 VANDERBILT L. REV. 191, 237 (linguistically analyzing nearly 3,000 IPO disclosure documents and finding that "boilerplate bears a strong relationship to the readability of disclosure"); Douglas G. Baird, *The Boilerplate Puzzle*, 104 MICH. L. REV. 933, 949–50 (2006) (outlining the application of contract law to boilerplate provisions in commercial transaction documents).

[137] We have included this form warrant in Appendix A (*see* Figure A.2).

information, we used automatic boundary and sentence classification techniques with the help of a BERT, a large language model and artificial neural network, which has been shown to be able to perform this kind of task with a high degree of accuracy.

In validating this method, we found that we were able to achieve a high degree of accuracy in the task (> 99% on a training set of 1000 random warrants and > 98% on a blind test set of 1000 random warrants). We also validated these measures using a hand-coded, random sample of 228 affidavits from our dataset. As is often the case with algorithmic approaches to cleaning complex texts, our results were not perfect. We did not calculate the fact-specific word counts for any of the roughly 1,200 affidavits submitted in 2020, and we were not able to calculate the fact-specific word counts for 1,210 of the remaining affidavits. For those roughly 25,000 affidavits that did produce data, our validation results indicated that the algorithm was fairly accurate but, to the extent it did make mistakes, tended to undercount the proportion of the affidavit that contained important factual information or context (identifying non-factual language as factual was much less common). To the extent that this biases our results, it would do so by understating the amount of content a judge would need to review and, consequently, the number of warrants that were not read in full.

Table 4: Alternative Approved Warrant Affidavit Length (Words)

Definition of Warrant Length	Obs.	Min	Max	First Quart.	Median	Third Quart.	Mean
Full Affidavit Word Count	25,601	279	18,511	698	979	1,489	1,264.74
No Boilerplate (Full - 188 words)	25,601	91	18,323	510	791	1,301	1,076.74
Facts Only (Machine Learning)	24,460	16	16,890	292	465	813	699.95

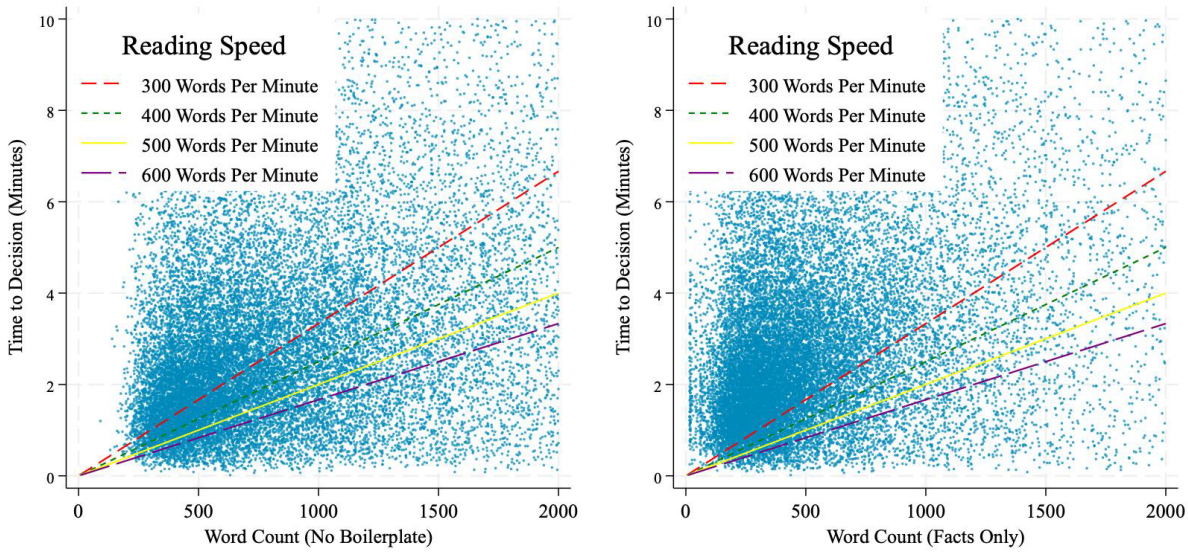
Notes: The sample only includes approved warrants (those with PDF images) from 2017-2019 and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. No Boilerplate word counts were calculated by subtracting the boilerplate word count (188) from the full affidavit. Word Count Facts Only (Machine Learning) word counts were calculated using a machine learning algorithm that isolated the factual allegations and context. The algorithm failed to identify any factual language in 1,210 warrant affidavits.

Table 4 (above) presents descriptive data on the length of the affidavit submissions under three word-count categories: the full count (which we presented in Table 3(b), *supra*); an affidavit word count without "boilerplate" language; and a word count that only includes

the facts identified by our algorithm. Not surprisingly, the counts for the alternative length that excluded the boilerplate language is simply 188 words fewer than the full count. The facts-only counts are also smaller than the full count on every measure, but the differences are more notable. According to our measure, the proportion of fact-specific language in an affidavit remains roughly the same as the overall length of the affidavit increases at about fifty percent. This is consistent with our reading of affidavits.

In Figure 6 (below), we replicate Figure 3 (*see* Section III.A), except with word counts that are adjusted to reflect our two alternative measures. As expected, we see the distribution of word counts move in density towards zero words (to the left), with many of the warrants nearly reaching zero (the shortest had 16 words). Keeping our four WPM lines consistent, there are fewer warrants that are clearly not being read in full. However, there are still many that fall below these curves. In the case of the facts-only counts, each of these points represent an affidavit where the judge likely did not even read all of the facts (or skimmed over them).

Figure 6: Approved Warrant Review Time Relative to Alternative Word Counts



Notes: The sample only includes approved warrants (those with PDF images) from 2017-2019 and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. No Boilerplate word counts were calculated by subtracting the boilerplate word count (188) from the full affidavit. Word Count Facts Only (Machine Learning) word counts were calculated using a machine learning algorithm that isolated the factual allegations and context. The algorithm failed to identify any factual language in 1,210 warrant affidavits.

Incredibly, the near-zero correlation between full affidavit length and review time that we discussed in Section III.A remains largely unchanged when looking at our alternative measures. The

correlation is, of course, the same with the no-boilerplate measure that simply subtracts 188 words (correlation coefficients are a relative measure, so changing all data by the same amount will not alter the resulting statistic) as it is with the full word counts (0.069). But the fact that the correlation coefficient for the relationship between fact-only word counts and review time is even lower, at 0.066, is striking. This suggests that even when we isolate the most fact-heavy portions of the warrants—those sections that, under any conception of constitutional review, require the most scrutiny—warrant review time is not affected by affidavit length.

Robustness Check 3: Removing Similar Affidavits

Our third robustness check removes similar affidavits from our analysis to account for the possibility that judges are able and willing to more quickly review warrants that are very similar to ones they have previously reviewed. From our discussions with judges, this is most likely to occur under one of two circumstances. First, it is relatively common when crimes are committed by groups of individuals for officers to submit multiple search warrants for different defendants that are nonetheless practically identical for the purposes of judicial review. Indeed, some affidavits in our sample differ only in the name of the suspect listed or the location to be searched (i.e. they were submitted on the same date, to the same judge, by the same officer, and include the exact same factual justifications and prayers for relief). In such cases, one can argue that a judge is fully justified in spending considerably less time on the second affidavit than on the first while still credibly meeting the requirements for a constitutionally sufficient judicial review.

Second, there are entire types of search warrants that are likely to arise from such similar facts that the substantive content will be highly similar simply as a consequence of inherently similar conditions.[138] In those cases, judges may become so familiar with an affidavit format that full judicial review will naturally not take as long as it would for a more novel circumstance. While one of the robustness checks we employed earlier explicitly excludes entire categories of search warrants that tend to be nearly identical (DUI investigations), this principle of inherent similarity might extend beyond simple crime categories. As a result, we feel it is prudent to identify those warrant

[138] These "MadLibs" warrants appear to correlate with "form" warrants that officers can use as a starting point for certain types of affidavit submissions. *See* our discussion in note 114, *supra*.

affidavits that are sufficiently similar to other affidavits and remove them from the dataset for this robustness check.

To do this with such a large dataset, we employed a natural language processing methodology called Jaccard similarity to identify any affidavits that share a substantial percentage of text with any other affidavit in the dataset. For all of the nearly 30,000 approved warrant affidavits, we computed Jaccard coefficients for each possible affidavit comparison. This resulted in a matrix of approximately 900 million measures, where a 0.0 indicates no similarity at all (as a practical matter, this never occurs with complex texts like affidavits) and a 1.0 indicates an identical document (this also never occurs). We then removed all affidavits that had a Jaccard coefficient of 0.9, 0.95, and 0.99 or above with *any* other affidavit from the dataset and re-ran our reading time calculations.[139]

Tables 5(a) (below) show the descriptive statistics on review time for three samples where we drop observations based on three Jaccard Similarity thresholds. Consistent with our expectation, many (more than 50 percent) of affidavits in our sample have at least one substantially similar counterpart. Curiously, however, we see a decrease in the median time spent on warrant approval when similar warrants are dropped. The difference is substantively small—only about 0.2 minutes or 12 seconds—but at a minimum, this demonstrates that after dropping observations with high affidavit similarity, the median time does not increase. Because we found the result surprising, we examined word counts (see Table 5(b), below) and found that affidavits with higher word counts are more likely to have high similarity with other affidavits, which helps explain the small drop in review time but runs against our priors that the shorter, ostensibly more form-driven, affidavits would be more likely to have high linguistic similarity.

[139] For a more detailed explanation of Jaccard similarity, *see* Appendix C.2: Jaccard Similarity.

Table 5(a): Approved Warrant Review Time (Minutes)
Accounting for Affidavit Similarity

Similarity Measure	Obs.	Min	Max	10th %tile	First Quart.	Median	Third Quart.	Mean
Jaccard Similarity ≤ 0.90	15,976	0:20	2,581:36	0:55	1:33	2:38	4:37	6:01
Jaccard Similarity ≤ 0.95	17,055	0:10	2,581:36	0:55	1:32	2:39	4:41	6:02
Jaccard Similarity ≤ 0.99	17,986	0:10	2,581:36	0:53	1:32	2:39	4:44	6:02
All Approvals	29,809	0:10	2,581:36	0:57	1:37	2:50	5:13	6:47

Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Minutes are reported as Minutes:Seconds.

Table 5(b): Approved Warrant Affidavit Length (Words)
Accounting for Affidavit Similarity

Similarity Measure	Obs.	Min	Max	First Quart.	Median	Third Quart.	Mean
Jaccard Similarity ≤ 0.90	15,976	279	18,000	679	930	1,381	1,162.19
Jaccard Similarity ≤ 0.95	17,055	279	18,511	690	956	1,436	1,201.39
Jaccard Similarity ≤ 0.99	17,986	279	18,511	700	983	1,494	1,243.09
All Approvals	29,809	279	18,511	698	979	1,489	1,264.73

Notes: The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours.

Robustness Check 4: Removing Resubmissions

Finally, it may be that the overall review times we observe are driven down by short re-reviews of affidavits that had already been submitted, reviewed, and found lacking. In these scenarios—especially where resubmissions happen quickly after an initial denial—judges may only need to review one or two portions of the affidavit where the deficiency was originally noted, which may only take a short amount of time.[140] While most (if not all) of these resubmissions were likely captured in our Jaccard similarity analysis above (presumably resubmissions are linguistically similar to previous submissions), we can target this robustness check on just those reviews of first-submission or first-viewing because of the detailed time-stamp metadata in our dataset.

[140] We note that this approach, while certainly economic, comes with the risk that the resubmitted affidavit varies in ways beyond the previously deficient portions, meaning that judges would potentially miss new or contradictory information that would only be apparent after a full re-review. Consequently, a constitutionally robust warrant review may technically preclude intentionally accelerated review after resubmission. Nonetheless, we expect that such scenarios are rare.

Table 6: Warrant Review Time (Minutes)
Only Including First Submissions

Decision Type	Obs.	Min	Max	10th %tile	First Quart.	Median	Third Quart.	Mean
Approval	27,637	0:03	1,930:29	0:59	1:40	2:53	5:16	6:37
Denial	1,902	0:08	2,655:03	2:41	4:20	7:02	12:02	20:40
Retraction	1,171	0:01	3,502:42	0:38	1:47	7:15	19:51	37:13
All	30,710	0:01	3,502:42	1:00	1:44	3:05	5:56	8:40
All Reviews (Mirrors Table 1 w/o outliers)								
Decision Type	Obs.	Min	Max	10th %tile	First Quart.	Median	Third Quart.	Mean
Approval	29,809	0:01	1,930:29	0:57	1:37	2:50	5:13	6:47
Denial	2,193	0:01	2,655:03	2:33	4:15	6:53	11:55	20:52
Retraction	1,446	0:01	3,502:42	0:29	1:31	6:28	18:40	38:01
All	33,448	0:01	3,502:42	0:57	1:41	3:03	5:54	9:03

Notes: The sample removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Minutes are reported as Minutes:Seconds.

Table 6 (above) presents the review times for those first-submission warrants and includes the overall review times (data from Table 1) for comparison. As we see (and discuss further in Part IV), initial approval rates are so high that a subset of data that excludes resubmissions is only slightly smaller than the full dataset. Nonetheless, we see no consistent differences in review time across these two analyses, with the median time for all reviews only increasing by 2 seconds, and the median time for approval increasing by 3 seconds. We also see that the portion of warrants that are approved in a minute or less (see the "10th %tile" column for an approximation) also do not differ significantly, demonstrating that the rapid review times we see in the data are not explained by re-reviews of substantially similar affidavits. The time for denials and retractions do vary more significantly but not so much as to warrant any particular conclusions.

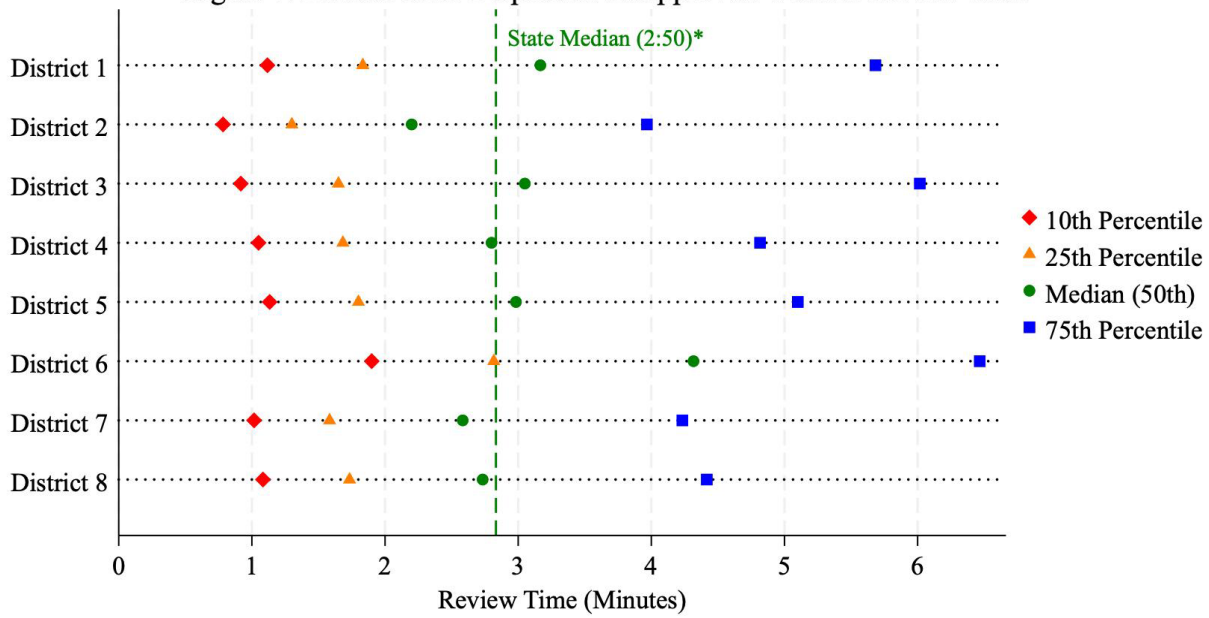
C. District- and Judge-Level Review Time Disparities

One overarching question that remains even in the face of our results on review time is whether this is all the result of a system and set of decision makers that are simply highly efficient. Indeed, one would naturally expect the judges to become more able to identify affidavit quality in shorter amounts of time as they become more tenured and experienced. Additionally, as we discussed in Section I.D.1, officers are likely incentivized to submit affidavits that can be

reviewed quickly. While identifying a true baseline for time spent remains a limitation, we can look to see if there are significant disparities among judges as a soft proxy for whether a given median or average review time represents some sort of ideal point. Over time, the warrant review process, while not random, should evenly distribute affidavits of equal expected quality, type, and complexity, thereby making intra-judge median and mean review times fairly consistent.

Figure 7 (below) shows the variation in approval time by judicial district, understanding that there are possibly systematic differences in affidavit characteristics across jurisdictions.[141] The results, however, show a good deal of consistency at each of the four percentiles we reported above (10th, 25th, median, and 75th). Indeed, all but two districts had a median approval time of around 2:30. While we do not have any explanation for District 2's slightly lower review times (a median of under 2:00), the results in District 6 are not wholly surprising. Given District 6 has very few judges and magistrates (6) in our dataset, judge-level disparities can more easily impact district-level trends.

Figure 7: District-level Disparities in Approved Warrant Review Time



Notes: The sample only includes approvals and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. *State Median reflects the median for the entire sample.

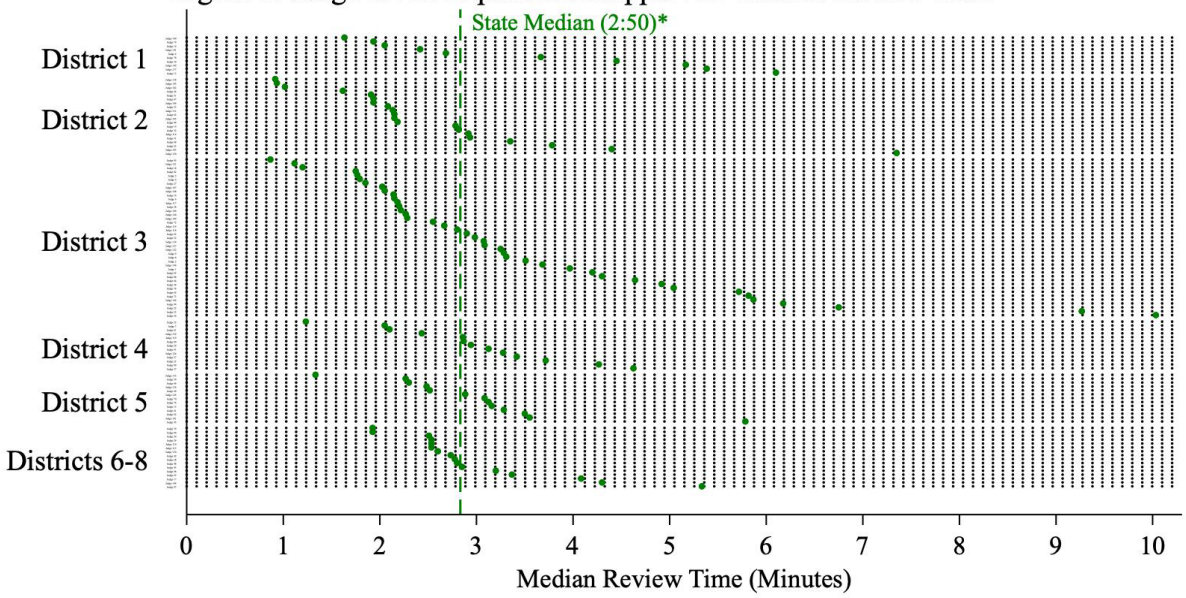
[141] We include a variation of Figure 7 that includes all decisions (approvals, denials, and withdrawals) in Appendix B (*see* Figure B.1).

Looking at judge-level disparities, Figure 8 (below) highlights the extent to which the reviewing judge makes a difference in terms of approval speed. In efforts to keep the data as anonymous as possible, we assign judge ID numbers that do not correlate with any particular attribute or characteristic. Additionally, because there are so few judges in Districts 6, 7, and 8, which might allow some judge-level attributions, we combine all of those judges into one district "chunk" in Figure 8 (and Figure 12 in Section IV.B). Finally, we exclude judges who reviewed fewer than 30 warrant affidavits in our dataset, as they are more likely to have disproportionately high or low review times simply due to random factors.

We note that inter-judge disparities are common in the criminal justice sphere, even for relatively formulaic and cursory decisions like warrant review.[142] They are also not inherently indicative of a problem with the system—indeed, the existence of disparities across judges is another demonstration that the warrant review process is not a pure "rubber stamp" (at least not for all judges). At the same time, the scale of these disparities clearly show that individual judges are approaching the same process (and on average the same submissions) in very different ways. While the majority of judges have a median review time of between 2 and 4 minutes, there are plenty of observations that fall well below and above that central tendency. In the most extreme cases, judges within the same judicial district are taking nine or ten times as long to review their warrant submissions as the swiftest of their colleagues (see District 3). And even when ignoring the clear outliers, almost all the districts have a range of review times that span 4 minutes—a massive gap considering how little time is spent on average.

[142] *See*, *e.g.*, Miguel F. P. de Figueiredo & Dane Thorley, *Pretrial Disparity and the Consequences of Money Bail*, 81 MARYLAND L. REV. 558, 600 (conducting an empirical study on pre-trial bail decisions in Pima County, Arizona, and finding that some judges are 250 percent more likely to assign money bail than some of their colleagues).

Figure 8: Judge-level Disparities in Approved Warrant Review Time



Notes: The sample only includes approved warrants and excludes judges who had fewer than 30 approvals. The sample also removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. *State Median reflects the median for the entire sample.

Looking at the judges individually, we see that about half of them have a median review time of 3 minutes or less (not surprising given the overall median of 3:03), 20 of them have a median of 2 minutes or less, and a few of them have median review times of around 1 minute. While the fact that around 10 percent of all warrants were reviewed in less than 60 seconds was disconcerting, finding that there are judges who review half of all their warrants in that span strikes us as objectively problematic. We explore the attributes potentially driving these patterns below.

D. Correlations with Warrant and Judicial Characteristics

Having demonstrated substantial disparities in the amount of time individual judges spend reviewing warrants, we now present a series of regressions that focus on the relationship between the reviewing judge's characteristics, the attributes of the warrant affidavits, and the speed in which the warrant determination is made. Our variable set includes a series of judge-level characteristics, including judicial tenure; demographic information on race and gender; and professional experience such as judicial tenure, legal training, and whether the judge previously worked as a prosecutor or

criminal defense lawyer (or both).[143] We also include some basic information on the warrants, including full affidavit length (words), Jaccard similarity (> 99), and whether the affidavit indicated that it was reviewed by a city or county attorney before submission.

When running these variables against our review-time measures and controlling for time-, warrant-type-, and court/district-fixed effects, we find that the background and experience of the judge does have a strong relationship with review time, specifically a judge's tenure (at the time of review) and previous work as a criminal defense lawyer. Depending on the model we use, we also see correlations between affidavit length and whether the affidavit was reviewed by an attorney.

In analyzing these results, we feel it prudent to encourage methodological caution in how the outcomes are interpreted. Under ideal circumstances, regressions can identify, correctly model, and therefore account for all the factors that go into the relationship between the independent variables (in our case, warrant and judicial characteristics) and the dependent variable (review time for a given warrant). In theory, this would then allow inferences regarding the causal connection between those variables.[144] However, in practice, regression analysis on its own rarely—we would argue never—allows for such causal inferences to be made. The nature of our dataset does not clearly lend itself to any of the quasi-experimental methods that are used to get around these limitations, so any significant relationships we identify could be the result of omitted variable bias or reverse causality.[145] For example, a strong negative correlation between a

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[143] As a reminder, the reviewing judge for non-approved (i.e., denials and retractions) is not available in our raw data and has been inferred using a mix of shift data and the identity of the judge who eventually approved the warrant. *See* Section II.C.3, *infra*, for an explanation of our imputation data and methodology.

[144] *See* DENNIS R. COOK & SANFORD WEISBERG, RESIDUALS AND INFLUENCE IN REGRESSION (NEW YORK: CHAPMAN AND HALL, 1982) (one of the foundational texts in regression theory).

[145] Instrumental variable, difference-in-differences, and regression discontinuity are the most used of these approaches. Our dataset has no apparent randomness (our interviews with Utah court administrators have indicated that judicial assignment is far from random), so instrumental variable design is not possible; the policy implementation that is of most relevance to warrant review in Utah (the advent of the e-warrants system) occurred before our dataset begins, making difference-in-differences difficult; and while we believe there might be an avenue for utilizing shift changes in the reviewing judge as a discontinuity, we have strong empirical indications that the submitting officers engage in a sort of "judge shopping" near the margins of shifts, which would violate one of the underlying assumptions of regression discontinuity.

judge's tenure on the court and the time spent on warrant review may be due to the fact that those judges have the seniority to be able to select shifts that receive simpler, shorter warrant submissions, as opposed to increased experience actually causing a change in how judges approach review.

That being said, our dataset has a robust set of explanatory variables, including the judge-level characteristics listed above, time- and location variables, and (at least for the approved warrants) all of the warrant-level categories and indicators we utilized in the previous subsections. We were also careful to create a predictive model that avoids the common pitfalls of regression analysis such as multicollinearity, over-fitting, and heteroskedasticity. As a result, we believe the results provide valuable context for understanding the relationship between reviewing judge and review time, even if the causal direction and exact scale of those relationships are not reliably identified.

1. Judge-level Descriptive Characteristics: Before we review the results of our regression analysis, we briefly present and discuss the judge-level data that is used to inform those tests. Table 7 (below) presents the basic demographic information for all the judges in our sample. The demographic characteristics of the trial court judiciary in Utah (at least those who review warrant submissions) departs from the general state citizenry in a number of ways.[146] Women are severely underrepresented, making up only 19 percent (or 22 individuals) of our sample. Similarly, non-white judges make up only 5.2 percent (6 individuals). Looking at professional background, we see that just over 50 percent of the judges (59 individuals) had some level of experience in criminal practice, with 41 percent (45) having worked as prosecutors, 16 percent (19) having worked as criminal defense lawyers (either public defenders or private attorneys), and 6 percent (7) having done both before joining the bench. The average tenure for our judges is just under 10 years, with the average judge having reviewed over 280 warrant submissions.

[146] For an outline of Utah demographics, *see* Section II.B, *supra*.

Table 7: Judge-Level Demographic Information

Judge Characteristic	Observations w/ Data	Mean/ Percentage	Std. Dev.	Min	Max
Tenure (Years)*	118	9.76	7.92	0.40	40.53
Warrants Reviewed	118	281.45	368.89	1	543
Gender (Female)	116	18.96%	-	-	-
Race (White)	116	94.82%	-	-	-
Full-time	111	90.99%	-	-	-
Law Degree	114	92.98%	-	-	-
Prev. Prosecutor	111	40.54%	-	-	-
Prev. Defense Lawyer	116	16.38%	-	-	-
Prev. Both Pros./Def.	116	6.03%	-	-	-

Notes: The sample only includes judges and magistrates who reviewed warrants in our dataset.
*Tenure is defined at the individual warrant level as the number of years between the relevant warrant review and date the judge joined the bench.

Table 8: District-Level Judge Demographic Information

District-level Judge Characteristic	Dist. 1*	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Dist. 6	Dist. 7	Dist. 8
Number of Judges	13	20	41	13	14	5	6	6
Warrants Reviewed	2,010	5,231	15,953	5,449	2,292	1,032	671	749
Warrants per Judge	154.62	261.55	389.10	419.15	163.71	206.40	111.83	124.83
Tenure (Years)	10.86	10.64	7.04	9.13	14.02	9.17	11.81	13.00
Gender (Female)	8.33%	10.00%	35.00%	15.38%	7.14%	0.00%	16.67%	16.67%
Race (White)	100.00%	95.00%	90.00%	92.31%	100.00%	100.00%	100.00%	100.00%
Full-time	63.63%	95.00%	100.00%	100.00%	76.92%	100.00%	100.00%	66.67%
Lawyer	90.91%	100.00%	100.00%	100.00%	69.23%	100.00%	100.00%	50.00%
Prev. Prosecutor	20.00%	40.00%	36.84%	69.23%	23.07%	80.00%	50.00%	33.33%
Prev. Defense Lawyer	16.67%	15.00%	20.00%	23.08%	7.14%	0.00%	16.67%	16.67%
Prev. Both Pros./Def.	8.33%	5.00%	7.50%	15.38%	0.00%	0.00%	0.00%	0.00%

Notes: *Four judges in our data reviewed warrants while sitting in multiple districts. For the purposes of these district-level measures, we coded these mixed-district judges to their "dominant" district (all of which were clear from their average review).

To better understand how these judges and their characteristics are distributed across the eight judicial districts in Utah, we also present district-level judge averages in Table 8 (above). Not surprisingly, we see some variation across courts. The more (sub)urban districts (Districts 2, 3, and 4) have a slightly more diverse (gender and race) and professional bench (again, among those who review warrants), as well as higher warrants-per-judge workloads. Rural

districts tend to have fewer but more tenured judges and a slightly slower pace.

2. Regressions Using the Approved Warrants Data: We begin our regression analysis by looking only at the data on approved warrants. As a reminder, the reviewing judges for non-approved (i.e., denials and retractions) affidavits are not available in our dataset and have been inferred using a mix of court calendars and the patterns in approved warrants.[147] Likewise, the warrant-level information on word count, warrant type, and warrant similarity is only available for approved warrants. Consequently, we can be most confident in models applied to the approved data.

Table 9 (below) presents a series of regression models that steadily increases the number of explanatory variables. Column 1 is a simple bivariate regression that explores the relationship between review time (in minutes) and affidavit length (in words). Columns 2-6a then add warrant-level indicators, judge-level indicators, time fixed effects, district fixed effects, and warrant-type fixed effects respectively, with Column 6a including nearly all of the explanatory information that is available in our dataset and representing our preferred model.[148] Some of the models also include fixed effects that account for location, time, warrant type, and submission sequence.[149] The models that include district and time fixed effects have clustered standard errors on the district-year level.

Focusing on the estimates in column 6a, which is our preferred model, we see that the relationship between the length of the affidavit (in words) and the time spent approving it (in minutes) is statistically significant, meaning the relationship is unlikely to have occurred due to random chance. However, as was expected given our correlational analysis of time and word count in Section III.B, the relationship is substantively weak, with every additional word only adding about a

[147] *See* Section II.A, *supra*, for an explanation of our imputation data and methodology.

[148] A few covariates were excluded due to multicollinearity concerns.

[149] The district-fixed effects account for the judicial district in which the warrant review occurred. The time-fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00am) measures.

Table 9: Regressions on Review Time

	(1) Approvals	(2) Approvals	(3) Approvals	(4) Approvals	(5) Approvals	(6a) Approvals	(6b) All Outcomes
Affidavit Length (Words)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)	
Jaccard $\geq$ 99 (Binary)		1.343 (0.917)	1.584 (1.002)	2.282 (1.451)	2.354 (1.443)	0.236 (1.176)	
Lawyer Review (Binary)		0.345 (0.735)	0.313 (0.757)	-0.110 (0.755)	-0.015 (0.535)	-0.358 (0.796)	1.876** (0.766)
Tenure (Years)			-0.104** (0.040)	-0.108*** (0.035)	-0.111*** (0.029)	-0.131*** (0.041)	-0.080** (0.032)
Female (Binary)			-0.329 (0.735)	-0.309 (0.793)	0.119 (0.675)	-0.150 (0.456)	-0.423 (0.632)
White (Binary)			0.055 (1.154)	0.015 (1.229)	-0.635 (1.136)	-0.964 (1.613)	-0.540 (1.013)
Full Time (Binary)			1.756** (0.643)	1.517** (0.720)	2.663 (2.073)	2.467 (1.809)	2.297 (2.232)
Law Degree (Binary)			0.418 (0.713)	0.915 (0.753)	2.764 (2.260)	4.680 (3.571)	5.169* (3.003)
Prosecutor Experience (Binary)			0.089 (1.160)	0.071 (1.110)	0.724 (1.117)	-0.353 (0.796)	0.880 (1.175)
Defense Experience (Binary)			-2.267** (0.815)	-2.305*** (0.776)	-1.998** (0.792)	-2.270** (0.833)	-2.028** (0.938)
Both Experience (Binary)			-0.437 (1.687)	-0.410 (1.754)	-1.035 (1.653)	0.508 (1.300)	-0.793 (1.979)
Constant	3.576*** (0.451)	3.180*** (0.551)	2.434 (1.497)	-0.271 (1.562)	1.194 (3.678)	2.901 (4.479)	1.420 (3.701)
Observations	25,597	25,597	23,352	23,352	23,352	12,445	24,857
Time Fixed Effects	No	No	No	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	No	No	Yes	Yes	Yes
Warrant Fixed Effects	No	No	No	No	No	Yes	No
District-Year Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dataset	Approvals	Approvals	Approvals	Approvals	Approvals	Approvals	All Outcomes

Notes: All linear models use fixed effects and have clustered standard errors on the district-year level. The time fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00am) measures. The warrant fixed effects use judicial districts. The warrant fixed effects use warrant type (*see* categories discussed in Part III.B.1, *supra*) and submission sequence number measures. Jaccard $\geq$ 99 represents whether there is another warrant in our dataset that has a Jaccard similarity score of at least 99. Lawyer Review represents whether the data indicate that the affidavit was reviewed by a city or county attorney prior to submission. Tenure is measured at the warrant level and represents the number of years between the judge's appointment to the bench and the day of the warrant review. Full Time represents whether a judge is full time or part time. Law Degree represents whether the judge is lawyer with a JD. Prosecutor Experience, Defense Experience, and Both Experience represent whether a judge worked as a prosecutor, a criminal defense lawyer (either public or private defense) or both.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

tenth of a second on average. The other warrant-level characteristics, including whether the warrant reviewed has a near-identical counterpart, whether it was a resubmission, and whether it was reviewed by a prosecutor before submission have a more substantive correlation with approval time but are nonetheless not statistically significant predictors.

Some of the judge-level characteristics are predictive of approval time, and sometimes in ways that run against our priors. The negative relationship between the judge's tenure at the time of review and the amount of time spent reading the warrant (an average reduction of about 13 seconds for every year on the bench) makes sense, either under a theory where more tenured judges are better able to review quickly or under a theory where repeated exposure to similar warrants makes a judge more disposed to give a warrant less time and attention than is necessary.

More surprising, however, is the role that a judge's experience as a criminal defense lawyer appears to play. While we anticipated that criminal work experience might relate to review time both as a proxy for familiarity with the issues and (possibly more relevantly) as an indicator for political ideology, our prior was that judges who were prosecutors would spend less time on warrant requests due to the previous professional connection they had with law enforcement and the warrant submission process. While there is a negative relationship between prosecutorial experience and approval time, that coefficient is not statistically significant. However, when controlling for all other relevant factors in our preferred model, judges who had criminal defense experience read through their warrants more than two minutes faster, on average, than those without such experience, a result that is statistically and substantively robust.

We will refrain from drawing any strong inferences from this relationship—recall that these models do not allow us to make credible causal claims—but given our emphasis on considering the extra-legal factors that might influence a judge's approach to warrant review (see Section I.D), it bears some commentary. One potential mechanism explaining quicker reviews from judges who were previously criminal defense attorneys is that such a professional background provides them with more opportunities to critically evaluate warrants and see the most common reasons for approved warrants to be later overturned. Alternatively, in a state (Utah) where judges are originally appointed by the governor and approved by the senate, both of which are virtually

always political conservative,[150] judicial candidates with criminal defense backgrounds may have to overcome a presumption of being soft on crime. This may result in a selection process where such judges are actually more conservative than their criminal defense colleagues or even their eventual colleagues on the bench. In any case, this correlation warrants further investigation in future studies.

3. Regressions Using All Warrant Decisions: We now turn to our analysis of all warrant decisions, including approvals, denials, and retractions. As we explain in more detail in Part IV, roughly 97 percent of all warrant submissions result in an approval (98 if withdrawals are ignored), so this dataset is not wildly distinct from what we used in the previous subsection. But as we have seen, the review time for denials and retractions are significantly higher than those for approvals (see Table 1 in Section III.A). Thus, by including them in our analysis, we will have a more complete sense of the relationship between judicial characteristics and all decisions, even if these regressions necessarily exclude some of the warrant-level data. In doing this, however, we re-emphasize the fact that we were not able to create shift data for two of the judicial districts (Districts 2 and 5), meaning that there are no imputed judges assigned to the reviews that resulted in rejections or retractions in those districts.[151] Consequently, any models on the full data that include judge-level covariates exclude any warrants reviewed in those districts.

The results of this full-data regression are in column 6b of Table 9 (above). For the most part, they match those in the previous regressions: the reviewing judge's tenure and previous experience as a criminal defense lawyer still have strong relationships with review time. The relationship between whether a judge is a trained lawyer is also noteworthy, not only because of the direction of the relationship but also because of the scale: lawyers take more than five minutes longer on average. While the reliability of this measure is somewhat suspect due to the small percentage of non-lawyer judges in the sample (just over 7 percent, see Table 6, above), this result stands even when

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[150] Every year since at least 1992, Republicans have made up at least 18 of the 29 seats in the Utah Senate. *United States Senate*, BALLOTPEDIA, ballotpedia.org/Utah_State_Senate (last accessed June 21, 2024). Similarly, the sitting governor has been a Republican since at least 1992. *Governor of Utah*, BALLOTPEDIA, ballotpedia.org/Governor_of_Utah (last accessed June 21, 2024).

[151] *See, supra*, note 116 for an explanation of why we could not make the imputations in these districts. And *see* Sections II.A and II.C.1, *supra*, for a discussion of our judge imputations and their associated limitations.

controlling for all the relevant data we have available. Note, however, that it is of borderline statistical significance ($p < .10$).

New to this full-data regression is the significant relationship between review time and whether a warrant affidavit indicated was reviewed by a lawyer prior to submission. Not only does the inclusion of denied and retracted warrants result in a sign change, but the size of the relationship also reflects close to a two-minute increase in review time relative to non-reviewed affidavits. We suspect that if this correlation reflects a true relationship, it is because city and county attorneys are most likely to become involved in a warrant submission for complicated, high-profile cases that oblige more reading time and greater attention from the judge.[152]

4. Regressions Using Only First Decisions: As we demonstrated in Section III.B.4, the median review time in the full sample does not appear to be driven by resubmissions. However, it is possible that controlling for judge- and warrant-level characteristics might expose differences between first submissions and resubmissions that were not apparent upon simply comparing descriptive data.

Table 10 (below) presents our preferred regression model using subsets of data that include only first submissions (column 1) and resubmissions (column 2). We also include the full-data model from previous tables (column 3, a reprint of column 6b in Table 9, above) for comparison.

As expected, the model using only first submissions produces nearly identical results to the full-data regression. However, although the regressions that only analyze resubmissions include less than 2,000 observations, we see a statistically significant and substantively sizable relationship between race/ethnicity and review time. On average, White judges spend nearly seven minutes more on review than their non-White counterparts. However, the fact that this relationship only exists when analyzing the resubmissions dataset complicates the implications that can be drawn. It is not clear why such a massive correlation would only manifest on re-review, and this data is likely influenced by selection bias and small-sample variability, as the only submissions that are included are those that have previously been denied. As a result, we do not believe those results warrant any solid conclusions or implications.

[152] This observation matches our understanding of the role of attorneys in the drafting process after interviewing a few of the County Attorneys in Utah.

Table 10: Regressions on Review Time By Submission Sequence

	(1) First Submissions	(2) Resubmissions	(3) All Submissions
Lawyer Review (Binary)	1.864*** (0.623)	2.635 (7.298)	1.876** (0.766)
Tenure (Years)	-0.104*** (0.033)	0.270 (0.424)	-0.080** (0.032)
Female (Binary)	-0.240 (0.655)	0.650 (1.782)	-0.423 (0.632)
White (Binary)	-1.086 (1.130)	6.970** (3.050)	-0.540 (1.013)
Full Time (Binary)	1.974 (1.708)	5.373 (9.188)	2.297 (2.232)
Law Degree (Binary)	6.031** (2.892)	0.979 (12.220)	5.169* (3.003)
Prosecutor Experience (Binary)	0.851 (1.013)	-1.052 (7.384)	0.880 (1.175)
Defense Experience (Binary)	-2.045** (0.875)	-1.169 (3.046)	-2.028** (0.938)
Both Experience (Binary)	-0.577 (1.805)	-2.267 (7.857)	-0.793 (1.979)
Constant	-0.810 (2.665)	12.930 (23.420)	1.420 (3.701)
Observations	22,921	1,936	24,857
Time Fixed Effects	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes
Warrant Fixed Effects	No	No	No
District-Year Clustered SE	Yes	Yes	Yes
Dataset	First Submissions	Resubmissions	All Submissions

Notes: All linear models use fixed effects and have clustered standard errors on the district-year level. The time fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00am) measures. The warrant fixed effects use judicial districts. Lawyer Review represents whether the data indicate that the affidavit was reviewed by a city or county attorney prior to submission. Tenure is measured at the warrant level and represents the number of years between the judge's appointment to the bench and the day of the warrant review. Full Time represents whether a judge is full time or part time. Law Degree represents whether the judge is lawyer with a JD. Prosecutor Experience, Defense Experience, and Both Experience represent whether a judge worked as a prosecutor, a criminal defense lawyer (either public or private defense) or both.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

IV. WHAT PERCENTAGE OF WARRANTS DO JUDGES APPROVE?

As we have demonstrated in the analysis on decision speed, judges spend surprisingly little time reviewing warrant affidavits. However, understanding how long judges are spending on warrant review only tells part of the story. Some may argue that certain affidavits—either because of linguistic repetition or simplicity or because they address circumstances that do not warrant a particularly careful eye—genuinely do not require more than a minute or two to analyze. Indeed, given their legal qualifications and (for most individuals) tenure as judges, one might reasonably expect that judges can very quickly conclude whether a given affidavit meets the probable cause standard or not.

In determining whether the warrant review process is a sufficient check on police power, it is critical, then, for us to also explore the rate at which judges approve warrants. If judges are spending little time reviewing warrants but are frequently identifying those that do not meet their legal burden, then the short review times may simply be indicative of efficient legal analysis. On the other hand, if we find that judges are quickly reviewing warrants and never finding any that fail to meet the standards, then we would worry that the review requirement is providing little, if any, check at all.[153] As we outline below, the data show that judges do, indeed, pull some warrants out of the pile for denial but do so quite infrequently. 93.56 percent of warrant affidavits are approved on their initial submission, and only 6.44 percent are denied (ignoring those submissions that are withdrawn before a decision is made). And once we account for the ability to resubmit affidavits, the eventual approval rate reaches 98.14 percent.

In this Part we begin by exploring the basic data regarding approval rates in Section IV.A, breaking down the likelihood of approval by submission sequence. As we did with review time, we then look for intra-judge disparities in approval rates in Section B and conduct an exploratory regression analysis to identify the judicial characteristics that best predict those disparities in Section C.

As we explore the data on approval rates, we will reemphasize the limitations in our analysis as appropriate (*e.g.*, only having PDF images of approved warrants).[154] However, one limitation bears repeating at the outset: recall that we do not have a true measure for

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[153] In coming to this conclusion, we are making the assumption that at least *some* submissions do not meet the standard (a reasonable assumption, we think).

[154] For a full discussion of these limitations, *see* Section II.C, *supra.*

the underlying "quality" of the warrant affidavits in our dataset. Ideally, we would have a reliable indicator for whether a given affidavit meets the probable cause standard, thereby allowing us to see whether the reviewing judge made the "correct" decision. While we do conduct a qualitative analysis of individual approved warrants in Part V, this process was extremely time intensive and is therefore unavailable for the wider dataset. As a result, determining whether approval rates are "too high" or "just right" is necessarily subjective and requires consideration of the various extra-legal factors we outlined in Section I.D.

A. Overall Approval Rates

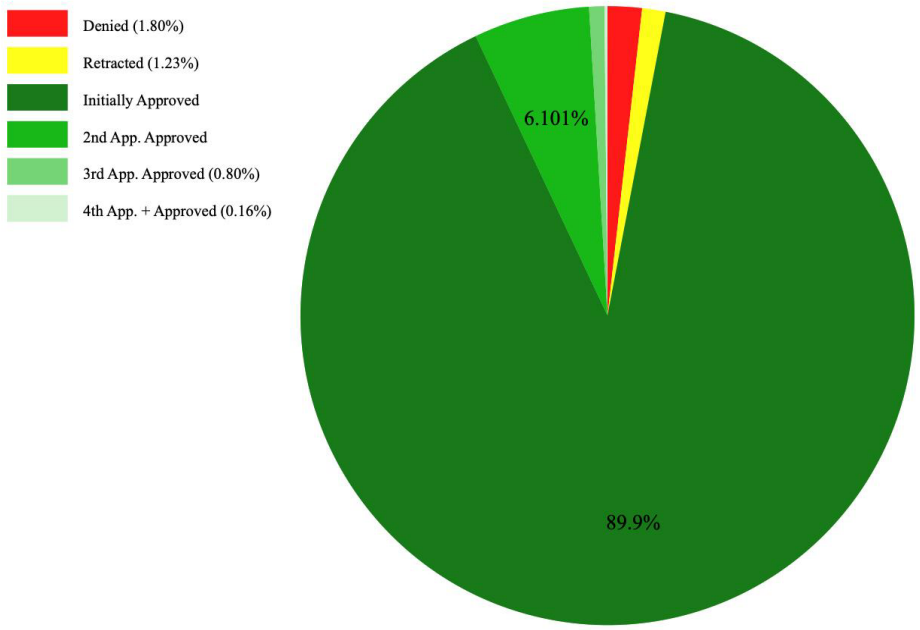
The first clear observation coming from the approval data is the overall approval rates. As we show in Figure 9 (below), of the roughly 33,000 warrants affidavits submitted by enforcement and prosecutors in our dataset, 89.90 percent are approved on the first try. Of the 10.10 percent of first submissions that are either denied (6.19 percent) or retracted (3.91), 7.06 percent are resubmitted and approved, meaning that 96.96 percent of all warrants are eventually approved (the sum of all the green areas). If we ignore the submissions that were withdrawn before the judge was able to review them, those percentages go up to 93.56 on first submission and 98.14 eventually (the values we have references throughout this Article and will use going forward). While we will speak to the potential legal implications of these rates later, they bear some emphasis now, as they are surprisingly high, even when we consider the likelihood that officers learn the legal standard—or at least the judicial interpretation of that standard—and adjust their requests to meet that bar.

We can also look in more detail at the approach that officers take when a warrant is initially denied and the approach judges take to resubmissions. Figure 10 (below) maps the final outcome status at the warrant level, with bars representing distribution of outcomes for warrants that were only submitted once (Bar "1"), warrants that were submitted twice or three times (Bars "2" and "3") and any warrants that were submitted for a fourth time or more ("4+").[155] In order for a warrant in Figure 10 to be included in any of the resubmission stages, it must have been denied or retracted in a previous stage. Conversely,

[155] One warrant was submitted 17 times. The next highest submission count for a given warrant was 10.

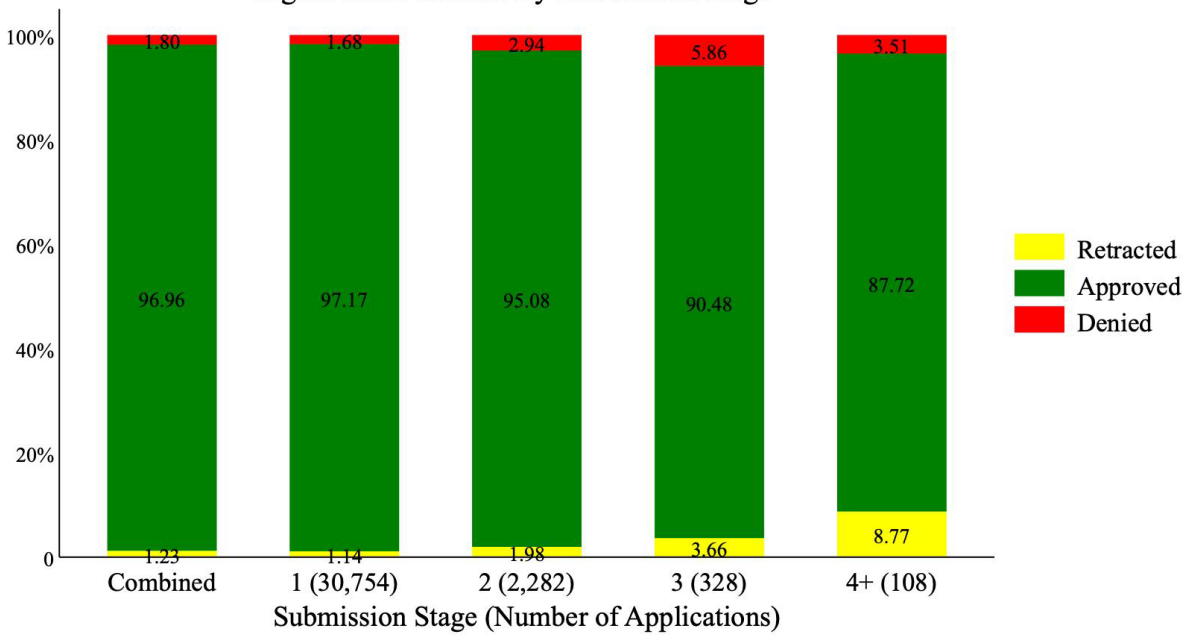
the red and yellow areas in a given bar in Figure 10 represent warrants that were denied or retracted and never resubmitted.

Figure 9: Final Outcome Status (Over Multiple Submissions)



Notes: The sample removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Final outcome status is defined as the final warrant-level outcome (approval, denial, or withdrawal), with approvals broken out into the submission stage

Figure 10: Decisions By Submission Stage



Notes: The sample removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours.

What do these data tell us? On the one hand, an initial approval rate of 93.5 percent demonstrates that the warrant approval process inherently includes some level of judicial scrutiny and is not a pure "rubber stamp" process. Barring a review regime where judges haphazardly or randomly deny warrants as some sort of low-effort auditing mechanism to keep officers "honest" (a strategy that does not fit within any of our realistic models of judicial behavior) regular denials demonstrate that the judges are reading the warrants close enough to identify at least some sub-standard submissions.

On the other hand, however, our data also show that of the roughly 10 percent of warrant affidavits that are not approved at first blush, 4 percent are retracted by the submitting officer before a decision is made, meaning only 6 percent actually fail to meet the legal bar according to the judges. And of those 10 percent of warrants that didn't pass on the first go, 8 percent are eventually approved (ignoring warrants that end by withdrawal), resulting in an ultimate approval rate of over 98 percent. This supports two theories: (a) law enforcement almost never submit warrants that do not meet the standard and/or (b) the speed in which these warrants are reviewed results in judges missing some of those sub-standard submissions. While we acknowledge the former explains much of our results, we argue that the latter also plays a role.

B. District- and Judge-Level Approval Disparities

Like with our analysis of district- and judge-level review times, we find substantial disparities in the final outcomes that each judge in our sample produces that raise new questions about the process of review and, we argue, demonstrate the relevance of the extra-legal influences we discussed earlier.

As Figure 11 (below) shows, these disparities are not particularly large at a district level (although one could argue that a difference of around five percentage points is quite significant). However, the gaps between the most "lenient" and "strict" judges presented in Figure 12 (below) are striking, even when only comparing disparities within a given district—some judges approve nearly 100 percent of affidavits that come their way, while colleagues approve less than 80 percent.

Figure 11: District-level Disparities in Overall Approval Rate (%)

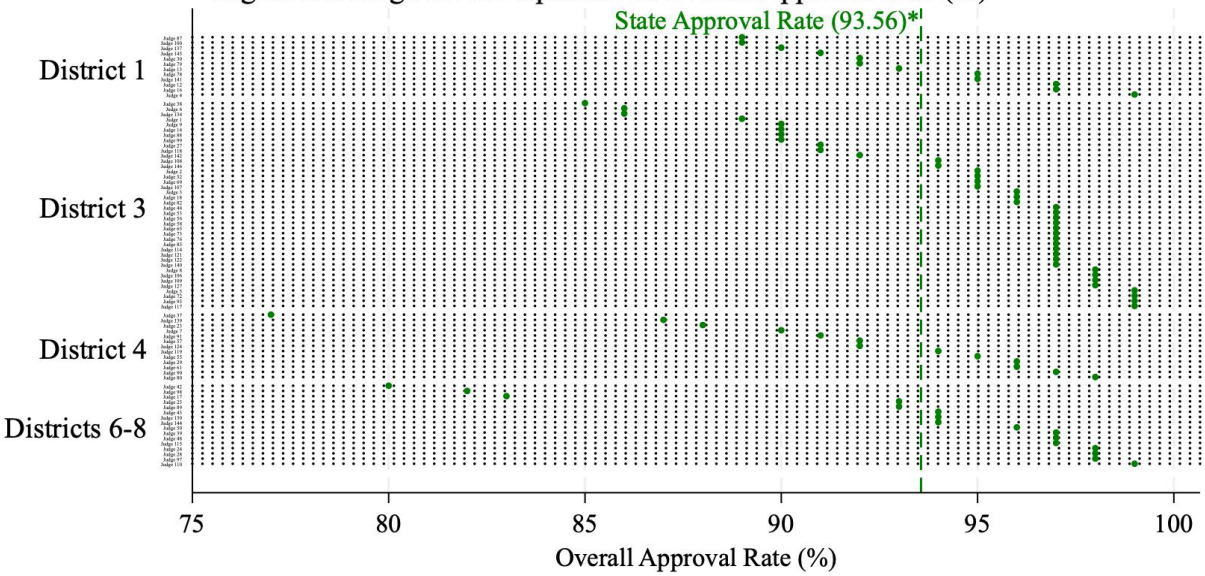


Notes: The sample only includes judges who had more than 30 warrant approvals and denials. Approval rates were calculated using only approvals and denials and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. *State Approval Rate reflects the overall approval rate for the entire sample.

The scale of these disparities further support our conclusion that the average judge is not simply "rubber stamping" every warrant request that comes across their desk—we would not expect any intra-judge disparities if that were the case. At the same time, the fact that most judges find roughly five percent of warrants to be substandard and worthy of denial does suggest that those judges who are approving *all* of the warrants that come across their desk may actually be treating the warrant review process as a procedural formality as opposed to a true legal barrier.

These observations also support the sentiment of several of the Utah police officers we interviewed who expressed a strong sense of which judges were preferable—or rather, which judges to avoid—and recalled frequent strategic decisions to hold back a warrant submission until a more favorable judge took their shift.[156]

Figure 12: Judge-level Disparities in Overall Approval Rate (%)



Notes: The sample only includes judges who had more than 30 warrant approvals and denials and excludes judges from Districts 2 and 5 due to lack of imputed judge for denied warrants. The sample removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Approval rates were calculated using only approvals and denials and were rounded to the nearest percent. *State Approval Rate reflects the overall approval rate for the entire sa

[156] We have substantial evidence from our data—peaks and valleys in submission rates right before and after judge shifts—that support these claims. We anticipate covering this potential "judge shopping" in future work focusing on officer behavior.

C. Correlations with Judicial Characteristics

As with our regression analysis of review time in Section III.D, *supra*, here we explore the relationship between judge-level characteristics and likelihood of approval. Our modeling varies slightly from the analysis on review time, as we use probit fixed effects regression to better meet the binary distribution of the outcome of interest (approval or not). However, the same methodological limitations and resulting cautions in making causal inferences apply.[157] Additionally, because we were not able to impute judges to denials and retractions in Districts 2 and 5, all our models necessarily exclude all data from those districts.[158]

1. Regressions Using All Warrant Decisions: Table 11 (below) presents a series of regression models that follows a similar progression as the models in Table 9 (see Section III.D.2), with each model adding judge-level indicators or fixed effects.[159] We present both probit coefficients and odds ratios for each model (a and b columns, respectively).

Under our preferred model (columns 4a and 4b), we see a number of relationships that warrant discussion. As with many of our regression models looking at review time, we see that a judge's professional background is predictive of outcome. Judges with law degrees are substantially less likely to approve warrants—roughly 0.4 approvals for every 1 approval from a judge without a law degree. More interestingly, judges who had worked as prosecutors before joining the bench are also less likely to approve warrants—nearly 0.7 approvals for every 1 approval from non-prosecutors. These results again run against our priors regarding the dynamics of prior criminal attorney experience—we expected that judges who have a background

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[157] *See* note 152, *supra*, and the accompanying text for a discussion of these cautions.

[158] *See* note 116, *supra*, and the accompanying text for an explanation of why we could not make the imputations in these districts. And *see* Parts II.C.3 and D.1, *supra*, for a discussion of our judge imputations and their associated limitations.

[159] Because we only have warrant-level indicators for approved warrants, these models do not include those covariates. The district-fixed effects account for the judicial district in which the warrant review occurred. The time-fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00 am) measures. A few covariates were excluded due to multicollinearity concerns. We are also currently working on incorporating additional judge-level data derived from Utah's Judicial Performance Evaluation Committee, which "grades" Utah judges using survey data from lawyers and court participants. *See* UTAH JUD. PERFORMANCE EVALUATION COMM., https://judges.utah.gov/.

as a prosecutor would be more likely to approve in a shorter amount of time than those with a background as a criminal defense lawyer.[160] Combining these results with those in Section III.D, our tests demonstrate that prior prosecutors take significantly more time (two minutes) and approve at lower rates (.695 approvals by prosecutors for every 1 approval by a defense lawyer) than their criminal defense counterparts. In the absence of more data, we are obliged to explain the mechanisms behind this counterintuitive relationship through intuition. As before, it may be that prior work experience—specifically with warrant submissions, suppression hearings, and appellate attacks on sufficiency—changes the manner in which judges approach and understand warrant review, or the traditional understanding of the interplay between ideology and legal practice may not run in the traditionally understood direction.

[160] As a reminder, these professional categories are not mutually exclusive in our data. While just 41 percent (45 individuals) of the judges had worked as prosecutors and 16 percent (19) had worked as criminal defense lawyers (either public defenders or private attorneys), 6 percent (7) did both before joining the bench.

Table 11: Regressions on Outcome (Approval or Not)

	(1a) Logit Coefficients	(1b) Odds Ratios	(2a) Logit Coefficients	(2b) Odds Ratios	(3a) Logit Coefficients	(3b) Odds Ratios	(4a) Logit Coefficients	(4b) Odds Ratios
Lawyer Review (Binary)	0.614 (0.383)	1.848 (0.708)	0.0349 (0.112)	1.036 (0.116)	0.096 (0.095)	1.101 (0.104)	-0.010 (0.110)	0.990 (0.109)
Tenure (Years)			-0.016*** (0.005)	0.984*** (0.005)	-0.012** (0.005)	0.988** (0.005)	-0.005 (0.06)	0.995 (0.006)
Female (Binary)			-0.098 (0.097)	0.907 (0.088)	-0.078 (0.086)	0.926 (0.080)	-0.167** (0.075)	0.846** (0.064)
White (Binary)			0.346 (0.252)	1.414 (0.356)	0.354* (0.211)	1.425* (0.300)	0.408* (0.209)	1.504* (0.314)
Full Time (Binary)			0.102 (0.332)	1.107 (0.368)	0.094 (0.351)	1.100 (0.386)	-0.112 (0.464)	0.894 (0.415)
Law Degree (Binary)			-0.876*** (0.240)	0.416*** (0.010)	-0.877*** (0.183)	0.416*** (0.077)	-0.842** (0.338)	0.431** (0.146)
Prosecutor Experience (Binary)			-0.413*** (0.145)	0.661*** (0.096)	-0.413*** (0.133)	0.661*** (0.088)	-0.364*** (0.138)	0.695*** (0.096)
Defense Experience (Binary)			-0.151 (0.165)	0.860 (0.142)	-0.151 (0.187)	0.860 (0.161)	-0.138 (0.186)	0.871 (0.162)
Both Experience (Binary)			0.439** (0.208)	1.550** (0.323)	0.309 (0.231)	1.362 (0.315)	0.340 (0.240)	1.405 (0.338)
Constant	1.838*** (0.371)	6.282*** (2.329)	3.201*** (0.443)	24.550*** (10.87)	3.312*** (0.332)	27.450*** (9.102)	3.080*** (0.420)	21.750*** (9.145)
Observations	25,459	25,459	18,468	18,468	18,468	18,468	18,468	18,468
Time Fixed Effects	No	No	No	No	Yes	Yes	Yes	Yes
District Fixed Effects	No	No	No	No	No	No	Yes	Yes
Warrant Fixed Effects	No	No	No	No	No	No	No	No
District-Year Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dataset	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5	Excludes Districts 2 and 5

Notes: All logit models use fixed effects and have clustered standard errors on the district-year level. The time fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00am) measures. The warrant fixed effects use judicial districts. Lawyer Review represents whether the data indicate that the affidavit was reviewed by a city or county attorney prior to submission. Tenure is measured at the warrant level and represents the number of years between the judge's appointment to the bench and the day of the warrant review. Full Time represents whether a judge is full time or part time. Law Degree represents whether the judge is lawyer with a JD. Prosecutor Experience, Defense Experience, and Both Experience represent whether a judge worked as a prosecutor, a criminal defense lawyer (either public or private defense) or both.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

Unlike our review time results, however, our tests here show significant relationships between a judge's demographic characteristics and their propensity for approving warrant submissions. Women are slightly less likely to approve than men (0.846:1 odds), and White judges are significantly more likely to approve than their non-White counterparts (1.51:1 odds), although the former relationship is of borderline statistical significance. While some of these findings are potentially explained by the discrepancies in diversity of judges across districts,[161] our model's district-fixed effects should account for this. We suspect that these results are driven by underlying (and unmeasured) political preferences and ideologies, with White and/or male judges tending to be more conservative than non-White and/or female judges.

2. Regressions By Submission Stage: In Table 11 (below) we present the results of our preferred model using datasets broken down by first submissions (columns 1a and 1b), resubmissions (2a and 2b), and the full dataset (3a and 3b, which mirror 4a and 4b in Table 11). Given that the vast majority of submissions are approved in the first round, it is not surprising that our results for only first submissions closely match those that come from an analysis on all submissions. Having a JD and previously working as a prosecutor are still negatively correlated with approval rate, and the gender and race relationships match those in the full dataset.

We also present the results of our preferred model using only resubmissions, although we do so with the caution that the resulting sample size (just over 1,500 observations) is so low that standard errors are likely to be large enough to mask any significant relationships. Indeed, the indicator for whether the reviewing judge has a law degree was omitted from this model due to multicollinearity. Except for a small but statistically significant correlation between tenure and approval rate—something that was not present in the tests using the full dataset—we do not see any notable relationships.

[161] *See* Table 7 in Section III.C, *supra*.

Table 12: Regressions on Outcome (Approval or Not) By Submission Sequence

	(1a) Logit Coefficients	(1b) Odds Ratios	(2a) Logit Coefficients	(2b) Odds Ratios	(3a) Logit Coefficients	(3c) Odds Ratios
Lawyer Review	0.019	1.019	-0.168	0.846	-0.0010	0.990
(Binary)	(0.083)	(0.085)	(0.199)	(0.168)	(0.110)	(0.109)
Tenure	-0.002	0.998	-0.027**	0.974**	-0.005	0.995
(Years)	(0.006)	(0.006)	(0.012)	(0.0117)	(0.006)	(0.006)
Female	-0.248***	0.780***	0.326	1.386	-0.167**	0.846**
(Binary)	(0.056)	(0.044)	(0.273)	(0.379)	(0.075)	(0.063)
White	0.509**	1.664**	-0.124	0.884	0.408*	1.504*
(Binary)	(0.258)	(0.429)	(0.286)	(0.253)	(0.209)	(0.314)
Full Time	-0.124	0.883	0.077	1.080	-0.112	0.894
(Binary)	(0.461)	(0.407)	(0.819)	(0.885)	(0.464)	(0.415)
Law Degree	-0.812**	0.444**	-	-	-0.842**	0.431**
(Binary)	(0.363)	(0.161)	-	-	(0.338)	(0.146)
Prosecutor Experience	-0.434***	0.648***	0.151	1.163	-0.364***	0.695***
(Binary)	(0.144)	(0.0934)	(0.260)	(0.302)	(0.138)	(0.0961)
Defense Experience	-0.025	0.975	-0.574	0.563	-0.138	0.871
(Binary)	(0.143)	(0.139)	(0.445)	(0.250)	(0.186)	(0.162)
Both Experience	0.302	1.353	0.134	1.143	0.340	1.405
(Binary)	(0.192)	(0.259)	(0.413)	(0.472)	(0.240)	(0.338)
Constant	2.899***	18.160***	3.072***	21.59***	3.080***	21.750***
	(0.478)	(8.687)	(0.736)	(15.88)	(0.420)	(9.145)
Observations	16,946	16,946	1,508	1,508	18,468	18,468
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
District Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Warrant Fixed Effects	No	No	No	No	No	No
District-Year Clustered SE	Yes	Yes	Yes	Yes	Yes	Yes
Dataset	First Submissions and Excludes Districts 2 and 5	First Submissions and Excludes Districts 2 and 5	Resubmissions and Excludes Districts 2 and 5	Resubmissions and Excludes Districts 2 and 5	All Submissions and Excludes Districts 2 and 5	All Submissions and Excludes Districts 2 and 5

Notes: All logit models use fixed effects and have clustered standard errors on the district-year level. The time fixed effects use year, month, day (weekday/weekend), and hour (four six-hour blocks, starting at 12:00am) measures. The warrant fixed effects use judicial districts. Lawyer Review represents whether the data indicate that the affidavit was reviewed by a city or county attorney prior to submission. Tenure is measured at the warrant level and represents the number of years between the judge's appointment to the bench and the day of the warrant review. Full Time represents whether a judge is full time or part time. Law Degree represents whether the judge is lawyer with a JD. Prosecutor Experience, Defense Experience, and Both Experience represent whether a judge worked as a prosecutor, a criminal defense lawyer (either public or private defense) or both.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentheses.

V. A CLOSER ANALYSIS OF APPROVED WARRANT CONTENT

Our analyses up to this point have demonstrated two key features of the warrant review process: (1) warrants are generally reviewed quickly, and (2) approval rates are high overall but vary by judge. On their own, we believe those outcomes raise serious questions about whether the current review process meets constitutional muster and can truly serve as a check on police searches and seizures. At a practical level, however, some may argue these issues only have bite if the resulting process results in error, with judges either failing to approve warrants that meet the standard or approving warrants that do not meet the standard. While the primary focus of our study was to provide a broad quantitative view into the warrant review process—and we reiterate that the limitations inherent in our dataset and our methodological approach prevent us from determining the true "baseline" for warrant review time and approval rate for the full sample[162]—we still feel it valuable to conduct a more detailed investigation into whether the current warrant regime is producing problematic outcomes.

This Part takes a more qualitative approach, even if brief relative to our quantitative analyses above. Section V.A highlights our observations after conducting an in-depth review of 231 randomly selected warrant approvals from the full dataset. Section B then focuses on a smaller sample (n = 40) of those warrant applications that were reviewed and approved in less than one minute.

A. A Qualitative Analysis of Approved Warrants

Because we only have the PDF images of warrants that were approved, we began our qualitative analysis by randomly selecting 231 examples from our approved warrant dataset.[163] We then read the affidavits, warrants, and returns for each of the respective warrant numbers we selected and recorded information on a wide range of variables, including the type of entity searched; whether a seal was requested and granted; whether a no-knock entry was requested and granted; and the similarity between the items requested in the affidavit,

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[162] *See* our discussion of these limitations in Section II.C.2, *supra*.

[163] Because we randomly selected these warrants, they should provide a roughly representative view into the full sample. The odd number of warrants (231) reflects the fact that we worked through a randomly ordered list of 1,000 warrants with no clear quota, starting from the top and moving down until we felt we could make qualitative findings.

the items granted in the warrant, and the items listed in the return.[164] We also recorded our conclusions as to whether the warrant appeared to meet the probable cause standard, including whether the affidavit lacked important factual information, was overbroad, or exclusively relied on anonymous informants.

At the outset, our expectations regarding this more holistic review of warrants were not that we would find a great number of examples where a warrant was improperly approved. For reasons we detailed in our discussion on the extra-legal factors that influence warrant review, we suspect that the quality of warrant submissions is generally quite good relative to the fairly low bar of probable cause, and that the current review process is able to filter out the most egregious of submissions. At the same time, however, our empirical findings that only six percent of warrants are initially denied and that the review process usually takes three minutes or less create a warrant review regime that is almost certainly missing important but less obvious details on the margins, resulting in mistakes. In other words, we expected that most warrants were justifiably approved but that a few should not have passed the review process.

As anticipated, we did find several warrants that were lacking, or to be charitable, had very thin foundations for probable cause. These warrants had a combination of issues that mirrored some of the same patterns highlighted in the DOJ's investigation of Louisville, including (1) not providing adequate specificity and detail; (2) being overly broad in scope; and (3) not establishing sufficient probable cause for all of the items or persons listed in the warrant.[165]

For example, in some affidavits, officers described what individuals involved in a given criminal activity do in broad terms and then requested (and were approved for) a warrant based on those generalities without alleging specifics in the relevant case. Similarly, approved a couple of warrants that made factual allegations that bear little relationship to the evidence sought. We include redacted images of a simple example of one such warrant in Appendix A (*see* Figure A.4). The affidavit seeks the collection of DNA from two suspects in the form of a buccal swab. But the facts presented in the affidavit have no clear connection to the need for DNA evidence. During a traffic stop, officers "located a stolen firearm under the [front passenger] seat of the vehicle" that was occupied by the two suspects. No additional

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[164] The full list of variables collected was much longer (about 75), but many are not salient to the analysis in this Article.

[165] U.S. DEPARTMENT OF JUSTICE, *supra* note 6, at 22-27.

facts were presented, and the purpose of the evidence was similarly vague, stating that it was being collected as "evidence of illegal conduct."[166] The approved warrant provides no additional context.

We also found warrants that were overly broad in scope. While the affidavit may have established probable cause to search one person or place, it would request the search of multiple persons and/or locations with very loose associations with the target of the investigation. One example involved an officer conducting undercover investigations during which he obtained child pornography over a peer-to-peer network.[167] The officer received the IP address and "nickname" of the user who provided the images, along with an incomplete download of a pornographic video that showed sexual acts between a minor. The officer obtained the name and address of the subscriber with a subpoena of the user's ISP. He also traced the vehicle in the driveway of the home to the same user. The affidavit requests not only a search of the individual to whom the IP address was registered, but a search of "all persons found to reside at the residence." Without having any individualized evidence, the officer justifies the broader search solely on his experience in such cases. While we found the background investigation in the warrant to be commendably robust, it arguably did not justify such a broad and generalized search. The trend mirrors what DOJ investigators found in Louisville where officers would seek (and be granted) authority to search individuals with only remote associations with the investigation target.[168]

More frequently, we encountered products of a rapid review and approval process that do not speak to constitutional muster but are nonetheless good examples of the costs of prioritizing expediency. We found numerous warrants that lacked address information, contained grammatical errors, or were difficult to understand, most often because the judge appeared to utilize the exact language in the warrant that the officer used in their submission. While nearly all of these more benignly problematic warrants ultimately met the probable cause standard, we worry that the manner in which they were written increase the potential for collateral consequences down the road.

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[166] For the sake of completeness, regarding the DNA buccal swabs, the warrant states "that said property or evidence "[w]as unlawfully acquired or is unlawfully possessed; has been used or is possessed for the purpose of being used to commit or conceal the commission of an offense; or is evidence of illegal conduct."

[167] We do not include the affidavit and warrant in the Appendix because they are a lengthy 15 pages. A redacted version of the affidavit, warrant, and return is available from the authors upon request.

[168] U.S. DEPARTMENT OF JUSTICE, *supra* note 6, at 23.

B. Looking Into the "Minute Warrants"

After reflecting on the results of our qualitative examination of the full sample, we expanded our review to those warrants that were reviewed and approved in 60 seconds or less. We excluded DUI-warrants and resubmissions, leaving us with a final "minute warrant" dataset of 1,863. This subset of the data represents the extreme (but not uncommon) in review time, and for that reason, we suspected that the affidavits and resulting warrants would be most likely to provide us with examples of the costs of expediency or, at the very least, be interesting to read in more detail.

Table 13: "Minute Warrant" Descriptive Characteristics

A. Review Time (Minutes)					
Min	10th %tile	First Quart.	Median	Third Quart.	Max
0:03	0:09	0:32	0:43	0:52	1:00
B. Affidavit Length (Words)					
Full Affidavit Median	Full Affidavit Max	No Boilerplate Median	No Boilerplate Max	Facts Only Median	Facts Only Max
1,008	10,664	820	10,476	438	8,151
C. Jaccard Similarity					
% Jaccard Similarity > 90		% Jaccard Similarity > 95		% Jaccard Similarity > 99	
51.32		44.6		36.56	

Notes: The sample only includes initial warrant submissions that were approved in 60 seconds or less and excludes DUI warrants, totaling 1,863 observations.

Table 13 (above) presents some basic descriptive information on this sub-sample, focusing on the same attributes and categorizations we explored in our previous analyses. Interestingly, there are no key characteristics that distinguish the sub-sample of minute warrants from the broader sample (other than review time, of course). As compared to Table 4 (see Section III.B.2), median affidavit length is roughly the same as other warrants for the three versions of word count we analyze, and, as compared to Tables 5a and 5b (see Section III.B.3), the percentage of warrants that have Jaccard Similarity scores of above 90, 95, and 99 are all within four percentage points of the full sample.

From the sub-sample, we randomly selected 40 warrants and reviewed them in a manner similar to our qualitative process in the previous section. Despite knowing the data presented in Table 13 (above), our first observation was surprise at how long and detailed some of the warrant affidavits were, given that they were reviewed in such a short amount of time. In some cases, the language of the text

provided a reasonable basis for the quick review, as with affidavits that were quite short or predominantly composed of the officer "hero statement" and other arguably "unnecessary" language (see our analysis in Section III.B.2). But with others, we found no apparent justification for how a judge could have credibly reviewed such a detailed document so rapidly other than the conclusion that they did not fully (or even partially) read the relevant text. One warrant affidavit, for example, comprised nearly 2,700 words of fact-dense justification for a nighttime no-knock warrant and was reviewed and approved in 46 seconds.

Despite reading through only 40 warrants, we identified issues consistent with our findings from the larger qualitative review, above. Many of these observations were arguably benign: poorly written and confusing affidavits (that would be exceedingly difficult to understand in a quick review), borderline probable cause questions, a search warrant that was clearly supposed to be an arrest warrant, and a good number of affidavits that never explicitly identified the suspected crime at all but ultimately had sufficient contextual clues to make a reasonable conclusion (again, difficult in a short timeframe). But we also found some more troubling cases, including a warrant where the officers were seeking authority to seize "any and all data" contained in "any electronic devices" without providing justification for such a broad search.

One warrant stood out as a particularly salient example of the issues we have highlighted in this Article, not because it contained an egregious error that wreaked havoc on an individual's privacy rights, but because it demonstrated the sort of problems that we would anticipate are common when a judge spends so little time (39 seconds in this case) reviewing a warrant request. From the text of the affidavit, it can be inferred that the officer was seeking information on a cell phone related to potential drug violations. However, it is clear that the officer (or the e-Warrants system) made a mistake when filling out the affidavit, because instead of identifying a place or an individual, it lists the "premises" where the evidence was located as "[a] rose gold iPhone" and the "items" that contained the evidence as "[a]ny messaging capabilities, and photos." While the four sentences of factual information that came at the end of the affidavit did list a name (we inferred that this individual was the subject of the search), it appears that when the judge approved the affidavit and wrote the warrant, they opted to automatically use the same pre-populated fields that the officer had included in their submission. As a result, the final warrant itself had no identifying information on it at all. It simply said

that the officer had the authority to seize "a rose gold iPhone with a clear case and broken screen protector."[169]

Admittedly, this error was likely harmless in practice. But on its face, the warrant was clearly unconstitutionally broad, as it could have technically been used to apprehend anyone's rose gold iPhone for as long as the warrant was executable. A judge who had spent more than a handful of seconds reviewing the affidavit and the resulting warrant would have identified this error, but for all the reasons we have discussed in this Article, the warrant review regime often moves too fast to catch anything but the most obvious and egregious problems. As a result, the reliability of the Fourth Amendment's protections via this warrant hinged on a latent reliance of the good faith of the police officer, which is precisely what the "check" of warrant review is supposed to avoid.

VI. CONCLUSIONS, IMPLICATIONS, AND AVENUES FOR REFORM

In this Article we have presented the results of the largest and most comprehensive empirical evaluation of search warrants to date. By utilizing novel and robust data from Utah's e-Warrant system, we evaluated nearly 33,500 warrant applications filed by more than 3,200 law enforcement officers to nearly 120 judges over a three-year period. Because the e-Warrants system maintains text PDFs of all approved warrants and detailed metadata on all the key events in the lifecycle of a warrant submission, we were able to determine precisely how long the review process takes and exactly what percentage of search warrant applications are approved. Additionally, by using judge- and warrant-level descriptive data, we were able to explore possible hypotheses that might explain our results.

In review, our empirical analysis demonstrated that the warrant review process is brief, and that it rarely results in a warrant being denied. The median time it takes a judge to review a warrant affidavit is three minutes, and approvals, which also involve producing the warrant document, are done even more quickly. Furthermore, 1 out of every 10 warrants are approved in a minute or less. We also find that only 6 percent of warrants are denied on first submission and that, eventually, 98 percent of all warrants are approved. Our key findings are robust to datasets that exclude simplistic, form-type warrants (e.g. DUIs), warrants that have previously been reviewed, and warrants that

[169] We have included images of the warrant in Appendix A (*see* Figure A.5: Minute Warrant Example).

are highly similar to other warrants. We also perform a qualitative, in-depth analysis of a sub-sample of the affidavits and find examples demonstrating some of the problematic outcomes of the warrant review process.

Nonetheless, the implications of these results are not perfectly obvious, and the solutions to the problems we identify are not clear. We conclude this Article by briefly discussing the implications, as we see them, being careful to recognize the limitations in our methodological approach and the external applicability of our findings. We then review some potential avenues for reform that account for the extra-legal factors we identified earlier in this Article that likely influence warrant review.

A. Implications from Our Findings

As we summarized above, warrant review is fast and almost always results in approval. But what does this actually say about the nature and quality of the warrant review process? Upon reading our results, many will undoubtedly see them as a clear and irrefutable indictment of the whole enterprise.[170] This is a prime example of the uncouth relationship between local trial judges and law enforcement, yet another instance in which defendants (or, in the case of warrants, suspects) are mistreated, and more evidence in favor of the conclusion that the criminal justice system is in dire need of reform. These sentiments are, of course, not new,[171] but many will conclude that our data substantiates their long-held suspicions that the process is broken.

On the other hand, however, many will genuinely find our results as not only expected but fully in line with a system working as it should.[172] Short review times and high approval rates simply reflect an investigative and adjudicative economy in which the vast majority of warrants *do* meet the probable cause standard, and the reviewing judges—after years of legal training and professional acclimation—are fully capable of honing in on and fully evaluating the relevant information in a warrant in just a few minutes.

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[170] Indeed, we know this because we have seen this exact sentiment in early presentations of our findings (coming from attorneys, colleagues, police officers, and even judges).

[171] *See* Steinberg, *supra* note 64, at 1031 (questioning the assumption that judges are inherently able to serve as neutral checks against law enforcement).

[172] Here too, we can confirm this sentiment because we have heard it from attorneys, colleagues, police officers, and judges.

As we have emphasized throughout this Article, we feel it is critical to interpret our findings within the full context of the legal system in which the judicial review process took place and the extra-legal factors that influence that process. Given that their first priority is to "ferret out crime," law enforcement is not compelled to prioritize Fourth Amendment rights. Nonetheless, police officers are incentivized to submit warrants that are likely to be approved and unlikely to be overturned down the road. Furthermore, we also emphasize some of the extra-legal factors that likely play an important role in the warrant review process.

We also reiterate the importance of recognizing that while our empirical findings reflect reality—judges really do review most warrants in three minutes or less—we do not know the true, normative baseline against which to compare these results. The probable cause standard is low, but does that mean we should expect all but a few warrants to meet it or does it incentivize boundary pushing and marginally unconstitutional searches? How quickly *should* judges review warrants, and what percentage of those warrants *actually* meet the standard? We cannot provide definitive answers to these questions with the data we have.

That does not prevent us, however, from drawing reasonable inferences using the context the data provides, and we believe the combined results of our analyses in this Article paint a compelling picture. Taken together, we argue that our empirical and qualitative evidence raises serious concerns about the ability for the current warrant review process to meet its call as the bulwark against police error or abuse. As evidenced by intra-judge disparities and the fact that some affidavits are being denied, judges are not engaged in a pure rubber-stamping exercise when they evaluate warrants submissions. Consequently, egregious constitutional violations are likely being filtered out. However, a process in which half of all warrants are reviewed in less than three minutes and a non-negligible portion are reviewed in less than 60 seconds will inevitably fail to identify warrants that have more nuanced issues. This has critical constitutional implications in a legal system that so centrally relies on warrant review as the robust "check" on law enforcement, and inevitably encroaches on the privacy of individuals. If the system has these flaws, then we must call into question the efficacy of Supreme Court decisions that

rely on the warrant process as a higher standard to preserve the privacy rights of the citizenry.[173]

B. Avenues for Reform

The combined results of this study expose a sobering reality regarding the process and outcomes of a warrant review regime that often moves too quickly and, as a result, likely approves more warrants than it should. Providing prescriptions for the problems we identify, however, is difficult, as it inherently requires us to venture beyond the confines of our careful statistical analysis into well-intended but less-empirically supported recommendations. That being said, by relying on the extant literature and considering the extra-legal factors we have discussed thus far, we feel there are a number of credible paths forward.

1. Continued Empirical Study: We start with the obvious and reliable call for more empirical analysis. While we are confident in our methods and have argued that our data and results can and should be informative regarding the broader warrant regime in the U.S., our study is one of only a handful of empirical investigations into the search and seizure process in the last half century.[174] More studies in more venues regarding a broader set of legal and behavioral outcomes are critical for both having a better understanding of the warrant process and instituting change that avoids the pitfalls of "one-size-fits-all" reform.[175]

But engaging in more empirical work is easier said than done. As we discussed in Section II.A, data availability is disappointingly low, despite the increased use of electronic warrants systems like Utah's e-Warrant program. Consequently, studies targeted specifically at individual steps in the warrant process or specific types of warrants are more likely to be fruitful. To this end, we are currently using Utah's data to explore police behavior at the front end of warrant submission (*e.g.*, cooperation with county attorneys and the prevalence of "judge-shopping"); police behavior at the back end of warrant execution (*e.g.*, hit rates as reflected in the warrant returns); and the use of warrants to

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[173] Such decisions include *Missouri v. McNeely*, 135 U.S. 1552 (2013); *Birchfield v. North Dakota*, 136 U.S. 2160 (2016); and *Mitchell v. Wisconsin*, 139 U.S. 2525 (2019), which required warrants for blood draws under circumstances involving impaired driving.

[174] *See* the research and accompanying discussions in notes 18, 19, and 20, *supra*.

[175] de Figueiredo & Thorley, *supra* note 149, at 625-27.

access digital information. Sound empirical analysis on no-knock warrants and potential race- and class-based disparities in searches and seizures also strike us as particularly fertile ground going forward.

States and local governments can ensure that researchers and academics (and the broader public) have access to the necessary data by implementing data transparency and reporting requirements with respect to certain warrants or the entire universe of searches. Many states have already done this, like Maryland's statutorily mandated disclosure of the number and nature of SWAT-involved no-knock warrants and California's monthly reports on emergency warrants for information from third-party electronic communication service providers.[176]

2. Doctrinal Reform: There will be those, of course, who will argue that the most direct avenue for meaningful reform is to change the legal standards by which judges evaluate warrant submissions and the standards of review employed when challenging the sufficiency of previously approved warrants. Legal scholars have consistently identified the probable cause standard as a low and discretionary bar,[177] so by elevating it, judges would necessarily be obliged to be more critical when reviewing warrant affidavits. One might imagine the standard with a higher burden of proof or with more bright-line standards. But in reality, doctrinal reform is likely a non-starter. Our current standards are embedded deeply within the Fourth Amendment jurisprudence and the discretionary underpinnings of probable cause doctrine are unlikely to undergo fundamental change any time soon.[178]

Doctrinal reform also has the disadvantage of being a primarily *back-end* recourse for problematic warrant practice. While a lower probable cause standard would ostensibly influence the initial stages

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[176] This data is available online. *See* Maryland Governor's Office of Crime Prevention and Policy, SWAT Team and No Knock Search Warrant, https://goccp.maryland.gov/crime-statistics/law-enforcement-reports/swat/ (last visited June 30, 2024); California Office of the Attorney General, Open Justice Data Portal, https://openjustice.doj.ca.gov/data (last visited June 30, 2024). At the federal level, the Administrative Office of the U.S. Courts published descriptive data on the number of delayed-notice search warrants (also called "sneak and peek" warrants) submitted and approved in the U.S. Federal Courts in 2022. *See* U.S. Administrative Office of the Courts, Delayed-Notice Search Warrant Report 2022, https://www.uscourts.gov/statistics-reports/delayed-notice-search-warrant-report-2022 (last visited June 30, 2024).

[177] *See* Slobogin, *supra* note 40; and Van Duizend et al., *supra* note 18, at 51-53.

[178] *See, e.g.* Kiel Brennan-Marquez, "*Plausible Cause": Explanatory Standards in the Age of Machines*, 70 VAND. L. REV. 1249 (2017).

of warrant review, our findings in this Article demonstrates that a given standard is not a sufficient bar against Fourth Amendment violations if the mechanism through which that standard is applied is even a bit unreliable. Furthermore, we suspect that changes in the standards would, especially at first, mostly influence the manner in which unconstitutional warrants are challenged during trial and at appeal. At that stage, substantial harm has already been done, even if the challenge is successful.

3. Policy Reform: Already seeing the deleterious effects of no-knock warrants, at least five states have implemented an outright ban on no-knock or no-announce entries, and half of all states in the U.S. have enacted some level of restrictions regarding the reach and implementation of no-knock warrants.[179] We applaud these efforts and encourage more legislatures to consider prescribing regulations that curb the danger that no-knock entries pose to the public while also recognizing the dangers they pose to law enforcement and the exigent circumstances that often exist, such as increasing the mandatory waiting period before entry with knock-and-announce procedures.

As an alternative to banning or augmenting the implementation of certain warrants, states could require mandatory review by police chiefs or prosecutors for certain types of warrants. While many states, including Utah, already rely on informal norms of prosecutorial review for many warrants, policy-level requirements could ensure that all necessary warrants—maybe those with the highest stakes—get an extra level of legal expertise while making the process more formal and more subject to scrutiny.

In a system where expediency is paramount but the judges who are reviewing the warrants are already overburdened, an obvious policy-level solution is to legislate more funding to the judiciary. This could come in the form of simply having more judges who review warrants, thereby spreading out the administrative load. But it could also be used to create new, specialized positions that are trained and solely focused on tasks like warrant review. States might also consider creating magistrate panels tasked with reviewing especially high-impact warrants, such as no-knock warrants, or more technically complicated warrants, such as requests for digital information from third-party service providers.

4. Institutional and Behavioral Reform: Courts, judges, lawyers, and law enforcement need not wait for formal legislative action in order to enact meaningful change. Many of the problems that

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[179] *See*, End All No-Knocks, *supra* note 14.

we have identified in this Article might credibly be addressed through simple, institutional- and individual-level reforms in how the warrant process is approached and who is involved. Indeed, we believe that some of the most impactful reforms might also be those that are the most feasible, as long as they account for the sorts of extra-legal influences we have highlighted throughout this Article.[180]

For example, in our past work on bail decisions, we have advocated for various "nudge" policies that change the nature of the choice architecture in which judges make their decisions.[181] While it can be tempting to believe that hardline standards or regulations on judicial decision making is a quick fix for undesirable behavior, these approaches often backfire.[182] Creating the warrant equivalent of a bail schedule, for example, where the probable cause determination and the extent of the warrant is purely determined by a pre-calculated set of factors is inevitably going to be clunky and, depending on the source of the factors, may increase race- and class-based disparities.[183] Likewise, simply requiring that judges spend more time on warrant review by instituting a timer will, by its nature, increase the amount of time an officer needs to wait for a warrant decision but may have no effect on the time the judge actually spends reviewing the warrant.[184]

Instead, adjusting the warrant review process so that it formally includes feedback loops or more individuals would strengthen its ability to serve as a true "check" on police behavior without ignoring the centrality of the judge or sacrificing expediency. A robust literature on auditing has demonstrated that the threat of external review

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[180] *See* Section I.D, *supra*, for a discussion of the extra-legal factors we felt were most relevant to warrant review.

[181] de Figueiredo & Thorley, *supra* note 149, at 622-25.

[182] *See*, *e.g.*, de Figueiredo, et al., *supra* note 74; and Petkin, *supra* note 74 (both finding that the "six-month list" used to motivate faster decisions in U.S. federal trial court does accelerate outcomes, but likely at the cost of quality).

[183] *See*, *e.g.*, Megan Stevenson, *Assessing Risk Assessment in Action*, 103 MINN. L. REV. 303, 309 (2018) (showing that risk assessment algorithms in Kentucky benefited White pretrial defendants more than Black defendants). *See also,* David Arnold, Will Dobbie, & Peter Hull, *Measuring Racial Discrimination in Bail Decisions*, 112 AM. ECON. REV. 2292 (2022) (using quasi-random judge assignment to identify racial disparities in bail decisions more broadly).

[184] Empiricists and theorists are increasingly finding that judges, like all people, act strategically in the face of constraints and regulation. *See* LEE EPSTEIN & KEREN WEINSHALL, THE STRATEGIC ANALYSIS OF JUDICIAL BEHAVIOR (CAMBRIDGE UNIVERSITY PRESS, 2021); and Pablo T. Spiller & Rafael Gely, *Strategic Judicial Decision Making*, NBER Working Paper (2007) (https://www.nber.org/papers/w13321).

(whether by colleagues or an independent agency) can have substantial impact on the amount of effort put into an action or report.[185] In the context of warrant review, courts might subject judges to occasional, random audits where all their decisions over the course of an hour could be reviewed live by another judge. Or that auditing process could take a purely *ex ante* approach, where judges review a selection of their past decisions with other judges, law enforcement, prosecutors, and even representatives from the criminal defense bar. The same approach could be taken with law enforcement officers, where the group audit could help address sloppiness in affidavits and clarify the distinction between constitutionally valid and overly broad requests. These delayed reviews would also benefit from having data on warrant returns and hit rates, as we discussed above.

For their part, judges should proactively push for more data transparency from their court systems and seek information regarding their own warrant practices. In our experience with this Article, judges have been genuinely shocked at the prospect of warrant review ever taking less than 60 seconds, let alone with the frequency we see in our data. Although we did not disclose data on their own behavior,[186] we suspect that nearly all judges consistently overestimate the amount of time they spend in their own reviews. Empirical studies have shown that becoming self-informed can have substantial effects on behavior and that being exposed to peer behavior changes the way in which you approach a given task.[187]

We would also encourage criminal defense attorneys to avail themselves of data on warrants (where it exists) to both identify circumstances that may have led to problematic outcomes, and potentially use the data to substantiate arguments made in court.

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[185] *See*, *e.g.*, Michael Hallsworth, *The Use of Field Experiments to Increase Tax Compliance,* 30 OXFORD REV. ECON. POL. 658 (2014); Guilia Mascagni, *From the Lab to the Field: A Review of Tax Experiments*, 32 AJ. ECON. SURVEYS 273 (2018) (both providing extensive review of the experimental literature surrounding tax policy, including auditing).

[186] IRB regulations and general ethical concerns prevent us from discussing identifiable data or data trends, even with the judge who made those decisions.

[187] While we are not aware of any experimental studies demonstrating peer effects in judicial behavior, randomized experiments conducted in the real world have demonstrated that knowing peer behavior changes one's approach to voting and household power usage. *See*, *e.g.*, Alan S. Gerber, Donald P. Green, & Christopher W. Larimer, *Social Pressure and Voter Turnout: Evidence from a Large-scale Field Experiment*, 102 AM. POL. SCI. REV. 33, 42 (2008); Ian Ayres, Sophie Raseman, & Alice Shih, *Evidence from Two Large Field Experiments that Peer Comparison Can Reduce Residential Energy Usage*, 29 J. L. ECON., & ORG. 992, 1015 (2013).

Although the process of gathering state-wide, comprehensive data on the search and seizure process is—from our personal experience with this Article—complex and resource intensive, case- or defendant-level inquiries are well within the capabilities of attorneys. To the extent that rapid review times are more indicative of rubber stamping or mistakes by the judges (and our qualitative analysis in Part V suggests it may be), attorneys or offices could use time-stamp data to identify red flags that warrant more in-depth investigation. More directly, defense attorneys might consider raising review times when challenging the sufficiency of a given warrant in a suppression hearing or appellate review. While success will ultimately depend on showing that probable cause was not met, highlighting problematically fast review times might narrow the latitude that trial and appellate judges give to the initial approval.

APPENDIX A: EXAMPLES OF WARRANT AFFIDAVITS

Figure A.1: Standard DUI Warrant Example

IN THE SECOND DISTRICT COURT - FARMINGTON DEPARTMENT

IN AND FOR DAVIS COUNTY, STATE OF UTAH

AFFIDAVIT FOR SEARCH WARRANT

STATE OF UTAH)
:ss
County of Davis)

The undersigned affiant, Officer [redacted] of Layton Police Department, upon an oath or written affidavit subscribed under criminal penalty, declares:

Your affiant has reason to believe that:

In the body of [redacted] further described as Hisp. male 602, 260 lbs, black eyes, black hair.;

In the City of Layton Police Department, County of Davis, State of Utah, there is now certain property or evidence described as:

Blood belonging to [redacted]

And that said property or evidence:

Contains evidence of the crime or crimes of: Driving Under the Influence, in violation of Utah Code Ann. Section 41-6a-502, specifically, the substance Marijuana.

The facts to establish the grounds for issuance of a Search Warrant are:

Your affiant, [redacted] a police officer with Layton Police Department, being duly sworn, deposes and states that:

I have been a police officer with Layton City for the past [redacted] years. I have had training in the investigation of the detection of imparied drivers. I have been trained in conducting the Standardized Field Sobriety Tests (SFST) used to detect impairment in drivers who are suspected of driving under the influence.

[redacted] was the driver of the vehicle that I stopped at Main and Hill Field Rd in Layton for an equipment violation. A Police K9 indicated on the vehicle. While

speaking further with the driver I could smell the odor of Marijuana. There was also burnt Marijuana found in the vehicle. [redacted] had red blood shot eye, a coated tonged, and slow and deliberate speech. [redacted] refused to get out of the vehicle and had to be forced out the vehicle. He was then arrested for DUI and transported to the Layton Police Department. He was read the admonition statement and the refusal and he refused the blood draw.

A warrant for a Blood draw is necessary to prevent the loss of evidence, to wit: through dissipation of the alcohol or any other controlled substance, from the Blood.

WHEREFORE, your affiant prays that a Search Warrant be issued for the seizure of said Blood at any time day or night, using a reasonable amount of force to obtain the sample.

I declare under criminal penalty of the State of Utah that the foregoing is true and correct.

Executed on: [redacted] @ 03:21 AM by /s/ [redacted]

Figure A.2: "Form" Affidavit for General Warrant

IN THE FOURTH DISTRICT COURT - ALL DEPARTMENT

IN AND FOR UTAH COUNTY, STATE OF UTAH

AFFIDAVIT FOR SEARCH WARRANT

STATE OF UTAH)
:ss
County of Utah)

The undersigned affiant, [first] [last] of , upon an oath or written affidavit subscribed under criminal penalty, declares:

That your affiant has reason to believe:

THAT

In the City of , County of Utah, State of Utah, there is now certain property or evidence described as:

and that said property or evidence:

Was unlawfully acquired or is unlawfully possessed;

has been used or is possessed for the purpose of being used to commit or conceal the commission of an offense; or

is evidence of illegal conduct.

Affiant believes the property and evidence described above is evidence of the crime or crimes of .

The facts to establish the grounds for issuance of a Search Warrant are:

WHEREFORE, your affiant prays that a Search Warrant be issued for the seizure of said items in the daytime.

I declare under criminal penalty of the State of Utah that the foregoing is true and correct.

Executed on: Today by /s/

- Page 1 of 1 Search Warrant No. [redacted]

Figure A.3: "Form" Affidavit for DUI Blood Draw

IN THE FOURTH DISTRICT COURT - ALL DEPARTMENT

IN AND FOR UTAH COUNTY, STATE OF UTAH

AFFIDAVIT FOR SEARCH WARRANT

STATE OF UTAH)
:ss
County of Utah)

The undersigned affiant, [first] [last] of , upon an oath or written affidavit subscribed under criminal penalty, declares:

Your affiant has reason to believe that:

In the body of , further described as ;

In the City of , County of Utah, State of Utah, there is now certain property or evidence described as:

belonging to .

And that said property or evidence:

Contains evidence of the crime or crimes of: Driving Under the Influence, in violation of Utah Code Ann. Section 41-6a-502, specifically, the substance .

The facts to establish the grounds for issuance of a Search Warrant are:

Your affiant, [first] [last], a police officer with , being duly sworn, deposes and states that:

A warrant for a draw is necessary to prevent the loss of evidence, to wit: through dissipation of the alcohol or any other controlled substance, from the .

WHEREFORE, your affiant prays that a Search Warrant be issued for the seizure and testing of said at any time day or night, using a reasonable amount of force to obtain the sample.

I declare under criminal penalty of the State of Utah that the foregoing is true and correct.

Figure A.4: Example Affidavit and Warrant Lacking Specificity

IN THE SECOND DISTRICT COURT - OGDEN DEPARTMENT

IN AND FOR WEBER COUNTY, STATE OF UTAH

AFFIDAVIT FOR SEARCH WARRANT

STATE OF UTAH)
:ss
County of Weber)

The undersigned affiant, Detective [redacted] of Weber Morgan Strike Force, upon an oath or written affidavit subscribed under criminal penalty, declares:

That your affiant has reason to believe:

THAT

On the premises known as [redacted] Ave.
Ogden Utah 84404,

On the person(s) described as: [redacted] Birthday [redacted] SSN [redacted]. Approximately 5'10 and weighs 225.
[redacted] Birthday [redacted] SSN [redacted]. Approximately 5'9 and weighs 195.

DNA from both suspects.;

In the City of Ogden Utah, County of Weber, State of Utah, there is now certain property or evidence described as:

DNA by form of buccal swabs.

and that said property or evidence:

Was unlawfully acquired or is unlawfully possessed;

has been used or is possessed for the purpose of being used to commit or conceal the commission of an offense; or

is evidence of illegal conduct.

- Page 1 of Affidavit for Search Warrant No. [redacted]

Affiant believes the property and evidence described above is evidence of the crime or crimes of Possession of a stolen firearm by restricted person..

The facts to establish the grounds for issuance of a Search Warrant are:

Your Affiant, [redacted] is an Ogden City Police Officer assigned to the Ogden-Metro Gang Unit. Your Affiant graduated Police Officer Standards and Training Academy in [redacted] Your Affiant spent [redacted] years in the Patrol Division with the Ogden City Police Department. During that time your Affiant also spent 5 years on the Ogden Metro SWAT Team. Your Affiant is utilized as a Field Training Officer responsible for training new probationers, where Your Affiant, due to Your Affiant's knowledge of several aspects of law enforcement including: narcotics, gang crimes, DUI's (traffic crime), field interviews, property crimes and crimes against persons; is in charge of training new recruits. Your Affiant was assigned to the Gang Unit in [redacted]

Your Affiant has training in drug terminology, drug identification, drug interdiction and search and seizure. All were through Multijurisdictional Counterdrug Task Force Training in 2008 and 2013. Basic SWAT Tactics and Hostage Rescue in August of 2008. Your Affiant was also assigned as a SWAT Instructor from 2009 to 2013. Your Affiant, as a member of the Ogden Metro SWAT Team, executed numerous search warrants for narcotics and weapon related cases. Your Affiant has received training in field testing narcotics through P.O.S.T. and through the Ogden City Police Department. Your Affiant has training in Interview and Interrogation through Multijurisdictional Counterdrug Task Force Training in 2010, Patrol Interdiction through Multijurisdictional Counterdrug Task Force Training in 2008, Field Training Officer Certification from Ogden City Police Department in 2008 and Gang Awareness through the Northern Utah Gang and Youth Violence Conference in 2008 and 2013. In this training, Your Affiant, gained in depth knowledge of Outlaw Motorcycle Gangs, Ogden Trece, Suerenos, 18th Street and Nortenos Gangs.

Due to Your Affiant's training and experience, Your Affiant has knowledge of what items would most often be found at the premises where there are suspect using, selling and manufacturing these drugs. Your Affiant has worked numerous narcotics cases while a Patrolman at Ogden City Police Department giving Your Affiant experience on which to base his conclusions. The items are those I have listed in the description of the items to be searched for.

Your Affiant is familiar with how controlled substances are manufactured, transported, packaged for sale, hidden and ingested. Your Affiant has also become familiar with the street terms used for controlled substances. Your Affiant has received numerous excellent work awards from 2010 to 2013, a distinguished unit citation in [redacted] Your Affiant has experience and

training in executing search warrants and interviewing individuals that use and sell narcotics.

Your Affiant was called to assist AP&P agents on a traffic stop at 27th St. and Jackson Ave. During the course of their stop they located a stolen firearm under the seat. The vehicle that was stopped is a [redacted] UT listing [redacted] The vehicle was being driven by [redacted] The passenger was identified as [redacted]. AP&P conducted the on [redacted] and located the firearm under the seat of Moncada. Both individuals could have easily reached and possessed the firearm. The firearm is a SCCY CPXI 9mm serial number [redacted]

WHEREFORE, your affiant prays that a Search Warrant be issued for the seizure of said items.

I declare under criminal penalty of the State of Utah that the foregoing is true and correct.

Executed on: 29th day of March, 2017 @ 07:34 PM by /s/ [redacted]

IN THE SECOND DISTRICT COURT - OGDEN DEPARTMENT

IN AND FOR WEBER COUNTY, STATE OF UTAH

SEARCH WARRANT

No. 1567681

COUNTY OF WEBER, STATE OF UTAH

To any peace officer in the State of Utah:

Proof by Affidavit made upon oath or written affirmation subscribed under criminal penalty of the State of Utah having been made to me by Detective [redacted] of Weber Morgan Strike Force, this day, I am satisfied that there is probable cause to believe

THAT

On the premises known as [redacted]
Ogden Utah 84404,

On the person(s) of: [redacted]
Approximately 5'10 and weighs 225.
[redacted] Approximately 5'9 and weighs 195.

DNA from both suspects.;

In the City of Ogden Utah, County of Weber, State of Utah, there is now certain property or evidence described as:

DNA by form of buccal swabs.

and that said property or evidence:

Was unlawfully acquired or is unlawfully possessed;

has been used or is possessed for the purpose of being used to commit or conceal the commission of an offense; or

is evidence of illegal conduct.

Affiant believes the property and evidence described above is evidence of the crime or crimes of Possession of a stolen firearm by restricted person..

YOU ARE THEREFORE COMMANDED:

to make a search of the above-named or described person, vehicle, item, and/or premises for the herein-above described property or evidence and if you find the same or any part thereof, retain such property in your custody subject to the direction of a prosecutor or an order of this Court.

Dated: [redacted] 2017 @ 07:54 PM /s/ [redacted]



Figure A.5: Minute Warrant Example

IN THE FOURTH DISTRICT COURT - ALL DEPARTMENT

IN AND FOR WASATCH COUNTY, STATE OF UTAH

SEARCH WARRANT

No. [redacted]

COUNTY OF WASATCH, STATE OF UTAH

To any peace officer in the State of Utah:

Proof by Affidavit made upon oath or written affirmation subscribed under criminal penalty of the State of Utah having been made to me by Detective [redacted] of Heber City PD, this day, I am satisfied that there is probable cause to believe

THAT

On the premises known as A rose gold iPhone, further described as A rose gold iPhone with a clear case and broken screen protector;

On the items(s) described as: Any messaging capabilities, and photos;

In the City of Heber City, County of Wasatch, State of Utah, there is now certain property or evidence described as:

Any evidence of illegal activity

and that said property or evidence:

Was unlawfully acquired or is unlawfully possessed;

has been used or is possessed for the purpose of being used to commit or conceal the commission of an offense; or

is evidence of illegal conduct.

Affiant believes the property and evidence described above is evidence of the crime or crimes of Arranging to buy illegal drugs.

YOU ARE THEREFORE COMMANDED:

- Page 1 of Search Warrant No. [redacted]

to make a search in the daytime of the above-named or described person, vehicle, item, and/or premises for the herein-above described property or evidence and if you find the same or any part thereof, retain such property in your custody subject to the direction of a prosecutor or an order of this Court.

Dated: [redacted] 2018 @ 02:34 PM /s/ [redacted]

APPENDIX B: ADDITIONAL FIGURES AND TABLES

Table B.1(a): Warrant Approval Time (Minutes) by Mixed Crime Category

Crime Category	Obs.	Min	Max	10th %tile	First Quart.	Median	Third Quart.	Mean
Violent	1,595	0:08	721:31	1:08	2:00	3:35	6.:56	8:51
Property	1,055	0:06	1,058:03	1:16	2:03	3:35	6:12	8:43
Drug	1,245	0:08	662:40	1:05	1:55	3:12	5:31	6:53
Vice/Morals	1,589	0:10	1,150:30	1:11	2:08	3:51	7:34	10:07
Motor Vehicle	6,375	0:10	133:20	0:47	1:14	1:59	3:11	2:49
Other Crimes*	4,613	0:07	1,109:13	1:07	1:58	3:26	6:16	7:25
All Approvals	29,810	0:01	84,698:26	0:57	1:37	2:50	5:12	14:22

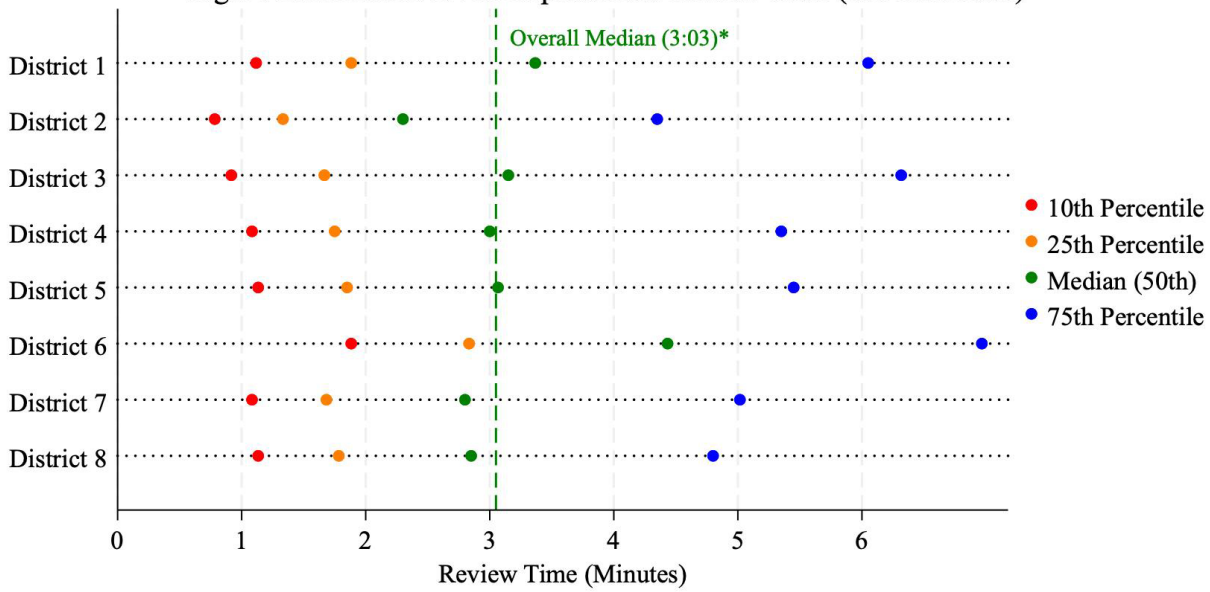
Notes: Mixed crime categories are determined based on whether a given warrant is coded as having that category (*i.e.*, double counting occurs). The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. Minutes are reported as Minutes:Seconds. *Other Crimes were those warrants that were coded to crime types other than the five main categories included above.

Table B.3(b): Warrant Approval Length (Words) by Mixed Crime Category

Crime Category	Obs.	Min	Max	First Quart.	Median	Third Quart.	Mean
Violent	1,595	366	18,511	935	1,255	1,768	1,719.07
Property	1,055	370	11,306	886	1,198	1,633	1,373.62
Drug	1,245	366	6,622	862	1,161	1,567	1,295.63
Vice/Morals	1,589	366	1,800	968	1,392	2,299	2,340.72
Motor Vehicle	6,375	338	3,642	566	662	805	712.23
Other Crimes*	4,613	389	18,511	935	1,335	1,870	1,521.54
All Approvals	29,817	279	18,511	564	979	1,489	1,264.74

Notes: Mixed crime categories are determined based on whether a given warrant is coded as having that category (*i.e.*, double counting occurs). The sample only includes approved warrants (those with PDF images) and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. *Other Crimes were those warrants that were coded to crime types other than the five main categories included above.

Figure B.1: District-level Disparities in Review Time (All Outcomes)



Notes: The sample includes all review decisions, including approvals, denials, and withdrawals and removes outliers, where outliers are defined as any review time that exceeds 7,200 minutes, or 48 hours. *Overall Median reflects the median for the entire sample.

APPENDIX C: SUPPLEMENTAL EXPLANATIONS OF DATA AND METHODS

C.1: Detailed Description of Dataset Sourcing and Cleaning

1. PDF Images and Machine-Algorithm Text Analysis: Using the Utah Administrative Office of the Courts (AOC) database, Xchange, we obtained digital PDF images of every unsealed digital affidavit, warrant, and return submitted and approved (denied and retracted warrants are not available, as explained in Section II of the Article) through the e-Warrants system from December 1, 2013, to January 29, 2020.[1] Xchange is ostensibly designed for easy access by parties and attorneys in criminal (and civil) cases, but it is also provided to academic researchers on an as-needs basis.[2] Because the Xchange system explicitly prohibits electronic "scraping" tools (*i.e.*, code or programs that automatically download files *en masse*), we manually downloaded each of the relevant warrant PDFs one by one.

At an individual level, procuring substantive information from the PDF files is fairly simple. Some of the data—submitting officer name, law enforcement agency, court location, and the dates of the affidavit, warrant, and return—are already available as bulk metadata via the AOC and all the information necessary to match it with the individual PDF images. Other key data points such as reviewing judge name and length can be determined simply by reviewing the last page of the affidavit. Even the more substantively complex aspects that we hoped to identify such as the legal "type" of the warrant and the length of individual sections within the warrants can be determined in short order by reading over the affidavit language.

However, our dataset included over 33,000 such affidavits,[3] so an individual manual coding of them is impracticably labor- and cost-intensive. Therefore, we turned to natural language processing (NLP) methods, a computational approach, to help with the analysis of the

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[1] *See* our discussion of sealed warrants in note 118, *supra* (in Article body).

[2] A basic description of the Xchange system is available at https://www.utcourts.gov/en/court-records-publications/records/xchange.html. The Xchange system explicitly prohibits electronic "scraping" tools (i.e. code that automatically downloads files *en masse*), so we manually downloaded each of the relevant warrant files one by one.

[3] This number is greater than the number of affidavits explored in our general analysis because that analysis only included affidavits that were approved during 2017-2019, the years in which time-stamp data for the reviewing judge's first viewing were collected.

warrants. The warrants were converted from their original image format as PDF documents to raw text using a combination of two methods. First the texts were converted to text using the PDFminer[4] library in Python 3.[5] However, the textual information from the judge's seal could not be accurately converted using this method. Thus, a second method, PyTesseract,[6] a Python wrapper for Google's proprietary OCR Engine, was also employed to both check the accuracy of the first conversion method and to convert the text from the seal. The PDF images contained the full text of the affidavit for the search warrant, the warrant itself, and the return for the search warrant as well as some metadata for the corresponding documents.

Relevant data was then extracted from the documents using regular expressions (or regex), an algorithmic method for advanced pattern matching in textual data. Using regex, the file was divided into its three documents (i.e., the affidavit, the warrant, and the return), and metadata about the warrant number, jurisdiction, dates, references to criminal statutes, officers submitting or returning the warrant (e.g., name, agency, rank), and judge were generated for each file. These regular expressions were developed over several iterations and evaluated for their precision and recall to ensure that they were maximally accurate. In our final test set of 50 warrants, the accuracy of these regular expressions yielded 100% accuracy, although in the larger dataset of 33,000+ warrants, small numbers of errors were observed.

From the affidavits, two additional blocks of text were extracted using a large language model (BERT[7]): (1) an explanation of the facts to provide grounds for the search warrant, and (2) a description of the submitting officer's experience that qualifies them to make the relevant judgments about the grounds in the search warrant. Word counts were then generated for each affidavit, warrant, and return as well as the descriptions of facts and officer experience using Python. While the text identification process for the facts and experience are much more complex and, consequently, less accurate,

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[4] Y. Shinyama, *Python PDF Parser and Analyzer. Documentation for the PDFminer Library Package*, PDFMINER (2014), https://pdfminer-docs.readthedocs.io/pdfminer_index.html.

[5] Guido Van Rossum, & Fred .L. Drake, *Python 3 Reference Manual*, (2009).

[6] S. Hoffstaetter, et al. *Python-tesseract is a Python Wrapper for Google's Tesseract-OCR* (2020), https://pypi.org/project/pytesseract/.

[7] Jacob Devlin, et al *BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding*, arXiv preprint ARXIV:1810.04805 (2018).

they provide us with an accurate enough measure to use in some of our robustness checks below (see Section III.B.2 of the Article).

2. Electronic Warrants Administrative Data: The second of our key datasets comes from the largely untapped data from the Utah Department of Public Safety (DPS).[8] Critically, for our study (and the element that makes our dataset so novel), the electronic warrant system records a series of metadata. These include time stamps at the second level for when (1) the officer submitted the affidavit, (2) the magistrate viewed by the affidavit, (3) the magistrate made a decision on the warrant application (retraction, approval, or denial), and (4) the officer served the warrant. The data contains a warrant identification number, which allows us to easily connect it with the PDF image data, but does not have geographic, judge, or other information. The DPS retains data starting from April 6, 2016, although only starting on March 28, 2017 does the data include a timestamp for when the judge viewed the affidavit.

We obtained this dataset through a Government Records and Access Management (GRAMA, Utah's equivalent to FOIA) Request, which was initially denied but granted on appeal.[9] The DPS data for this study ends on January 29, 2020 (the date our data request was fulfilled).

3. Imputed Reviewing-Judge Data: As we alluded to earlier, our dataset only includes PDF images for *approved* affidavits. In other words, the small percentage of affidavits that are submitted for review and subsequently denied by the reviewing judge or withdrawn by the submitting officer will have administrative metadata (e.g. timestamps) but not any PDF images that allow us to create data derived from the text of the affidavit itself. While we discuss the ways in which this prevents us from conducting certain analyses in Section I.D of the Article, we are able to impute the reviewing judge for a denied or retracted affidavit by reconstructing the county-level shifts for each day covered in our broader dataset. This allows us to conduct some judge-level analyses on those denied and retracted affidavits, such as exploring the likelihood of approval in Part IV of the Article.

We created this shift data using a combination of schedules provided to us by county administration and the reviewing-judge patterns that existed in the PDF image data we were able to scrape. Starting with the PDF-derived data, research assistants ordered the

[8] We note the previous work by the *Salt Lake Tribune* that used a small portion of this data in their analysis. *See* MILLER & WEIBER, *supra* note 20 (in Article body).

[9] Utah Code 63-G.

dataset by county and then by submission date and tracked the approving-judge name by hand, noting any clear changes in the judge name and when those changes occurred. Once the entirety of a given county's data was coded, we attempted to identify patterns in the variations that translated to identifiable week-, or month-level "shifts."[10] Overlaying those patterns back onto the existing data, we then calculated the judge who approved the majority of the warrant affidavits during a given shift and assigned that judge as the "on-call" judge.[11] This process provided us with clear shift data in all but two of Utah's judicial districts (Districts 2 & 5).[12]

With the shift data, we then needed to determine what the parameters of our shift imputations would be. On the one hand, the most conservative assumption would be to assign all warrants reviewed during a given shift to the judge assigned to that shift. On the other hand, however, we have confirmed through interviews with law enforcement officers and judges (and some instances in the data) that the actual process is more complicated and that affidavits are not always sent to the judge who is on-call during a given shift.

For example, in one of the warrants in our dataset an officer submitted a warrant affidavit during shift 1, was denied by the judge (anonymous in our data), resubmitted during the next shift, was denied again, and submitted during a third shift, where the warrant was denied for the last time. We might be justified in assuming that the reviewing judge for each submission was the on-call judge at the time of each submission, but it is also possible that the officer resubmitted the warrant both times to the judge who had originally reviewed the warrant given her familiarity with the contents.

While we have some intuitions regarding the most likely path a warrant took in a given scenario (informed by some anecdotes shared by officers we interviewed), the various permutations in the data are

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[10] As we discussed above, four districts have week-long shifts, generally starting and ending at 8am on Mondays; one has two-week shifts; and three have month-long shifts.

[11] We acknowledge that this approach is not perfect. Indeed, we are certain that the judges assigned to periods within our shift data deviate from the actual judge who sat and reviewed warrants. However, we were able to confirm our inferences regarding the basic structure of the shifts (e.g. when and how long the shifts were) in discussions with county administrators.

[12] In these two districts, there appeared to be main judges on call but a backup judge that takes warrants throughout the other judge's shift. The switching between these two judges was significant enough that we did not feel comfortable making any inferences regarding reviewing judge. Consequently, these districts are not featured in our judge-level analysis of approval rates in Part IV (in Article body).

sufficiently complex that any attempt at systematically imputing each of them made the analysis unwieldy. As a result, our dataset adopts the more conservative approach—where the on-call judge is assumed to be the judge who reviewed an affidavit submitted but denied or retracted during that shift. Any approved warrants during that period retained the reviewing judge that we scraped from the PDF images for the purposes of our analysis.

4. Hand-Coded Data: While most of the data we use in this study is available in bulk metadata form or is electronically scraped from the PDF images, some of the data required manual efforts.

Although our analysis is completely anonymous on the judge level, we do draw some correlations between the amount of time reviewing and likelihood of approval for a warrant affidavit and the characteristics of the reviewing judge. Some of this data comes from Utah's Judicial Performance Evaluation Commission (JPEC), a state-sponsored committee which conducts regular performance evaluations of each judge or magistrate in Utah, primarily as a mechanism for providing information to Utah's voters during the judges' retention elections.[13] Their dataset provides detailed results from these evaluations (some of which we use in our study) but also compiles clean, up-to-date registries of the judiciary, including judge names, tenure, and court.

We add to this base dataset with a rich set of hand-coded biographical variables on each judge, including their gender, race/ethnicity, legal education, professional experience (whether they were formerly a prosecutor or a criminal defense attorney), and the time and manner of appointment. This information was gathered by research assistants using a mix of the judge biographies included on court websites and online search engines (e.g. google).

In addition to the previously described administrative data, our qualitative analysis also relies on two in-depth hand-coded sources of data. First, we make use of a hand-coded random sample of 228 affidavits, warrants, and returns from the Utah AOC database. Second, we similarly review 40 warrants that were approved in a minute or less. We discuss our use of these samples in detail in Part V of the Article.

5. Dataset Merging and Additional Cleaning: Due primarily to the fact that the recording of first viewing timestamps in the DPS data was only recorded starting in March 2017, the primary dataset used in this study limits all the datasets (AOC PDF data, hand-coded judge

[13] *About Us*, UTAH JUD. PERFORMANCE EVALUATION COMM'N, https://judges.utah.gov/about-us/ (last accessed June 21, 2024).

data, shift data) to the period of March 2017 to December 2019.[14] Additionally, as we describe in Section III.A of the Article, we excluded outlier review times for portions of our analysis.

C.2: Jaccard Similarity

While computational approaches for measuring similarity have been widely used in other fields, it has only recently been applied to analyzing legal texts.[15] An extended outline of the technicalities of Jaccard similarity is beyond the scope of this Article,[16] but we feel it warrants a brief explanation. Like most measures for linguistic similarity, Jaccard similarity (also called the Jaccard index) involves the direct comparison of two distinct datasets and computes a ratio of dataset observations that are the same relative to the overall number of observations in those data.[17] In the case of this study, we compute word-level Jaccard coefficients for each of the approved affidavits in our dataset against every other affidavit. While including all affidavits (denials and retractions) in this analysis would be ideal, we are once again limited by the fact that only the PDF images of the approved affidavits are retained in the warrant database.

Using a simplistic but germane example of search warrants, imagine that the entirety of a warrant affidavit, Affidavit A, stated only that, "The suspect was seen pocketing a bag with *unidentified* contents." A second affidavit, Affidavit B, states that, "The suspect

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[14] Although we have some data for 2020, we are not including it due to concerns about the effect that the advent of the COVID pandemic had on the "normal" search and seizure process.

[15] *See*, *e.g.*, Jeremy McClane, *Boilerplate and the Impact of Disclosure in Securities Dealmaking*, 72 VAND. L. REV. 222 (2019), using Cosine Similarity–a methodological cousin to Jaccard Similarity–to measure text-similarity in IPO documents.

[16] As a mathematical methodology, Jaccard Similarity is more than a century old. *See* Paul Jaccard, *The Distribution of the Flora in the Alpine Zone*, 11 NEW PHYTOLOGIST 37 (1912). However, it has been further developed over that time and is commonly used in linguistic analysis for measuring text similarity. *See, e.g.,* Abhishek Jain, et. al, *Information Retrieval using Cosine and Jaccard Similarity in Vector Space Model*, 164 INT'L J. COMP. APPLICATIONS 28 (2017) (documenting the use of Jaccard Similarity to document match over the internet).

[17] In formal terms, a Jaccard coefficient for datasets A and B is equal to the number of observations shared between A and B divided by the sum of the shared and unshared observations in A and B:

$$J_{A,B} = |A \cap B| / |A \cup B|$$

where $|A \cap B|$ represents the shared observations and $|A \cup B|$ represents all observations.

was seen pocketing a bag with *white* contents," would have a Jaccard coefficient of 0.9 because there are 18 similar observations between the two affidavits (9 words in each affidavit) and 20 observations in total. Similarly, comparing Affidavit A to a third affidavit, Affidavit C, that states that, "The suspect was seen pocketing a bag with *white powder*," would produce a Jaccard coefficient of 0.8 because only 16 of the 20 observations are similar. Conversely, the Jaccard coefficient for the comparison of Affidavits B and C would be 0.9. Computing the Jaccard similarity scores for full-length affidavits is more computationally complex than these single-sentence examples, but the resulting coefficient is still straightforward in interpretation.

Using Jaccard Similarity scores naturally comes with some limitations, although we feel that they are mitigated somewhat by the general goal behind this robustness check. First, the Jaccard scores do not tell us anything about *why* there is a difference between the two affidavits, only the size of the difference. A Jaccard coefficient for two affidavits might be 0.5 because 50 percent of one affidavit is completely different than another affidavit, or it might be that the second affidavit contains all of the text of the first but also includes substantially more language that was not included in the first affidavit at all. Second, a Jaccard coefficient is content neutral, which is to say that the word-to-word similarity does not account for the relative substantive importance of some words over others (*e.g.* facts vs. non-facts). Using the example from above, the comparison between Affidavits A and B would yield the same coefficient as a comparison between Affidavit A and a fourth affidavit that states, "A suspect was seen pocketing a bag with unidentified contents." Even though the difference between the first and second affidavit (i.e. a bag with unidentified contents vs. one with white contents) is clearly more substantively important than the mere change in articles between the first and fourth ("The suspect" v. "A suspect"), the Jaccard Similarity score would be the same. However, because we are only broadly concerned with overall similarity for the purposes of excluding boilerplate-type observations from our dataset, neither of these limitations prove to be overly limiting.