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Mythic Infallibility of the Dog's Nose: Unreliable Information in Law Enforcement Search and Seizure

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ABSTRACT

Background. The Fourth Amendment to the U.S. Constitution guides two social goods exhibiting an essential tension: effective law enforcement search and seizure, and protection of privacy. Unreliable information may subvert the U.S. judicial process. In Fourth Amendment cases involving the use of dogs to sniff out drugs, the validity of this Constitutional guidance is called into question by: the capabilities of the dog, the dog's training, the nature of human-canine interaction, the questionable objectivity of law enforcement officials who base the legitimacy of their searches upon dogs' alerts, and the knowledge of judges and lawyers of the capabilities of human-canine search teams. Each of these elements is characterized by and generates many kinds of information. Concerns about such information, however, are major.
Objectives. We explore these concerns through a detailed examination of the 2013 U.S. Supreme Court decision *Florida v. Harris*, draw some policy conclusions about the implications of this use of unreliable information in the judicial system, and provide a brief summary of the information-centric questions the paper considers.

ANOTHER ISSUE OF INFORMATION AND SOCIAL JUSTICE

There has been considerable scholarly attention in recent years related to information and social justice, such as bias in algorithms, and under-representation of women and members of minorities in highly compensated information technology fields. In this paper, we address a different issue of information and social justice, namely the subversion of fair search-and-seizure practices caused by incorrect or questionable information provided through the use of sniffer dogs to establish probable cause. Failure of the probable cause system undermines social justice, but it is particular noteworthy because these searches occur more frequently to poor people, especially to people of color. Exploring information, probable cause, and privacy

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in the context of drug-sniffing dogs reveals many concerns of interest to information scholars and practitioners, as well as to legal, policy, and other actors.

Dogs have a much more acute sense of smell than humans,[1] so humans regularly employ dogs to sniff for illegal drugs or explosives as an augmentation of themselves,[2] and these uses have significant privacy implications.[3] The use in the United States of dogs, with their acute sense of smell, to detect drugs has been the subject of a number of formal legal decisions; and these cases offer us some important insight into the complexity of this type of surveillance and the pressing public policy questions they bring to the fore. The primary bases of these decisions lie in considerations related to whether and how the use of drug-sniffing dogs constitutes a search under the Fourth Amendment to the U.S. Constitution,[4] with particular emphasis on questions related to whether a drug-sniffing dog's alert constitutes probable cause to institute a search or to seek a warrant from a magistrate. These are, in substantial ways, informational questions.

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[1] Dogs have between 200 and 300 million olfactory receptors, while humans have approximately five million (Turner, 2018). If the wind is correct, a good sniffer dog can sometimes detect some smells from 1000 meters (U.S. War Dog Association, n.d.). Dogs also have separate breathing and smelling mechanisms in their noses, which enables continuous sniffing episodes lasting up to 40 seconds (Levine, 2013).

[2] Sniffer dogs are used for other purposes as well, including search for cadavers, bed bugs, illegal cell phones in prisons, invasive species (e.g., quagga mussels) on boats at public boat ramps, and cancer in humans. In a prominent national case, a sniffer dog named Bear found the hidden flash drive that had been overlooked by the police at the home of Subway spokesperson Jared Fogle, which helped to convict him of child pornography and illegal sexual contact with a minor (Smallwood, 2018; Wayne County Forfeitures, n.d.). In a more humorous vein, in a cartoon one dog says to another: "Did you hear—we're being transferred from bomb-sniffing to trans fats" (Mike Twohy, *New Yorker*, 23 December 2013). Indeed, cartoons featuring sniffer dogs are popular. If one searches on CartoonStock.com, for example, one finds thousands of these cartoons.

Denning (2012) points out the fear that an individual—innocent or not—might possess can be detected by a German Shepherd. Some dogs are especially frightening to the public. As a result, the Transportation Security Administration is replacing some of its pointy-eared dogs such as German shepherds with presumably less threatening floppy-eared dogs such as Labrador retrievers (Brulliard, 2019).

The Russian airline Aeroflot has been breeding sniffer dogs for more than 30 years. They are promoting a new breed called Shalaika as the best sniffer dog in the world. The Shalaika, which is reported to have 95% accuracy at sniffing out explosives, is a hybrid of a jackal and an Arctic reindeer herding dog (RussianDog.net, n.d.).

[3] In *The Culture of Surveillance*, David Lyon talks at length about the surveillance imaginary of post-9/11 travel, including how emotion contributes to our practices of surveillance. He discusses how full-body scanners, full-body searches, and other techniques can easily arouse fear. Emotion-laden responses are common reactions to drug-sniffing and other surveillance dogs. As Lyon observes, "Fear is a powerful means of obtaining compliance or of silencing voices" (p. 59; also see pp. 61-63 on "The emotional life of surveillance"). As has been long established in the literature of surveillance, based on theoretical and empirical evidence, the primary goal of surveillance is not simply observation but is instead classification—"social sorting" that uses power to change, manipulate, and determine people's behavior. The work of both David Lyon and Oscar Gandy, especially on the discriminatory panopticon, is especially valuable to our understanding of this aspect of surveillance and its political effects.

[4] The Fourth Amendment of the U.S. Constitution states: "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized."

We contend that the important question of the reliability of drug-sniffing dogs has been given too little attention by the U.S. legal system as a whole, as well as by information studies and cognate disciplines. Our close examination of a 2013 U.S. Supreme Court case involving the use of a drug-sniffing dog (*Florida v. Harris*, 2013) shows the failure of many actors in the justice system to understand, probe, and seriously consider important questions related to the information generated by, and to the reliability of dogs' alerts in these circumstances—questions that materially affect the outcome of the judicial decision.[5]

While this paper uses historical, legal, public policy, and other methods, it springs primarily from the discipline of information studies and the field's contribution to the study of information policy. More particularly, this paper contributes to surveillance studies, an active field of research in information studies, by examining a largely neglected topic regarding a common method used in search and seizure. While information scholars often focus on information behavior, information retrieval and evaluation, data studies, classification, human interactions with computers, and especially libraries and archives, there are many institutions of modern society in which information plays an important, even defining role. The justice system, which is about the finding of fact, is an important one; it has created elaborate procedures and rules for making the process of finding fact legitimate and unbiased, but there are nevertheless information gaps in this process, as we demonstrate.

The paper is, more generally, about the quality of information and how human institutions and rewards provide incentives (e.g., higher arrest and conviction rates, and seized property) for both human agents and the system as a whole to undermine the quality of information. It is also about how contextual factors, such as the quality of the dogs and the training of dogs and handlers, have a marked impact on the quality of information. The paper, on human-canine interaction, provides an irreverent parallel to the commonly studied field of human-computer interaction, because both the computer and the canine are information tools, and there are complex and interesting issues when they work in tandem with humans. This paper also draws upon the use of formal logic as a way of analyzing an information issue. Few information scholars have adopted this method of analysis, but we commend it as one worthy of wider use. The conclusions focus on policy implications of unreliable information from our canine friends' noses and related information questions.

We begin with an examination of the reliability of drug-sniffing dogs, then move to a discussion of the relationship between dogs and their handlers, with a particular emphasis on how that relationship implicates dogs' reliability and, therefore, the quality of information generated from the human-dog relationship. We briefly identify and explore some of the important difficulties posed by reliance in the judicial system on the use of interested parties to provide the training, certification, and evidence of the reliability of contraband-sniffing dogs. These interested parties, including dog handlers, other representatives of police agencies and prosecutors, and private certification agencies, cannot deliver unprejudiced evidence or information to our judicial system.

A fairer system of justice, especially related to the protection of privacy and information, subject to police surveillance and judicial review, demands a wider range of

[5] Such failure is especially troubling given the important roles that the judicial and legislative branches of government must play in circumscribing, defining, and overseeing the police powers of the executive branch of government, including those related to surveillance, search, and arrest. Because of the expansion of surveillance of all kinds, including the use of dogs in law enforcement and security situations, the lack of informed oversight of these powers is particularly disquieting and a significant failure of judicial duty. Such failure seriously undermines privacy.

experts and evidence to be involved. For example, the system needs data about occurrences of false positive alerts, as well as the testimony of those skeptical of dogs' ability to provide reliable information about the possession of illicit drugs. To illustrate this point, we take a deep dive into *Florida v. Harris*, a unanimous 2013 U.S. Supreme Court decision about the use of a drug-sniffing dog's alert as the foundation for probable cause for a search as defined under the Fourth Amendment. The paper concludes with (1) some policy recommendations regarding the use of contraband-sniffing dogs, probable cause, and privacy in our securitized and increasingly surveilled present and (2) summary remarks about the other important information questions that the paper identifies.

LEGAL BACKGROUND

In this section, we point to several other U.S. dog-sniffing cases related to the Fourth Amendment, both before and after the *Harris* case, and describe more closely one other Florida case (*Jardines*) that occurred at about the same time as the *Harris* case, and that is often studied in connection with it. It is beyond the scope of this paper, however, to examine these other cases in detail. All of them, however, relate to information and its quality in the U.S. legal system.

The U.S. Supreme Court ruled in 1983 (*United State v. Place*, 462 U.S. 696, 706, 1983; also see *United States v. Beale*, 674 F. 2nd1327, 9th Cir., 1982) that using a dog to sniff for drugs on the outside of luggage at an airport, or the outside of an automobile stopped legally at a checkpoint (*City of Indianapolis v. Edmond*, 531 U.S. 32, 40, 2000; *Illinois v. Caballes*, 543 U.S. 405, 409, 2005) does not constitute a search under the Fourth Amendment, and therefore does not require a warrant.[6] There are other situations, however, that have required additional scrutiny from the courts, for example, transporting marijuana in a trailer parked at a gas station (*United States v. Solis*, 1976), or narcotics dogs in public schools (*Doe v. Renfrow*, 1979; and *Horton v. Goose Creek Independent School District*, 1982).[7]

In one well-known case (*Florida v. Jardines*), the police in Miami, Florida, came to the home of Joelis Jardines after a crime-stopper report—the reliability of which the police did not verify—informed the police that marijuana was being grown in the house. The police had the dog (Franky) circle the house, and soon it sat down on the front porch, alerting the handler that there was a marijuana smell inside. Based on this alert, the police obtained a warrant to search the house and indeed found marijuana growing inside. The Florida Supreme Court ruled that the dog sniffing of a private home (which the courts have traditionally given greater protection because there is a greater expectation of privacy there) did constitute a search and

[6] The court also found in the *Edmond* case that the city had violated the Fourth Amendment when it created checkpoints to "detect evidence of ordinary criminal wrongdoing" (see Chemerinsky, 2012).

[7] *United States v. Solis* (536 F. 2nd 880) (9th Cir., 1976); *Doe v. Renfrow* (475 F. Supp. 1012, N.D. Ind. 1979); and *Horton v. Goose Creek Independent School District* (690 F. 2nd 470, 476, 5th Cir. 1982). The Mass.gov website discusses some additional relevant cases, mostly about Massachusetts: *Carey v. Commissioner of Corrections* 479 Mass. 367, 2018); *United States v. Grupee* (682 F.3d 143, 1st Cir., 2012); *Comm. V. Feyenord* (445 Mass. 72 (2005); *Comm. v. Lawson* (79 Mass App Ct 322 (2011); and *Comm. v. Negron* 29 Mass L Rep 483 (2012).

For a discussion of these cases, as well as *Place*, see Even (1987). Katz and Golombiewski (2011) argue that *Place* has set too lax standards on policing the police in dog-sniffing searches. Hunt (2005) argues that *Caballes* was "wrongly decided" and "constitutes a deeply problematic and dangerous intrusion into American civil liberties." For a legal review of cases related to *Caballes*, also see Denning (2012).

thus required a warrant. This decision was based in part on the precedent of *Kyllo v. United States* (533 U.S. 27, 2001) in which the U.S. Supreme Court ruled that the use of thermal imaging aimed at the outside walls of a private home from the vantage of public space was a search, and hence required a warrant. The thermal imaging had detected heat lamps used to grow marijuana plants inside the house. Part of the *Kyllo* ruling was that the police had used a device (thermal imaging device) that the public does not use; and in the *Jardines* case, the court found that the use of a trained dog is analogous to the use of an imaging device. In *Jardines*, the police did not have other reasons to use the dog sniffing on the porch of Jardines's house, and hence the court found the evidence (what non-lawyers might term "information") resulting from the warranted search inadmissible: the dog's alert did *not* provide probable cause for granting a search warrant. Florida appealed the ruling, and in 2013, in a 5-4 ruling, the U.S. Supreme Court affirmed that the dog sniffing constituted a search and thus required a warrant.[8]

We close this brief legal review with two, more recent U.S. Supreme Court cases. In *Rodriguez v. United States* (2015), the court ruled 6-3 that a police time extension (an addition of ten minutes to call in a backup officer before using a drug-sniffing dog after a legal traffic stop), in Nebraska, during which a ticket was issued for driving on a highway shoulder but for which there was no reasonable suspicion to investigate for drugs, constituted an unreasonable search. The court said it was reasonable to prolong a traffic stop to take actions such as run a records check, or inspect a driver's license or proof of insurance—for public safety reasons—but there was not sufficient nexus to call in a drug-sniffing dog. The case, however, was more about the time delay than about the dog-sniffing.[9]

In *Edstrom v. Minnesota* (139 S. Ct. 1262, 2019) the U.S. Supreme Court denied a motion to review lower court findings. In this case, the Minnesota court decided that the police did not need a warrant to bring a drug-sniffing dog into the hallway of an apartment building and sniff at a person's door. The police received a tip that Cortney Jon Edstrom of Brooklyn Park, Minnesota, was selling drugs out of his apartment. Using car registry and apartment registry records, they found where Edstrom lived, used a lockbox to enter the building, and the sniffer dog detected drugs when smelling the hallway door to the apartment. The police used this information to obtain a warrant and found drugs, a scale, and a gun on the premises. In particular, the court decided that the public hallways of an apartment building do not constitute curtilage in the same way as a porch of a home.[10]

THE CANINE PARTICIPANT

While many kinds of dogs are used for drug sniffing, the most common are German shepherds and Belgian Malinois.[11] Dogs are typically at least 12 months old before beginning

[8] Good, non-legal coverage of *Harris* and *Jardines* can be found in Denniston (26 July and 30 October 2012); Schott (2013); Gray (2013), and Hawke and Middleton 2012. For an extended legal analysis of both the *Jardines* and *Harris* cases, see Kinports (2013) and Clutter (2013-4).

[9] For more on this case, see National Constitution Center staff (2015); Hattem (2015); Shwartz (2015); Root (2015); and Warren (2017). For practical legal advice for drivers, see HG.org, n.d.

[10] On *Edstrom*, see (Colb 2019; Collins 2017; Cushing 2019; King 2019). For a similar case, see *State v. Nguyen*, N.D., No. 20130159, which is discussed Collins (2017); and in Bloomberg Law (2014).

[11] Turner (2018). These two breeds have been the most commonly employed dogs by the U.S. military in recent years because they are "very aggressive, smart, loyal and athletic" (U.S. War Dog Association, n.d.). Groves (2016) identifies 12 additional breeds that are well suited to be sniffer dogs: American pit bull terrier, beagle, border collie, bloodhound, coonhound, English springer spaniel, German short haired pointer, golden retriever, Labrador retriever, Nova Scotia duck trolling retriever, rough collie, and smooth collie (also see Leigh 2018).

training to be sniffer dogs, and dogs sometimes continue to serve until age 10. Demand for sniffer dogs has increased greatly since the 9/11 attacks, and there is at times a shortage of trained dogs. The typical cost of a sniffer dog is approximately $8,000, including shipping (typically from Europe, which supplies over 80% of dogs to U.S. law enforcement). Training costs, if the dog receives training in patrol work and urban tracking as well as detection, can be as high as $15,000. Many of these dogs are paid for by individual or corporate gifts, rather than the police budget.[12] The dogs and their handlers are often organized into a separate K-9 division in larger police departments.[13] Drug-detecting police dogs typically receive months of training and are tested before they are sent into the field. They are tested in tandem with their handlers, and typically the dog and handler continue to work as a team for as long as both are available (Melina, 2011). Testing includes not only dogs' smell-detecting abilities,[14] but also their emotional suitability for field work. Retesting of the team is conducted typically every three years.

When selecting a sniffer dog, U.S. law enforcement agencies look not only for an acute sense of smell, but also "[a] dog with drive. One who can hunt for scent for hours and not give up." Unfortunately, the dogs often arrive in the United States in poor condition: "These dogs—usually with ribs showing as a result of pacing in their kennels, being chronically underfed and then shipped long distances—arrive with the stench of kennel urine. They don't arrive with cheery notes from their trainers. Or warning labels" (Warren, 2016). The health, training, and personalities of the dogs is typically not provided. While many K-9 handlers form deep bonds with their dogs, others merely respect them, and a few actually fear them.[15]

How does one train a scent-detection dog? Following training in basic obedience, they are given positive reinforcement training to pick out the desired smells, using either the actual drug or a pseudo-narcotic that has a similar smell. There are structured exercises and a great deal of repetition training. Dogs have sensitive enough noses that they can generally detect drug residues, even when the drug is not present on the person at the time of sniffing (Turner, 2018). Older dogs tend to make better sniffer dogs because of their refined sense of smell.[16]

One successful trainer of sniffer dogs reports not beginning with the basic behavioral training one might give to a family dog (sit, down, fetch, give), but instead focuses first on instilling the "one desire [that] should override everything else: getting to the odor, wherever it's located" (Warren, 2016). This means designing exercises that addict a dog to a scent, training the dog in "obedience to odor" (Warren, 2016). Tasks are broken down into their simplest components, both for the dog's and the trainer's sake. Also, "in general, it means slowing down and not tossing a dog you don't know into a scrum of people and new situations he's not comfortable with, flooding him instead of teaching him. It means not rushing into training that might backfire" (Warren, 2016).

[12] National Police Dog Foundation, "Frequent Questions," n.d., https://www.nationalpolicedogfoundation.org/faq (accessed 23 April 2020).

[13] Dogs have been used in the United States for law enforcement only since the 1970s. However, there is a much longer history. The London police took bloodhounds with them in 1888 when they were trying to track down Jack the Ripper. In 1899 the police in Ghent, Belgium, began to train dogs for police practice, and the use of dogs for law enforcement spread rapidly to Germany and England (Dogs for Law Enforcement, n.d.).

[14] Some drugs, such as LSD, have little smell, but the chemicals used to make them have detectable smells. Other drugs, such as marijuana, have a strong smell.

[15] On the relationship between cops and dogs generally, see Colb (2018).

[16] See Smallwood (2018) on the use of older dogs and concerns about retraining and boredom for sniffer dogs. There is also a comparison there of using mice instead of dogs for these sniffer missions. Mice, jackals, and elephants all can smell at least as well as dogs (Levine 2013; also see ICTS, n.d.).

One can obtain a further sense of the process of training a drug dog and its handler from an examination of the website of Custom Canine Unlimited (2020). which sells and trains dogs for this purpose. The dogs are trained to detect the smells of marijuana, cocaine, methamphetamines, and heroin. An interview identifies the needs of the buyer, and the dog and handler are trained specifically to those needs. The training program is approved by various organizations such as the South Carolina Criminal Justice Academy and licensed by the Drug Enforcement Agency. Dogs are hand-selected on the basis of "drive, characteristics, and health" (Custom Canine Unlimited 2020). Including the handler in the training and testing is critical because, "Knowledge must flow down the leash not up it" (Custom Canine Unlimited 2020). A typical single-purpose K-9 handler course at this academy runs 120 hours over three weeks and involves both classroom and field instruction.

The dogs seldom get poisoned by the illegal drugs. There is one case, however, in Florida, where sniffer dogs became ill from sniffing the opioid fentanyl (Smallwood, 2018). These dogs sometimes suffer from canine post-traumatic stress disorder (Levine, 2013).

CANINES, HUMAN-CANINE INTERACTIONS, AND THE JUDICIAL PROCESS: THE RELIABILITY OF INFORMATION

By law, a sniffer dog needs to be trained, certified, and reliable, but it does not need to be 100% accurate (Overson, n.d.). Commentators have noted the courts' belief in the "mythic infallibility" of the dog's nose, either assuming the reliability of the dog's alert or addressing reliability in at most a perfunctory way (Taslitz, 1990). Multiple studies have shown, however, that the number and proportion of false positives, a serious occurrence of bad information, from dog sniffing are quite high.[17] For example, based on three years of suburban police department data, the Chicago Tribune found that only 44% of sniff dogs' positive signals led to discovery of drugs or paraphernalia. For roadside stops of Hispanic drivers, only 27% resulted in a positive discovery.[18] In another, longitudinal study of a single dog (Rocky):

> The record shows that during 79 field deployments, Rocky alerted 41 times. Seven times, no contraband was found following the alert and there was no explanation for the alert. Another seven times, no contraband was found following the alert, but there was a reasonable explanation for the presence of the scent of drugs. On three occasions, Rocky alerted but it was not documented whether any contraband was found.[19]

What are the reasons for such a high rate of false positives from dog sniffing? Three explanations have been posited: (1) something fallible in the dog's behavior, triggered inadvertently or in response to the action of someone who does not want to be detected of an illegal activity, that generates erroneous information; (2) some kind of intentional cue given to the dog by the handler, in order to establish probable cause and make a search, seizure or conviction more likely, resulting in inaccurate information; and (3) unintentional cues from the handler that are noticed and acted on by the dog thereby generating unreliable information. We consider each of these cases as a cause of erroneous information in turn.

[17] For corroborating evidence from Australia about the high number of false positives, see Patty (2011); RMIT ABC Fact Check (2018).
[18] Melina (2011). Also see Coble (2019).
[19] This quotation is taken from *State v. Howard*, 282 Neb. 352, 803 N.W.2d 450 (September 2011), as cited in Daus (2013).

Fallibility in the Dog's Behavior

Let us first consider fallibility in the dog's behavior. Sometimes criminals try to foil detection of their illegal drugs by carrying treats, which they hope will receive the dog's attention instead of the drugs, or by carrying meat or some other odoriferous substance with the drugs in order to mask the contraband's smell. A well-trained dog, however, will not be subverted from its task by these tactics.[20] One court case (*United States v. Bentley*)[21] noted poor training on the part of a dog (Lex), who had a high percentage of alerts:

> [T]he defendant was searched after an alert by a drug dog that had alerted 93 out of every 100 times it sniffed. Why did it alert so often? Perhaps because the drug dog's handler admitted that he rewarded the dog with a treat only when it alerted.[22] The dog was confirming its owner's hunches, and getting a treat each time it did. It also had a false positive error rate of 41 percent — 4 out of every 10 drivers searched because of a dog's alert turned out to be innocent.

There are other reasons for false positives based on the dog's behavior:

> A drug detection dog might offer a "false positive hit" if a female dog is nearby in heat or has left its scent on an article of clothing or interior carpet. This is the drug dog's way of telling his master that something interests him. It does not mean that the dog has detected drugs. The dog is not lying. In fact, he really is interested, and if he could put in for time off, he would fill out all the requisite forms and request comp time. The same might apply to any scent that the dog might find interesting: the scent of a ferret (which is unusual to the dog), scents carried by fur trappers, the smell of a new type of Yankee candle that the dog has never encountered, etc.[23]

Intentional Cues from the Handler

Next, we consider situations in which a handler is giving the dog intentional cues. In 2019, Radley Balko published an article about sniffer dogs in the *Washington Post* that received considerable attention. He had dog trainers watch a number of videos of roadside searches, and the trainers were able to point out a number of cases in which the handler gave "clear indications" through hand and other gestures that signaled the dog to alert, an all-too-often neglected informational element of the use of drug-sniffing dogs (Balko, 2019). Wayne County Forfeiture has also noted and explained this situation:

> Police officers can give oral and visual commands for a dog to bark or react. Hand gestures and oral inflections can cause a dog to "react" because the dog wants to please his owner. And these officers live with their dogs. At the end of a shift, the drug sniffing dog goes home with the officer. Drug dogs are not like school buses, and they don't get left at the station. If a police officer wants his dog to sit, he will sit. And if the officer wants his dog to hit, he will hit. After all, just like any dog, these

[20] Smallwood (2018). There is passing reference in the literature to the fact that some dogs used in drug enforcement have been neither well trained nor certified, but none of these allegations provides substantial evidence for these claims.

[21] *United States v. Bentley*, No. 13-2995 (July). For a discussion of this case, see Partida (2015).

[22] Berry Law (n.d.) makes a similar point about incentives reinforced during training, such as praise or a dog toy to play with, when it alerts.

[23] Wayne County Forfeitures (n.d.).

> dogs are man's best friend, and they want treats and belly rubs. And since they can't testify, drug dogs won't reveal to jurors why they bark, sit, or otherwise react.

In 2012 three Nevada Highway Patrol officers sued the state's Director of Public Safety, Chris Perry, under RICO for intentionally training dogs to falsely alert based on handlers' cues.[24]

Unintentional Cues from the Handler

The third case of unintentional cuing from handlers is perhaps the most interesting from an informational perspective. In a study conducted at the University of California, Davis, in 2010, Professor Anita Oberbauer, chair of the animal science department, together with neurology postdoc (and former dog handler) Lisa Lit observed 18 certified, experienced dog/handler teams from law enforcement agencies.[25] The researchers found that the teams alerted when there was no scent more than 200 times; this phenomenon happened most often when the handler believed there was a scent. In their study, no target scents (drugs or explosives) were placed in any of the observation rooms, but the handlers were told that there might be as many as three target scents in each room. In two of the observation rooms, a piece of red construction paper was taped up identifying the location of the target scent in that room. Oberbauer and Lit observed more alerts (false positives) at the places identified on the construction paper than on locations that might have actually interested the dogs (the researchers had hidden sausage and tennis balls in several locations in the observation rooms). The researchers concluded that the dogs were reading subtle cues from the dog handlers about the presence of targets.

Oberbauer and Lit (and others after them) explained the results in terms of the Clever Hans effect. Hans was a horse owned by Wilhelm van Osten, a high school mathematics teacher and part-time horse trainer, in the early twentieth century. Hans received wide notoriety for his seeming ability to solve arithmetic problems, answer questions about the calendar, and understand German—answering by tapping his hoof. For example, the exploits of Hans were reported in the *New York Times* in 1904.[26] Because of the widespread interest in Hans, a scientific commission was formed that same year to determine if there was something fraudulent occurring and to ascertain the scientific reasons for Hans's behavior if his performance was indeed legitimate. The commission was chaired by the famous philosopher and psychologist Carl Stumpf and included a dozen other members, including a veterinarian, several schoolteachers, a military officer, a circus manager, and the director of the Berlin Zoo (Prinz, 2006). The observations made by the committee were given to psychologist Oskar Pfungst, who worked in Stumpf's laboratory, to evaluate. In 1907, Pfungst explained the phenomenon. It was not fraud; instead, Hans was reading subtle cues from the questioner, but only when both Hans could see the questioner and the questioner knew the answer to the question. Since then, psychologists have made the Clever Hans effect a central element in the study of the observer-expectancy effect, a methodological phenomenon of special interest to information and communication scholars who do empirical research with human beings.

[24] Moonin et al. v. State of Nevada Department of Public Safety, No. 3:2012cv00353 (D. Nev., June 26, 2012). See the Docket history at https://dockets.justia.com/docket/nevada/nvdce/3:2012cv00353/88463. Also see Vogel 2012; Fuchs, Chris 2012. The government offered Moonin a cash settlement, which he did not reply to.

[25] Details of the research method can be found in UC-Davis Health (2011). The scientific research paper can be found in Lit, Schweitzer, and Oberbauer (2011).

[26] Berlin's Wonderful Horse: He Can Do Almost Everything But Talk—How He Was Taught," 4 September 1904.

The UC Davis paper received considerable attention. It was the subject of articles on National Public Radio and in *The Economist* (Conan, 2013; M.K., 2011). Dog trainers and handlers, who believed the study duped the participants and impugned the integrity of sniffer dog use, were incensed; and they would no longer cooperate with the researchers (Cushing, 2017). Over time, however, some handlers came to see the importance of this research; and new research was designed to address handlers' biases and find more rigorous ways to eliminate them to enhance the reliability of information provided by drug-sniffing dogs to their handlers and the courts.[27]

Thus, as Balko summarized the problematic nature of the most recent U.S. Supreme Court cases discussed earlier (Rodriguez & Edstrom): "Many drug dogs, then, are not alerting to the presence of drugs, but to their handlers' suspicions about the presence of drugs. And searches based on little more than law enforcement's suspicions are exactly what the Fourth Amendment is supposed to prevent" (Balko, 2019). Unfortunately, as Balko notes, while these conscious or unconscious biases by handlers can be averted by proper training, there is an incentive for the police not to do so: "But police departments don't want dogs trained that way. They want dogs that will alert often. They want dogs that will err on the side of alerting" (Balko, 2019). That is, dogs that provide unreliable information are preferred by some legal actors. Both individual police officers (with performance measured on arrest record) and police departments (receiving civil asset forfeiture) have tangible incentives to encourage false positive responses from their sniffer dogs (Berry Law, n.d.). This point was a matter of some concern in *Florida v. Harris* (discussed at length below, especially in missed opportunities in oral argument and in the conclusion to the paper).

Civil liberties activists and criminal defense lawyers are, not surprisingly, pushing back, basing their efforts on concerns about the quality of information provided by drug-sniffing dogs used to determine probable cause and, thus, the admissibility of evidence at trial and appeal. Further, the dog-provided evidence is often the dispositive information used to determine guilt or innocence. Critics of information provided by drug-sniffing dogs are concerned about false positives when dogs falsely detect the presence of drugs either when there never had been any drugs on the person or in the car or house being sniffed, or if there was simply residual smell from some previous presence of a substance with the drug smell.[28] The problem for civil liberties advocates is that an alert by a certified sniffer dog and handler typically provides probable cause for a search. A study by one law firm found that police do not generally take any additional measures to confirm an alert by a dog, such as use of ion scanners.[29]

These advocates also note a problem with handlers' practices. Dogs can read their handler's desire for there to be an alert, and handlers sometimes intentionally repeat a standard sniff test at a site if the original test turned out negative. For example, a police handler may walk the dog around and around a car, many times, to do sniffing, instead of just once or twice. The dog may sense from this change in standard procedure the officer's desire for a positive result, and it may act accordingly (Berry Law, n.d.).

[27] Some of this new research is described in Kaste (2017).

[28] There are many other reasons for false positives (Wayne County Forfeitures (n.d.). This article includes a video of a trained sniffer dog creating a false positive.

[29] In some states, a distinction is made between *alert* and *indicate*. Alert is when a dog displays behavior that there may be some drug smells present, while indicate is when a dog performs the signal it has been trained to do when it finds drug smells present, e.g., sitting down where the drug smell is strongest. Where a distinction between alert and indicate is made, only the indicator sign establishes probable cause.

Reliability of the Judicial Process

Finally, there are sometimes problems with the reliability of the judicial process itself. When dog sniffer cases make it to trial, there are sometimes problems with the knowledge of judges and lawyers about drug-sniffing dogs, their performance, and the practices of trainers and handlers. That is, there are serious if neglected problems with these actors' ability to understand and evaluate the information generated by drug-sniffing dogs. One commentator notes:

> Canine officers often testify in front of judges who have little working knowledge of how a K-9 officer performs his duties, let alone how a dog is trained to alert to drug odor. Most judges' frame of reference about how dogs work or perform is their current or childhood pets. The lack of foundational information about subject matter that is critical to the case over which the judge is presiding is clearly one of the causes of our problem. A "Dog Training 101" course is not offered as part of the law school curriculum. Handlers are questioned by lawyers who sometimes know even less than judges (Daus, 2013).

Defense lawyers sometimes use terms such as "dead scents," "stale odors," or "lingering odors" to dismiss positive dog sniffs and confuse witnesses. The concept of "residual odors" invoked, in turn, by handlers, prosecutors, and judges to "explain" alerts that result in not finding contraband or other evidence of crime is also germane, but space does not allow its exploration here.

All three of these reasons and more indicate the skepticism and rigor with which information generated by drug-sniffing dogs, especially when used as evidence at trial and appeal, must be met. These requirements are particularly acute in formal legal cases where privacy, presumption of innocence, and loss of liberty are involved and where there is a clear lack of concern about erroneous or unreliable information. The next section of the paper examines just such a case: *Florida v. Harris*.

FLORIDA V. HARRIS: A FORMAL LOGICAL ANALYSIS

Florida v. Harris (568 U.S. 257, 2013) is a 2013 U.S. Supreme Court decision that makes clear the ill effects of judges' lack of understanding of the potential unreliability of information generated by drug-sniffing dogs, especially given the multiple reasons for failure and unreliability in the dogs' performance discussed above. In *Harris*, a Liberty County deputy sheriff and canine officer pulled over a truck in Blountstown, Florida, driven by Clayton Harris for having an expired license plate. The deputy noted that the driver was breathing rapidly and shaking, which the deputy believed to be signs of the use of illegal drugs. Harris denied the deputy's request to search the interior of the truck. The dog (Aldo), which the police claimed was trained to sniff out methamphetamine but was not certified, alerted the deputy to the odor of drugs on the exterior door handle. The deputy used this alert as probable cause to search the truck and found ingredients for making illegal drugs.

Questioning whether Aldo was sufficiently trained to sniff out this particular illegal drug and whether the handler was sufficiently trained and experienced[30] to use Aldo in a

[30] The officer had three years of experience on the sheriff's force and two years as a canine officer. He had worked with Aldo for one year at the time of this stop. They had completed a 40-hour annual training four months prior to the stop, and the officer typically spent four hours per week training Aldo in the field. Aldo's training records had consistently shown a grade of "satisfactory" in his drug-sniffing capabilities. It was noted, however, that Officer

proper way, however, the Florida Supreme Court ruled in 2011 that Aldo's alert was not sufficient justification to search the interior of the truck, and the evidence was ruled inadmissible (*Harris v. State of Florida*, 71 So. 3rd 756, Fla. 2011). The state of Florida appealed that decision to the U.S. Supreme Court, which ruled unanimously that the courts will trust the dog's capabilities in the field if the dog has been certified to be able to reliably identify drugs in a controlled setting, or if the dog has been deemed sufficiently proficient in a training program. Put directly in informational terms, the U.S. Supreme Court held an unshaken belief in the presumed ability of drug-sniffing dogs to provide high-quality, accurate information. Thus, the U.S. Supreme Court ruled that Aldo's detecting the odor of drugs on the external handle of the truck provided probable cause for a search. The justices reached this conclusion despite evidence introduced that dogs make wrong false positives up to 80% of the time, and despite the Florida Supreme Court's explicit discussion of these failures in reliability of information from drug-sniffing dogs in the decision appealed to the U.S. Supreme Court by the state of Florida.

The U.S. Supreme Court decision in *Harris* was unanimous, with all nine justices finding that the alert of a drug-detection dog during a traffic stop "provides probable cause" (*Florida v. Harris*, 1) to search a vehicle consistent with the demands of the Fourth Amendment to the U.S. Constitution. They found it also clearly consistent with the U.S. Supreme Court's 1983 decision in *Illinois v. Gates*. Justice Kagan wrote the opinion in *Harris*, particularly citing the necessity for a "flexible, common-sense standard" (*Illinois v. Gates*, 462 U.S. 213, 239, 1983) from *Gates* for determining probable cause rather than the Florida Supreme Court's earlier ruling demanding that the state produce records (another important information element) of the performance of the drug-sniffing dog in the field, rather than just from training in controlled environments. The U.S. Supreme Court strongly spoke with one voice, rejecting the claim by plaintiff Harris (that, without such field records, there was insufficient basis for a finding of probable cause in the search of his vehicle), stating unequivocally that, "The better measure of a dog's reliability thus comes away from the field, in controlled testing environments" (*Florida v. Harris*, 8).[31]

A key to the foundation of the court's overturning the lower court's finding for Harris was acceptance of the reliability of the training records of Aldo and his handler (Officer Wheeley), individually and together, as the primary and dispositive factor of the performance of the dog for the purposes of determining probable cause for a search. Particularly important was the failure of Harris's attorney to question the quality of the pair's training and its documentation at trial, thereby making such questioning at the U.S. Supreme Court disallowed (*Florida v. Harris*, 3). This matter was of concern in the Florida Supreme Court decision, however, but the U.S. Supreme Court chose not to explore this matter in depth, despite this question's importance to the "totality of circumstances" demanded by *Illinois v. Gates* (*Harris v. State*, 71 So. 3rd, 756, Fla. 2011, 767ff., especially 768).

The 2013 U.S. Supreme Court decision granted that there might be problems with blind tests in training and other controlled environments, either from false negatives (a failure to alert to the smell of drugs, whether present or residual) or false positives (an alert when no smell of drugs or other evidence of crime is present, whether present or residual)—two important information concerns. The Court chose to dismiss this concern because, as noted

Wheatley did not keep records in the field or during training that would enable one to calculate Aldo's percentage of false positives.

[31] Also see note 3 on that page showing the Court's reliance on the questionable if commonly used concept of "best practice" for determining reliability.

above, Harris failed to raise the evidentiary question at trial and cannot do so for the first time at the Supreme Court (*Florida v. Harris*, 10). Emphasis on this part of the argument made by the U.S. Supreme Court, however, ignores the question of whether the evidence of Aldo's training and performance, which was introduced at trial, indeed shows what the Court believes it to show: Aldo's adequate performance (the provision of accurate information) even in controlled, training environments. This lacuna merits closer scrutiny.

In explaining the rationale of the U.S. Supreme Court decision, Kagan cites a series of U.S. Supreme Court decisions emphasizing the import of the collection of information as a whole, a fluid, non-quantitative approach to determining probable cause, not reaching the "[f]inely tuned standards such as proof beyond a reasonable doubt or by a preponderance of the evidence" (*Florida v. Harris*, 5, citing *Illinois v. Gates*, 235). The U.S. Supreme Court had overhauled its understanding and operationalization of determinations of probable cause in *Illinois v. Gates*, simplifying it considerably, giving an overall emphasis to fluidity, a holistic view of circumstances, and an approach that we might term more qualitative rather than an accumulation of circumstances akin to a quantitative mode of reasoning. Particularly important to Kagan and the other justices in *Harris*, and to the justices making earlier rulings of the U.S. Supreme Court, was reliance on the concept of "fair probability," as understood by people "reasonable and prudent not legal technicians" (*Florida v. Harris*, 5, citing *Illinois v. Gates*, 238 and omitting the internal quotation marks). The concept of fair probability figured in the oral arguments before the Court; and a close reading of those arguments gives us insight into the Court's insufficiently rigorous and incomplete understanding of what fair probability might mean in the context of probable cause for drug-sniffing dogs and privacy. This, too, is an informational question.

Gregory Garre argued for the state of Florida, asking that the U.S. Supreme Court set aside the Florida Supreme Court's finding that Aldo's alerting did not provide sufficient probable cause for a warrantless search. The foundation of Garre's and Florida's argument is a firm belief in and acceptance of the reliability of Aldo's performance as established by the testimony of Officer Wheeley at trial as "really good."[32] The support for this conclusion of "really good" is provided in the brief presented by the state of Florida. The brief reiterates that, in controlled training exercises as noted in the Joint Appendix as well, Aldo would alert to eight cars if eight cars had (the odors of) illicit drugs in them.[33] What is most important about this record, however, is what is neglected here, what is not said. Neither the brief nor the training records it cites indicates whether Aldo would alert to only the eight cars that had (the odor of) illicit drugs in them and not to any other cars in the exercise or in other controlled training environments. A reasonable person might ask, did he provide accurate information about circumstances *without* the odor of illicit drugs? The training records proffered illustrate only Aldo's clear ability to alert when the odor of illicit drugs was present; it does not illustrate that Aldo did not give incorrect alerts nor how often Aldo did so. There is no empirical evidence, even in controlled conditions, of Aldo's ability to provide correct alerts more than incorrect alerts.[34]

In oral argument, Chief Justice Roberts pressed respondent Harris' attorney Gifford about what proportion of false and correct alerts might be the standard for establishing probable cause for a search. Gifford adroitly sidestepped the question, citing the Court's

[32] Oral argument, *Florida v. Harris*, 5.

[33] Brief for petitioners, 38; Joint Appendix, 60.

[34] See the section above about three major reasons for false positives: the dog's behavior, intentional cuing, and unintentional cuing by the handler.

unwillingness to use mathematical proportions to make decisions, but rather rely on the totality of circumstances as iterated in *Illinois v. Gates* and subsequently.[35] What this exchange shows, however, is that the Court does not consider the totality of circumstances when it ignores (or does not have access to) the record of false alerts in training and other controlled circumstances, where the number and proportion of correct and false alerts are known.[36] In other words, the courts, this one included, routinely operate with unnecessarily limited and potentially erroneous information generated by the use of drug-sniffing dogs. We explore this point further below.

Florida's attorney Garre asserts that the requirement outlined by the Florida Supreme Court demanding documentation, a key informational question, of a dog's field performance:

> [I]n effect, puts the dog on trial in any suppression hearing in which defendant chooses to challenge the reliability of the dog, converting probable cause, which this Court has referred to as a substantial chance or fair probability of the detection of contraband or evidence of a crime, into what amounts to a continuously updated batting average and a requirement that dogs be virtually infallible.[37]

We cannot say strongly enough that this set of pronouncements, which ends up largely accepted by the nine justices (as described further below), appears to be reasonable, but it is not. There is no hint whatsoever of claims of the need for "infallibility" in the brief for Harris or the Florida Supreme Court's earlier decision, but there is a more important point overlooked by Garre and, unfortunately, also by the nine justices of the U.S. Supreme Court. It is not, primarily, because Garre, the State of Florida as petitioner, and the Court accepted the record of training without sufficiently interrogating it, thus reaching a conclusion that only appeared justified and reasonable. The Florida Supreme Court did not assert that dogs had to be "virtually infallible," but rather that they had to be demonstrably reliable in field settings, that is, provide accurate and reliable information. But the focus on performance in the field and documentation thereof, however important as a serious information question, was not at the heart of what the U.S. Supreme Court did not satisfactorily address.

Even in the context of the controlled settings of initial training and continual refreshers, the Court appears to have ignored serious examination of Aldo's performance in producing false positives, that is, alerting to the odor of illegal drugs or of other evidence of a crime when there is none. As noted above, the training records produced by Wheeley as indicated in the Joint Appendix to the petitioner's brief did not indicate Aldo's performance with blanks, that is, when there was no evidence of the smell of illegal drugs or the smell of other evidence of crime. This was a clear if mistaken choice to ignore pertinent information, especially as demanded by the *Gates* decision. Instead, both Garre's argument and the questioning of the justices of the U.S. Supreme Court focused instead on whether Aldo alerted when such smells of contraband were present. There, his performance appeared to be infallible[38]—but that is only one side of the informational coin.

As long known, in such a dichotomous situation (alert or no alert, odor of drugs or no odor of drugs), there are two ways to be right and two ways to be wrong. The range of possibilities is illustrated in Table 1, a type of 2x2 matrix commonly used in policy, social scientific, and other settings, especially but not limited to formal hypothesis testing.

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[35] Oral argument, *Florida v. Harris*, 44-45.

[36] The Florida Supreme Court explores the many causes of false alerts, especially false positives, at length, *Harris v. State*, 767 *et passim*.

[37] Oral argument, *Florida v. Harris*, 3-4.

[38] Oral argument, *Florida v. Harris*, 21.

Table 1. Universe of possibilities for reaching correct or erroneous conclusions about dogs' alerts

	No smell of contraband	Smell of contraband
Dog alerts	a false positive **I**	**C**
Dog fails to alert	**C**	a false negative **I**

C = correct conclusion
I = incorrect conclusion

What Garre argued, and what the nine justices seemed predisposed to accept and argue themselves, is that concerns about missing potential contraband (a false negative) outweigh concerns about using an erroneous alert (a false positive) as probable cause for a search as under the Fourth Amendment. Deeply problematic, however, is the fact that the U.S. Supreme Court did not examine that question explicitly, despite dancing around it and then dismissing it on essentially mechanical grounds, that is, examination of false positives in training and refresher courses, perhaps the fundamental information question in this case, was not a matter of concern at trial and thus could not be in the U.S. Supreme Court. This dismissal also resulted from a serious logical flaw in this Court's and others' reasoning, as shown in oral argument.

Justices Kagan and Scalia touched upon the more important element of drug-sniffing dogs' false positives in field settings in the decision and oral arguments, although only briefly. In an exchange with respondent Harris' counsel Glen Gifford, Justice Scalia asked, "Why would a police department want to use an incompetent dog [i.e., one that alerts to false positives]? . . . What incentive is there for a police department?" [39] In the decision, Justice Kagan echoed this exchange, stating that "after all, law enforcement units have their own strong incentives to use effective training and certification programs because only accurate drug-detection dogs enable officers to locate contraband without incurring unnecessary risks or wasting limited time and resources" (*Florida v. Harris*, 37). While this appears to be a most reasonable argument (that Scalia explores at greater length in oral argument), closer examination reveals its flaws.

The justices simply dismissed respondent counsel Gifford's answer to Scalia that police agencies have vested interests in dogs that alert more often than they should. He responded specifically to Scalia's question: "The incentive [for using dogs that alert to false positives] is to acquire probable cause to search when it wouldn't . . . otherwise be available."[40] As Gifford noted, officers' performance evaluations and promotions, and municipalities' seizure of valuable contraband and other valuable property (forfeiture) are enhanced by more rather than fewer alerts and searches, that is, there are incentives for and bias toward dogs and interactions that provide inaccurate information. Unmentioned by Gifford but also important

[39] Oral argument, *Florida v. Harris*, 34.
[40] Oral argument, *Florida v. Harris*, 34.

are the public relations benefit of appearing to control the distribution of illegal drugs, and the deterrent effect of overzealous use of dogs and the stretching of probable cause. But do these "benefits" cancel concern about rigorous protection of probable cause and the totality of circumstances demanded by *Illinois v. Gates*, other Fourth Amendment protections, and privacy?

Also in oral argument, Justice Sotomayor asked respondent's counsel Gifford whether the Florida Supreme Court was concerned about what she termed perceived "deficit in the training records here because there was no evidence of false positives," another information question.[41] But instead of allowing Gifford to respond to this question, which is at the heart of the weakness in the plaintiff's and the U.S. Supreme Court's reasoning (that is, an unquestioned embrace of limited information), Sotomayor pivoted her question to focus on assuming what appears to be the opposite, that is, that the training records showed satisfactory performance by alerting where the odor of drugs appeared. Not only does the question move to asking about the Florida Supreme Court's emphasis on the import of field performance records (we might say justifiably because that was the question before the Court), but it totally misses the mark by asking about correct positives thereby avoiding the question of false positives even in controlled environments. This pivot clearly illustrates how the canonical judicial reasoning obscures the essential question of false positives even in the controlled environments of training. Importantly, it underscores yet another unexamined erosion of the *Gates* decision's criterion of the need to consider the totality of circumstances, the totality of information in considering probable cause.

Police agencies benefit from using dogs that are more likely to alert that will also lead to true positives that more "conservative" dogs might not detect. This concern is strongly related to courts' questionable practice of using interested parties (dog handlers, police agencies, and certifying agencies sympathetic to those handlers and agencies) as the primary source of the appropriate criteria for use and judgment of dogs' performance.[42] In other words, the justices in this decision and judges more generally show an unwavering faith that every alert is correct—an unachievable goal, and one certainly not documented in dogs' training records, whether in controlled circumstances or in the field. The Constitutional exercise of skepticism about government's ability to search without probable cause, long established in Fourth Amendment and related jurisprudence in the U.S. Supreme Court and other venues, seems missing. That absence is deeply troubling since we rely on courts as the major means to protect the polity from overreach on the part of the police powers of the executive branch –to protect privacy and information from prying governmental eyes particularly for members of the polity made vulnerable by poverty, racial and ethnic suspicion, and other characteristics. In our securitized present where surveillance only expands, and as the use of dogs to find contraband of all kinds grows, we cannot afford for the courts to let down their guard about the questions of false positives and a finding of probable cause. The unanimous decision, petitioners' brief, and oral argument in Harris indicate just how much work needs to be done to help judges, prosecutors, and other actors throughout U.S. judicial system be better arbiters of the quality of information generated by contraband-sniffing dogs and its strong implications for privacy.

[41] Oral argument, *Florida v. Harris*, 37.

[42] Leading to a situation where, as Partida (2015) puts it, "the dog always wins."

EXAMINING THE JUDICIAL ILLUSION OF DRUG-SNIFFING DOGS AND PERFECT INFORMATION

When insufficiently reflective, courts—especially the U.S. Supreme Court—regard dog sniffing as perfect (recall the purported "mythic infallibility" of the dog's nose). It is clear, however, that the dog is not perfect in its sniffing capabilities, and that improper training and handling can further compromise this presumed infallibility. Indeed, there are strong incentives for law enforcement to tweak the system in favor of positive alerts. It is also true, however, that, with appropriate training and handling, the information provided by a sniffer dog can be of greatly heightened quality. Efforts are underway to develop more rigorous and reliable approaches to objective training and handling, such as those currently being pursued by the Pacific Northwest Police Detection Dog Association, which is specifically trying to remove human factors from sniffer dogs' performance evaluations (Cushing, 2017). But this concern is only one of many.

Public Policy Issues and Selected Recommendations

There are myriad important, heterogeneous, and substantial information questions related to the use of dogs to identify illegal drugs and other contraband. In summary, we can aggregate those discussed in this paper into two major categories: those directly related to information policy, especially surveillance and privacy studies, and those related to other kinds of questions important to information studies and cognate fields. We examine these two categories of questions in turn.

As a field, surveillance studies critically examines the use of observation—sometimes using only the five human senses, other times augmented by technologies of many kinds, organizational structures, and even dogs' noses—to gain and exercise social control.[43] Oftentimes, this social control is plied by rich or powerful organizations or individuals over those classes of people who are or who have been traditionally disadvantaged, further disadvantaging them in the judicial system, access to housing, access to insurance and health care, and more (Browne, 2015). Surveillance studies has been an active research field over the past quarter century, particularly in Europe, and it is hard to characterize the field and its rich literatures in just a few sentences. Perhaps it is best to simply point the reader to some of the major collected volumes and introductory books on the subject (Monahan & Wood, 2018; Ball, Haggerty & Lyon, 2012; Lyon, 2007, 2018). Surveillance studies is often closely associated with privacy studies, which itself has numerous aspects and a somewhat longer history of scholarly inquiry and professional interest, so we again only point the reader to a few collected volumes and introductory books to establish some important foundations for further study and practice, such as van der Sloot and de Groot (2018); Nissenbaum (2010) and Solove (2008).

Privacy and surveillance are widely regarded as central topics in information policy. As a field information policy, both governmental and institutional, investigates policy issues related to computers, the Internet, and data sets as they interact with people and institutions. Like many complex concepts, information policy has no canonical definition, but it is often understood as "a set of principles, laws, guidelines, rules and regulations, directives,

[43] In *The Culture of Surveillance*, David Lyon talks at length about the surveillance imaginary of post-9/11 travel, including how emotion contributes to our practices of surveillance. He discusses how full-body scanners, full-body searches, and other techniques can easily arouse fear. Emotion-laden responses are common reactions to drug-sniffing and other surveillance dogs. As Lyon observes, "Fear is a powerful means of obtaining compliance or of silencing voices" (p. 59; also see pp. 61-63 on "The emotional life of surveillance").

procedures, judgments, and practices that guide the creation, management, access, and use of information" (McClure, 1996, p. 214). There are other useful overviews of information policy, especially focusing on information professionals (Jaeger & Taylor, 2019; Rowlands, 1996; Doty, 1998). As indicated in the widely read entries in multiple editions of the *Encyclopedia of Library and Information Sciences*, many Asian and Continental European practitioners and scholars use the term "Information Society" as a general rubric to include what is called "information policy" in the UK and U.S. Popular topics in information policy studies include computer security, the interactions between computing and telecommunications, regulation of Internet use, Internet governance, copyright and patents, the digital divide and technology access, the information workforce, and antitrust. The authors of this paper have a long history of research, publication, consulting, and teaching in information policy, including surveillance and privacy, and this experience has informed the research reported here.[44]

The important information policy questions we have examined in this paper include those related to surveillance, privacy, probable cause, information and social justice, and the admissibility of evidence at trial and thus determinations of legal innocence and guilt. Specifically, the paper has provided an overview of important U.S. legal cases involving an increasingly common practice of surveillance: the use of dogs to sniff for contraband, especially illegal drugs and other evidence of crime. The close examination of *Florida v. Harris* especially has allowed us to identify and examine important public policy questions related to information, its quality, and surveillance and privacy. The cases do so by invoking Fourth Amendment protections against unreasonable search and seizure, conflicts about probable cause for a search (whether with or without a warrant), and, perhaps most importantly, the presumption of innocence that is as fundamental to the U.S. legal system as is equality under the law.

One such important public policy question involves a larger frame of reference, recalling that the goal of surveillance is not simply observation but rather classification, in this instance, whether an individual, group, or set of circumstances should be classified as exhibiting probable cause for a search. This kind of social sorting links concerns with surveillance, privacy, searches, and Fourth Amendment protections to the courts' role as an essential buffer between the police powers of the state and the people. Further, the courts, as well as the legislatures at various levels of government, have long played the role as legitimately empowered overseers of how the state enacts its police powers, particularly with regard to searches and privacy. This active oversight is particularly important in our securitized and increasingly surveilled present.

A second important policy question involves dog handlers' biases and expectations, and how drug-sniffing dogs react to them. As evidence clearly shows, dogs that alert often are preferred by police agencies for reasons enumerated above: more alerts mean more "legitimate" searches, and more searches (1) lead to more forfeitures to the state of valuable property, (2) enhance police officers' performance records, (3) lead to promotions and salary increases for those officers, and (4) communicate to citizens and others that the state is being "tough on crime"—a public relations benefit that increases district attorneys', sheriffs', and judges' likelihood of election and that discourages illegal drug manufacture, transportation, and distribution. We may regard some or all of these as very important benefits, but we must recall that these benefits come at a cost. That cost includes an increased number of

[44] See, for example, Aspray (2004); Aspray and Doty (2011); Doty (1998, 2001, 2015a, 2015b, 2020a, 2020b, 2021); Floegel and Doty (2021).

questionable searches (an essential information question), potential miscarriages of justice, and, importantly, erosion of faith in the integrity and rigor of the judicial system as a whole. This shocking erosion of the integrity of the principle and practices of probable cause is a matter of deep concern.

A third public policy problem raised by the questionable reliability of drug-sniffing dogs involves the presumption of innocence and enacting suspicion. As discussed above in *Harris*, prosecutors, police agencies, and judges all seem to believe that not alerting to potential contraband or other evidence of a crime (a false negative) is worse than an alert made in error (a false positive)—an informational question that lies unaddressed by the courts. This presumption operates sub rosa by failure to examine closely dogs' records in the controlled environments of training and certification with blanks and false positives. As we and others argue, clearly the matter needs explicit, rigorous, and sustained examination in the training and certification of dogs, in their use by police officers and others, and in the use of drug-sniffing evidence at trial and appeal. Without such reasonable skepticism about the quality of information provided by drug-sniffing dogs, commensurate with the skepticism routinely exercised about other forms of evidence, miscarriages of justice and other serious negative outcomes are virtually assured.

Considering such examination leads us to a fourth public policy question related to the reliability of drug-sniffing dogs: the necessity of enhanced understanding by police officers, trainers, prosecutors, defense attorneys, judges, and legal educators of the many reasons for false positive alerts. Such understanding must lead to more discerning evaluation of the information generated by contraband-sniffing dogs and their handlers. As discussed above, reasons for false positives range from the proximity of a female dog in heat, meat, or dog treats to the drug-sniffing dog, to the smells of oils and lures used by hunters and trappers, and other odors that drug-sniffing dogs may find new and interesting. While none of these involves contraband, an alert to such odors looks precisely like an alert for contraband. Thus, as the first epigraph to this paper says, "Cops already refer to K-9s as 'probable cause on four legs'" (Cushing, 2019). One president of a sniffer dog training company expressed concern about the alert rate of one of their dogs (Lex) in use in law enforcement, nearly 93% in the field (Partida, 2015). We mentioned Lex and his performance above in the brief discussion of *United States v. Bentley*. The *Bentley* appellate court even noted that such a high alert rate is "more of a pretext for a search than an objective basis for probable cause" (Partida, 2015). Lex had shown similarly unreliable performance in training and subsequent controlled tests, that is, Lex consistently showed bias by systematic production of inaccurate information about the presence of contraband. Even given the totality of those circumstances, however, the court found Lex's performance sufficiently reliable so as to admit evidence found from his alert. This result, of course, aligns well with the finding in *Harris*. All of which indicates the serious need for education and increased understanding by actors in the judicial process, especially given the primacy of "commonsensical" reasoning the U.S. Supreme Court enshrined in *Illinois v. Gates*.

While there are other questions that merit attention, for example, about standardization of requirements for certification and about the concept of "residual odors," the last public policy problem we discuss involves documentation, an essential information question. If we accept that controlled training is more dispositive than field performance for relying on a dog's alert as probable cause, as per *Harris* and others, then records of that training must be explicit and rigorous in the use, documentation, and reporting of the use of blanks and false positives as well as misses (i.e., false negatives). Without such explicit documentation and

review of these records, both at trial and in appeal, all actors in the judicial system are operating with their eyes shut to evidence that is an essential part of the "totality of circumstances" required by *Illinois v. Gates* and essential to due process, the presumption of innocence, and any finding of probable cause. This is implicit but deliberate and dangerous embrace of limited information while still proclaiming the importance of the *Gates* decision's totality criterion. This is, perhaps, the most important informational question that this paper considers.

In a 2005 law review paper on suspicionless sniff searches, Hunt (2005) reminded us that "the law-abiding public faces the prospect of potential 'false positives' when a drug-sniffing dog may alert to them in complete error" (Hunt, 2005, p. 316). Drug-sniffing dogs make mistakes—no matter their skill, training, and disposition, and despite their extraordinary senses of smell. Belief in their infallibility and in the presumption that an alert is always correct, or "correct enough," simply cannot hold. Such dog error rates, even in controlled circumstances, remove the veil of supposed infallibility, and, as Hunt said, quoting U.S. Supreme Court Justice David Souter in his dissent in *Caballes*, they are "stripped of that aura of uniqueness'" and presumed free from error.[45] Discussing *Caballes* in particular and going beyond it, Hunt argued that the U.S. courts, most especially the U.S. Supreme Court, had been much too accommodating of law enforcement agencies and the state. The courts, he argued, had allowed the state to abrogate legitimate privacy interests and the principles of probable cause, totality of evidence, and privacy (Hunt, 2005, pp. 341-344). This argument is one reflected by many commentators about privacy and Fourth Amendment jurisprudence more generally, as well as about the reliability of information provided by drug-sniffing dogs in particular. As this paper has shown, the sort of blind faith in the reliability of such information, whether generated in training or in the field, is seriously misplaced, especially given the criterion of "totality of circumstances" demanded by *Illinois v. Gates*.

The goal of our close examination of *Florida v. Harris*, and, indeed of the paper as a whole, is not to contest the role field records of drug-sniffing dogs should play either in trial or appeal courts. Nor is it to eliminate the use of drug-sniffing information as a whole. Rather, the goal is to clarify the inconsistencies in the courts' use of the training records of drug-sniffing dogs, identify and examine substantial questions about information generated by these dogs (especially in the controlled circumstances of training and certification exercises), and underscore the importance of the "totality of circumstances" and "fair probability" standards that the U.S. Supreme Court has consistently ruled as paramount. These are clearly informational concerns. Adhering to such standards is the key to U.S. courts' protection of citizens from overzealous police agencies and prosecutors dependent on the unreliable performance of even the most skilled dogs, "precisely the kind of overreaching that the Fourth Amendment was originally enacted to prevent" (Hunt, 2005, p. 344). Closely examining dogs' performance with blanks and false positives in training and certification is an essential part of the courts' acting as such protectors. So is reasonable skepticism about claims of dogs' infallibility. Given the vast expansion of the securitized state and the surveillance practices of governments at all levels in current times, the courts are required even more than they have in the past to be vigilant protectors of the rights outlined in the U.S. Constitution and more than two centuries of jurisprudence. Enacting that responsibility is necessary to prevent the reduction of determination of probable cause in drug-sniffing cases to a mere pro forma exercise and to provide robust protection to privacy.

[45] *Caballes*, 543 U.S. 839 (2005), Souter dissenting, quoted in Hunt 328-329 and note 215.

CONCLUDING REMARKS: INFORMATION AND CONTRABAND-SNIFFING DOGS

The major focus of this paper has been the information policy questions related to the mythic infallibility of contraband-sniffing dogs in U.S. jurisprudence and surveillance practice. As should be clear, however, we have identified and considered many other important information questions beyond those explicitly related to information policy. These questions include concerns about:

- Determination of the quality of information, e.g., inaccurate positive alerts
- Institutional incentives to undermine the use of dogs to generate accurate alerts and thus accurate information, an example of disinformation
- The inability of judges, lawyers, and others in the judicial system to understand the limitations of information generated by contraband-sniffing dogs, an example of misinformation
- Inadvertent signaling of trainers to dogs to make erroneous alerts, including the Clever Hans effect
- The importance of documentation and record keeping related to false positive as well as accurate positive alerts in training and in the field
- Implicit and explicit links of human-canine interaction to human-computer interaction (HCI).

These two streams of informational concerns (policy-related and beyond) merge in our discussion of the importance of information about false positives to the "totality of circumstances" of the U.S. Supreme Court decision in *Illinois v. Gates*. Information about performance related to false positives, in training or in field settings, is often not gathered, often not made available to the judicial system, and is deliberately ignored routinely by dog trainers, police officers, lawyers, and, most importantly, judges in trial and appeals courts. Such errors are likely made in good faith, but, as we and others have argued, there are important incentives for bad actors to obscure drug-sniffing dogs' performance with blanks and other instances where there is no evidence of contraband materials.

As this paper shows, information scholars have useful roles to play in considering the information elements of the use of dogs for drug sniffing and other uses in the legal arena. While consideration of privacy and surveillance are significant elements of these roles, other important information questions reveal themselves to the kinds of analysis practiced here. We encourage our colleagues in information studies and beyond to consider this area of research, particularly as we look to ensure a more just and equitable world.

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