

Functional Speech: Cracking the First Amendment Puzzle at the Heart of the Modern Economy

By Owen Healy, '20 *

I. Introduction

Consider the following hypothetical: A researcher at a private lab sends a sample of RNA to physicians at a hospital. The physicians combine the RNA with a protein to create a gene-editing molecule. The RNA will match a sequence of DNA on Chromosome 4, and the protein will delete a gene for Huntington's disease. The physicians hope this procedure will provide treatment to their patient.¹ The next day, the lab receives a visit from an FDA investigator. The RNA sample is a drug, the investigator says, and distributing it to hospitals without FDA approval was a violation of federal law.² The lab disagrees: The researchers view a pattern of RNA bases as a message telling the physicians where in the DNA to cut. They could have sent the pattern by writing it on paper, but using RNA was convenient because the molecule would bind to the corresponding DNA sequence without circuitous translations. Moreover, the lab insists the message was nothing more than a true statement about the human genome: "Next to this pattern lies the gene for Huntington's disease." How can the FDA prohibit the lab from sharing knowledge about its discoveries? The lab claims it is engaging in "functional speech"—that is, speech designed to convey information to a tangible object, like a machine, with no human intermediary.³ The disagreement between the agency and the lab is whether such a message is speech at all. While the lab focuses on the informational

* I would like to thank Professor Laura Little for invaluable advice and comments.

¹ This story is fictional. For an account of researchers developing a similar treatment without flouting federal law, see Michael Eisenstein, *CRISPR Takes On Huntington's Disease*, NATURE (May 30, 2018), <https://www.nature.com/articles/d41586-018-05177-y>.

² 21 U.S.C. § 355(a) (2019).

³ See *Bernstein v. U.S. Dep't of State*, 974 F. Supp. 1288, 1305 n.20 (N.D. Cal. 1997) (identifying software as functional speech), *aff'd*, 176 F.3d 1132 (9th Cir. 1999), *withdrawn pending reh'g en banc*, 192 F.3d 1308, *appeal dismissed without prejudice and remanded*, No. 97-16686 (9th Cir. Apr. 11, 2000).

content of the molecule, the agency focuses on its functional capacity.⁴ To the agency, the sample is no different than any other chemical designed to alter the human body.

Whether speech from machine to machine is “speech” within the meaning of the First Amendment will determine how the government may regulate whole swaths of new and existing technologies.⁵ If we view the development of new genes, algorithms, and chemicals as discoveries about the nature of the world around us, we should balk at the government depriving the public of this knowledge under the guise of regulating commodities. On the other hand, if we view these items as machines, we should expect the government to regulate their sale just as it has regulated the sale of drugs for the past century.⁶

Distinguishing “ordinary” from “functional” speech will become increasingly difficult as we offload more fact-gathering and decisionmaking to machines. As the global stock of knowledge expands beyond human comprehension,⁷ it becomes harder to explain why messages from person to person deserve any unique status.

Functional speech lies at the heart of the modern economy: it is coveted by businesses and a tempting target for regulators. Whether courts will bow to these dual pressures will serve as a model for what we can expect for free speech in the decades to come.

II. Background

The Parts that follow define functional speech, survey examples of what might be called “functional censorship,” and describe in what little ways the law of functional speech has so far progressed—and where it is likely to head next. The second half of this Article will take up the issue of why any of these examples should be considered speech.

⁴ Ryan Christopher Fox, Comment, *Old Law and New Technology: The Problem of Computer Code and the First Amendment*, 49 UCLA L. REV. 871, 907 (2002).

⁵ Daniel A. Farber, *Expressive Commerce in Cyberspace: Public Goods, Network Effects, and Free Speech*, 16 GA. ST. U. L. REV. 789, 789–90 (2000).

⁶ See *The History of FDA’s Fight for Consumer Protection and Public Health*, FDA, <https://www.fda.gov/AboutFDA/History/default.htm>.

⁷ See Martin Hilbert & Priscila López, *The World’s Technological Capacity To Store, Communicate, and Compute Information*, 332 SCI. 60, 60 (2011).

A. Defining “Functional Speech”

“Functional speech” refers to speech that transmits its message directly to a tangible object with no human intermediary.⁸ For example, a mold transmits the shape of its interior to the part to be cast without the manufacturer looking inside.⁹ And in the gene editing example above, an RNA molecule communicates the pattern of a gene directly to a protein by attaching to a pattern of DNA. Three elements tie these examples together: (1) the recipient acquires an object not for the medium but for the message, (2) the information could as feasibly (though not as easily) be sent as words on paper, and (3) the recipient uses the information by applying it to a non-human object like a machine.¹⁰

Perhaps the fastest growing category of functional speech consists of digital information transmitted between machines without human observation. The Supreme Court recently gave a nod to data as speech in *Sorrell v. IMS Health Inc.*,¹¹ where it hinted that healthcare marketing data might be protected speech.¹² The Court observed that data consist of “[f]acts,” and facts have the power to “advance human knowledge.”¹³

Sorrell's dictum is interesting enough for suggesting data may be speech, but what the Court left unsaid may foreshadow even bigger changes. The respondent in that case, a data miner,¹⁴ planned to feed its data to an algorithm to generate sales strategies for its clients.¹⁵ In other words, it was a case of speech with no human listener. *Sorrell* thus leaves two lessons: functional speech is not far-fetched, and entire industries may be transformed if the Court's hint proves accurate.

⁸ Cf. *Bernstein*, 974 F. Supp. at 1305 n.20 (identifying software as “functional speech”).

⁹ Katherine A. Moerke, Note, *Free Speech to a Machine—Encryption Software Source Code Is Not Constitutionally Protected Speech Under the First Amendment*, 84 MINN. L. REV. 1007, 1046 (2000).

¹⁰ Cf. Lee Tien, *Publishing Software as a Speech Act*, 15 BERK. TECH. L.J. 629, 689–90 (2000) (describing how a machinist may receive a lathe template for its information content).

¹¹ 564 U.S. 552 (2011).

¹² *Sorrell*, 564 U.S. at 570.

¹³ *Id.*

¹⁴ *Id.* at 558.

¹⁵ *Id.* For a more in-depth description, see how IMS's successor, IQVIA, describes its business. IQVIA, <https://www.iqvia.com/> (last visited Dec. 10, 2012).

B. *Looking for Functional Censorship*

Functional speech would be an academic curiosity if no one wanted to censor it. But in 2007, officials in a Chinese province arrested an environmental activist carrying samples of polluted water to the national government in Beijing.¹⁶ In the United States, Wyoming engaged in a strikingly analogous practice in 2015 when it made it a crime to “[c]ross[] private land” to “collect[] resource data,”¹⁷ a statute the Tenth Circuit held implicated First Amendment concerns.¹⁸ The court noted the statute targeted gathering information, both through traditional means like photographs and written descriptions, but also in ways somewhat “further afield” like collecting soil samples.¹⁹ The court declined to reach whether the latter by itself would be speech.²⁰

The motivation to censor mineral data is hard to deny. After all, without physical evidence, people cannot judge invisible hazards like chemical pollution for themselves.²¹ Japanese officials struggle to convey trusted information about the remnants of the Fukushima disaster,²² and dozens of nonscientists around Pennsylvania monitor water quality to fill a perceived gap in the state’s attention to fracking.²³ Much of the way we learn about environmental harms is by informing our machines, who then inform us.

¹⁶ Joseph Kahn, *In China, a Lake’s Champion Imperils Himself*, N.Y. TIMES (Nov. 14, 2007), <https://nyti.ms/2u06YdJ>.

¹⁷ See WYO. STAT. ANN. § 6-3-414(c) (West 2018), *invalidated by* *W. Watersheds Project v. Michael*, 353 F. Supp. 3d 1176 (D. Wyo. 2018) (concluding the statute imposed content-based restrictions on speech and failed strict scrutiny under the First Amendment).

¹⁸ *W. Watersheds Project v. Michael*, 869 F.3d 1189, 1196–97 (10th Cir. 2017). On remand, the district court struck down the statute. *W. Watersheds Project*, 353 F. Supp. 3d at 1191.

¹⁹ *W. Watersheds Project*, 869 F.3d at 1196–97.

²⁰ *Id.* at 1198.

²¹ See OLGA KUCHINSKAYA, *THE POLITICS OF INVISIBILITY: PUBLIC KNOWLEDGE ABOUT RADIATION HEALTH EFFECTS AFTER CHERNOBYL 7* (Geoffrey Bowker & Paul N. Edwards eds., 2014).

²² Simon Denyer, *Eight Years After Fukushima’s Meltdown, the Land Is Recovering, but Public Trust Is Not*, WASH. POST (Feb. 20, 2019), https://www.washingtonpost.com/world/asia_pacific/eight-years-after-fukushimas-meltdown-the-land-is-recovering-but-public-trust-has-not/2019/02/19/0bb29756-255d-11e9-b5b4-1d18dfb7b084_story.html.

²³ See Jennifer Gabrys, *Citizen Sensing, Air Pollution and Fracking: From ‘Caring About Your Air’ to Speculative Practices of Evidencing Harm*, 65 SOC. REV. MONOGRAPHS 172 (2017).

It is not hard to imagine other examples of mechanical speech someone might want to censor. Early evidence of global warming emerged when a scientist at NASA working with a programmer in industry pooled together a century of temperature measurements from sensors around the globe.²⁴ Recently, a federal district court held that mechanically scraping data from websites to uncover racially biased hiring algorithms was speech protected by the First Amendment.²⁵ Guiding data from machine to machine is an essential step in becoming informed in an age when there is simply too much data to learn the facts ourselves.

C. From Tangible to Digital and Back Again

Functional speech is ancient, yet the issue of its First Amendment status escaped the attention of judges until a few decades ago, when cases started posing questions such as whether software or 3D-printer files are speech.²⁶ The answers tended toward “yes”: at least some of these items are speech some of the time.²⁷ That they happen to be functional does not take away the protection they enjoy as objects of communication.²⁸

Even so, judges who accepted that software could be speech seemed to employ a “water[ed][-]down” First Amendment scrutiny to uphold regulations that would not survive if applied to traditional media.²⁹

²⁴ James Hansen & Sergej Lebedeff, *Global Trends of Measured Surface Air Temperature*, 92 J. GEOPHYSICAL RES. 13,345 (1987) (analyzing surface air temperature data from the period 1880–1985); see also SPENCER R. WEART, *THE DISCOVERY OF GLOBAL WARMING* 116 (Margaret C. Jacob & Spencer R. Weart eds., rev. & expanded ed. 2008) (discussing Hansen & Sergej’s contribution to early research on global warming).

²⁵ *Sandvig v. Sessions*, 315 F. Supp. 3d 1, 16 (D.D.C. 2018).

²⁶ E.g., [Def. Distrib. v. U.S. Dep’t of State](#), 838 F.3d 451 (5th Cir. 2016); **Universal City Studios, Inc. v. Corley**, 273 F.3d 429 (2nd Cir. 2001); *Junger v. Daley*, 209 F.3d 481 (6th Cir. 2000); *Bernstein v. U.S. Dep’t of Justice*, 176 F.3d 1132 (9th Cir. 1999), *withdrawn pending reh’g en banc*, 192 F.3d 1308, *appeal dismissed without prejudice and remanded*, No. 97-16686 (9th Cir. Apr. 11, 2000).; **Universal City Studios, Inc. v. Corley**, 273 F.3d 429 (2nd Cir. 2001); ~~[Def. Distrib. v. U.S. Dep’t of State](#), 838 F.3d 451 (5th Cir. 2016)~~.

²⁷ *Bernstein*, 176 F.3d at 1140–42; *Universal City Studios*, 273 F.3d at 449.

²⁸ See *Bernstein*, 176 F.3d at 1142; Kyle Langvardt, *Remarks on 3D Printing, Free Speech, and Lochner*, 17 MINN. J.L. SCI. & TECH. 779 (2016); Robert Post, *Encryption Source Code and the First Amendment*, 15 BERK. TECH. L.J. 713 (2000); Tien, *supra* note 10; Brandon Matsnev, Comment, *Code Speak: Constitutional Avoidance on the First Amendment Encryption Question*, 90 TEMP. L. REV. 305, 333-34 (2018).

²⁹ Langvardt, *supra* note 28, at 798–800.

Functionality was an uncomfortable side-effect, a risk that might be tolerated to protect software's expressiveness for the few who want to read it, but that served no First Amendment purpose of its own.³⁰ Of course, this distinction is metaphysical: the functionality and content of software are one and the same.³¹ Saying the government may regulate functionality but not content is like saying it may regulate the sound of the left hand clapping but not the right.

If these cases remain par for the course, functional speech will stagnate as a curiosity. Despite raising fascinating issues, the software cases go nowhere: 3D-printed guns are widely available despite the ban,³² and the outlawed DVD decrypting software DeCSS exists as, among other things, a T-shirt, a movie, and square dance song.³³ On the other side, 3D-printed weapons are impractical and uneconomical.³⁴

I predict that will soon change. There are three areas where functional speech stands poised to play a determinative role: personal data, environmental monitoring, and healthcare.

Personal data include the credit transactions, search queries, and cell-site hits that litter our daily lives and whose significance only appears through aggregation and automated processing.³⁵ California already restricts how businesses may collect and disseminate personal data,³⁶ and federal

³⁰ *Universal City Studios*, 273 F.3d at 449, 454; Fox, *supra* note 4, at 875; Steven E. Halpern, *Harmonizing the Convergence of Medium, Expression, and Functionality: A Study of the Speech Interest in Computer Software*, 14 HARV. J.L. & TECH. 139, 150 (2000); Moerke, *supra* note 9, at 1045.

³¹ See Fox, *supra* note 4, at 907.

³² See Josh Blackman, *The 1st Amendment, 2nd Amendment, and 3D Printed Guns*, 81 TENN. L. REV. 479, 489 (2014); Danton Bryans, *Unlocked and Loaded: Government Censorship of 3D-Printed Firearms and a Proposal for More Reasonable Regulation of 3D-Printed Goods*, 90 IND. L.J. 901, 913 (2015); Google search for "3D printed gun files," GOOGLE, <https://www.google.com/search?q=3d+printed+gun+files> (last visited Mar. 10, 2019).

³³ David S. Touretzky, *Gallery of CSS Descramblers*, CARNEGIE MELLON UNIV., <http://www.cs.cmu.edu/~dst/DeCSS/Gallery/index.html> (last modified Feb. 13, 2008, 9:39 PM).

³⁴ See Blackman, *supra* note 32, at 489, 536–37.

³⁵ Ashutosh Bhagwat, *Sorrell v. IMS Health: Details, Detailing, and the Death of Privacy*, 36 VT. L. REV. 855, 871–72 (2012).

³⁶ See Daisuke Wakabayashi, *California Passes Sweeping Law To Protect Online Privacy*, N.Y. TIMES (June 28, 2018), <https://nyti.ms/2lEdwdX>.

legislation appears imminent.³⁷ Given the economic importance of personal data and the social concerns surrounding its misuse,³⁸ litigation over the permissible scope of regulation seems inevitable.

Environmental monitoring could provide another test for functional speech. As discussed above, advocacy groups distrust official accounts of environmental harms enough to conduct their own research, and Wyoming's effort to ban the practice shows that governments are not above using censorship to stop them. As with personal data, the issue is important enough both economically and politically that a lawsuit would be more than symbolic.³⁹

Then there is healthcare. The healthcare industry has already proven itself capable of using free speech to overturn regulation.⁴⁰ Unlike export restrictions on 3D-printed guns, FDA rules are rigorously enforced and produce billions of dollars in fines.⁴¹ And information about medical

³⁷ Dan Clark, *Federal Data Privacy Legislation Is Likely Next Year, Tech Lawyers Say*, CORP. COUNS. (Nov. 29, 2018, 5:00 PM), <https://www.law.com/corpcounsel/2018/11/29/federal-data-privacy-legislation-is-likely-next-year-tech-lawyers-say/>.

³⁸ See Dylan Walsh, *How Much Is Your Private Data Worth—and Who Should Own It?*, STAN. GRADUATE SCH. BUS. (Sept. 19, 2018), <https://www.gsb.stanford.edu/insights/how-much-your-private-data-worth-who-should-own-it> (describing some concerns over how private parties use personal data).

³⁹ E.g., Jon Meyer, *Judge Throws Out \$4.2 Million Verdict Against Cabot Oil and Gas*, WNEP (Mar. 31, 2017), <https://wnep.com/2017/03/31/judge-throws-out-4-2-million-verdict-against-cabot-oil-and-gas/> (discussing the national attention garnered by a case against an oil and gas company for water contamination).

⁴⁰ See *United States v. Caronia*, 703 F.3d 149 (2d Cir. 2012) (vacating pharmaceutical sales representative's conviction for conspiring to introduce misbranded drug into interstate commerce because his promotion of off-label drug use was protected under the First Amendment); *Amarin Pharma, Inc. v. FDA*, 119 F. Supp. 3d 196, 199 (S.D.N.Y. 2015) (granting preliminary injunction against FDA's enforcement of its off-label marketing ban); *Wash. Legal Found. v. Friedman*, 13 F. Supp. 2d 51 (D.D.C. 1998) (granting permanent injunction against FDA applying and enforcing official actions that limited speech regarding non-FDA-approved medical devices), *vacated sub nom.* *Wash. Legal Found. v. Henney*, 202 F.3d 331 (D.C. Cir. 2000).

⁴¹ See Alex Tabarrok, *FDA Loses Another Free Speech Case over Off-Label Use*, FOUND. FOR ECON. EDUC. (Aug. 12, 2015), <https://fee.org/articles/fda-loses-another-free-speech-case/> (noting the significance of *Amarin Pharma* for the “billions of dollars” the FDA had “extracted . . . in settlements from pharmaceutical firms for engaging in what appears to be constitutionally protected speech”).

treatments (like the RNA example from the introduction) is valuable enough to make challenging the FDA’s authority worthwhile.⁴²

Other examples are likely to emerge. As the world supply of information increases, an ever-smaller percentage is known to humans.⁴³ The shifting human role from listener to custodian forces us to think of “speech to a machine” as a human activity. And, inevitably, courts will be asked to decide whether it is a human activity protected by the First Amendment.

III. Discussion

This Section explores why functional speech might be considered “speech” at all—and how communication from machine to machine is more familiar than it first appears.

A. Making It “Speech”

Consider two machinists, A and B. Both desire to cut an airfoil from a sheet of aluminum. Machinist A calls Steve to ask for his design, and he reads her a series of dimensions which she jots down on paper. Later, she traces the shape with her milling machine, moving the cutting blade by hand along the prescribed path. Machinist B asks Steve for the same design, but he sends it to her as a wooden stencil. Without examining the shape, B runs the blade along its edge to cut the desired path.⁴⁴

Is there any reason to view the interactions between Steve and the two machinists differently? If Steve is speaking to Machinist A, is he not speaking to both?

⁴² See Zachary Brennan, *Off-Label Promotion: Are FDA’s Rules About To Unravel?*, REG. FOCUS (May 9, 2018), <https://www.raps.org/news-and-articles/news-articles/2018/5/off-label-promotion-are-fdas-rules-about-to-unra>.

⁴³ See Dillon Reisman et al., *Algorithms Are Making Government Decisions. The Public Needs To Have a Say.*, ACLU (Apr. 10, 2018, 10:00 AM), <https://www.aclu.org/issues/privacy-technology/surveillance-technologies/algorithms-are-making-government-decisions>; David Weinberger, *Our Machines Now Have Knowledge We’ll Never Understand*, WIRED (Apr. 18, 2017, 8:22 PM), <https://www.wired.com/story/our-machines-now-have-knowledge-well-never-understand/>.

⁴⁴ A similar analogy is discussed in Tien, *supra* note 10, at 689–90.

One response might be that Steve is not really speaking to either of them: he just instructs them. The problem is that instructions—“cut here to make an airfoil”—are awfully hard to distinguish from factual statements about the world: “a sheet of aluminum cut like this will make an airfoil.” Is “Vote for Kennedy” not speech because it merely instructs? Of course not—it is just another way of saying “Kennedy is the best candidate.”

A wide consensus exists that bare facts enjoy the protection of the First Amendment.⁴⁵ Certainly, at a time when Americans lament the dearth of truth in politics, it would be strange to throw out facts entirely. To say Steve is not speaking to Machinist A by giving her the shape of an airfoil would be to backtrack on a great deal of precedent and about as much common sense.

Another answer might be that we should romanticize the human element of the phone call between Steve and Engineer A even if it makes no practical difference. That is, we treat speech between humans differently not because it matters but because we sympathize with human activities more than mechanical ones, and the law encodes our sympathies as sometimes arbitrary rules.

That is not wholly unreasonable: the law must draw lines, and lines sometimes split hairs. But it encourages hoop-jumping. When gun designer Cody Wilson made a 3D-printed weapon and claimed it as his constitutional right, he was duplicating something that already existed (a gun) in a less useful way (3D printing) to gain advantage of a law (the First Amendment) that ostensibly had nothing to do with firearm technology.⁴⁶ Why encourage that sort of behavior? And it makes the First Amendment look silly, like a trick to evade regulation. When an internet activist set the illegal DeCSS code to music and sang it as a song, he was making a point—namely, that the law

⁴⁵ See *Sorrell v. IMS Health Inc.*, 564 U.S. 552, 570 (2011) (“Facts, after all, are the beginning point for much of the speech that is most essential to advance human knowledge and to conduct human affairs.”); *Bd. of Trs. of Leland Stanford Junior Univ. v. Sullivan*, 773 F. Supp. 472, 474 (D.D.C. 1991) (“It is . . . settled . . . that the First Amendment protects scientific expression and debate just as it protects political and artistic expression.”); *Bernstein v. U.S. Dep’t of State*, 922 F. Supp. 1426, 1435 (N.D. Cal. 1996) (finding computer programming languages to consist of a “system of understood meanings within specific communities,” much like natural language); *Blackman*, *supra* note 32, at 501 (arguing CAD files are speech because they consist of a language that “explains the shape, size, and dimensions of various types of objects”); *Halpern*, *supra* note 30, at 165 (arguing that, because a textbook that teaches how to control a computer would be speech, so too should instructions that accomplish the same task in an automated fashion).

⁴⁶ See *Blackman*, *supra* note 32, at 489, 536–37.

seemingly asked him to engage in frivolity to obtain its protection.⁴⁷ But if we cling to the human element of speech, that is precisely what the law would do. A human-centered definition of speech may do more to protect the clever hoop-jumpers than the honest communicators.

B. *Finding It Everywhere*

Even if we could confine speech to human-human interactions, we might cut out more of everyday communication than we would like. There is little left of human knowledge that exists purely in people’s minds; for most of it, we rely on our machines. That people communicate by imparting information to the material world is not a radical step—it is routine.

To take an analogy, consider how the First Amendment applies to corporations. We know corporations have a right to speak,⁴⁸ but we tend not to ask where their ideas originate—from individuals, groups, or algorithms.⁴⁹ “[P]eople are happy to say that NASA knows how to build a space shuttle even if there is not a single individual human being within NASA who knows how to build a space shuttle.”⁵⁰ We do not make a corporation prove the human origin of its ideas before giving it the First Amendment right to convey them.

But that is true for individuals as well.⁵¹ Cell phones extend our memories: they record white-boards, calendars, menus, and notes that would otherwise disappear.⁵² We think of knowledge in our phone as ours whether or not it will ever reach our eyes.

⁴⁷ See Touretzky, *supra* note 33.

⁴⁸ *Citizens United v. FEC*, 558 U.S. 310, 342 (2010).

⁴⁹ See Audrey S. Bollinger & Robert D. Smith, *Managing Organizational Knowledge as a Strategic Asset*, 5 J. KNOWLEDGE MGMT. 1 (2001).

⁵⁰ Joshua Knobe, *Do Corporations Have Minds?*, N.Y. TIMES: OPINIONATOR (June 15, 2015), <https://opinionator.blogs.nytimes.com/2015/06/15/do-corporations-have-minds/>.

⁵¹ See generally Robert W. Clowes, *Hybrid Memory, Cognitive Technology and Self*, in THE 5TH AISB SYMPOSIUM ON COMPUTING AND PHILOSOPHY: COMPUTING, PHILOSOPHY AND THE QUESTION OF BIO-MACHINE HYBRIDS 4 (J. M. Bishop and Y. J. Erden eds., 2012) (describing how technologies that extend our memories and mental processes are becoming more integrated into our daily lives). For a philosophical discussion of whether people truly “know” information stored externally, see Andy Clark & David Chalmers, *The Extended Mind*, 58 ANALYSIS 7, 14 (1998).

⁵² Anna Reading, *Memobilia: The Mobile Phone and the Emergence of Wearable Memories*, in SAVE AS... DIGITAL MEMORIES 81, 88 (Joanne Garde-Hansen et al. eds., 2009); Seth F. Kreimer, *Pervasive Image*

The law is starting to catch up to this, at least in the emerging “right to record.” At first, judges struggled to see how saving images to a cell phone could be speech if the photographer had no intent to share them.⁵³ But a growing minority of circuits now recognize that if the right to record means anything, it protects photographs that are not shared because their salience “may not be immediately obvious.”⁵⁴ Stored but unseen facts are part of a system of communication even if individually they are shared with no one but a machine.⁵⁵

Today, we increasingly offload not just information but also the power to use it to make decisions.⁵⁶ The consequence is that much external knowledge is not like a library for us to read—it serves only the machines, and we never see it. For example, load-balancing algorithms in data centers read electricity prices and shift resources to keep costs down.⁵⁷ The First Amendment protects these businesses’ right to learn prices,⁵⁸ but, like NASA and the Space Shuttle, they “learn” the data only as an organization: no human is involved.

Finally, some external knowledge is physically unknowable. Since 1799, scientists defined the kilogram as the mass of a metal cylinder in France.⁵⁹ In theory, the tangible message “the kilogram weighs this much” (“here, feel it”) translates to words as the mass of so much water or of so many atoms

Capture and the First Amendment: Memory, Discourse, and the Right To Record, 159 U. PA. L. REV. 335, 341 (2011); see also Margot E. Kaminski, *Privacy and the Right To Record*, 97 B.U. L. REV. 167, 183 (2017) (“[I]t can be incredibly challenging to draw the line between human and algorithmic authorship. . . . Courts assessing recording have not distinguished between cameras held by humans and cameras left in place by an absent human author.”).

⁵³ E.g., *Porat v. Lincoln Towers Cmty. Ass’n*, No. 04-cv-3199, 2005 U.S. Dist. LEXIS 4333, at *15 (S.D.N.Y. Mar. 17, 2005); see also Kaminski, *supra* note 52, at 177.

⁵⁴ *Fields v. City of Phila.*, 862 F.3d 353, 358 (3d Cir. 2017); *Animal Legal Def. Fund v. Wasden*, 878 F.3d 1184, 1203 (9th Cir. 2018) (“The act of recording is itself an inherently expressive activity”); *Turner v. Driver*, 848 F.3d 678, 689 (5th Cir. 2017) (“[T]he First Amendment protects the act of making film, as ‘there is no fixed First Amendment line between the act of creating speech and the speech itself.’” (quoting *ACLU v. Alvarez*, 679 F.3d 583, 596 (7th Cir. 2012))).

⁵⁵ Kreimer, *supra* note 52, at 381–82.

⁵⁶ See Clowes, *supra* note 51, at 7.

⁵⁷ See Arash Deylamsalehi et al., *Real-time Energy Price Aware Network Routing*, 2014 11TH ANNUAL HIGH CAPACITY OPTICAL NETWORKS AND EMERGING/ENABLING TECHNOLOGIES (PHOTONICS FOR ENERGY) 15 (2014).

⁵⁸ See *Va. State Bd. of Pharmacy v. Va. Citizens Consumer Council*, 425 U.S. 748, 754 (1976).

⁵⁹ Richard S. Davis et al., *A Brief History of the Unit of Mass: Continuity of Successive Definitions of the Kilogram*, 53 METROLOGIA A12, A12 (2016).

of silicon.⁶⁰ So far, all such attempts have failed: no measuring device can match the precision of an ordinary balance, and information is inevitably lost in translation.⁶¹ Thus, scientists can communicate the mass of the kilogram from one to another and use it in their work, but *no one knows what it says*.

Messages like the kilogram suggest we should abandon the readability test for speech that emerged in the software cases.⁶² Deciphering which objects are messages and which are machines is a far different task than asking whether they resemble, superficially, the speech we are used to. Functionality itself can be what makes an object expressive.

Considering again the RNA example from the Introduction, the information in the sample could be “speech” even if the physicians do not perceive it before applying it in their treatment: the hospital as an institution is informed by an RNA sample no less than by records in its filing system that no human can recite. On the other hand, the mere passage of information cannot make the sample speech either, as information passes in literally every interaction.⁶³ My point here is only that we cannot discount that an RNA sample *might* be speech merely because the information does not reach a human listener. Managing information and directing it to physical media are as much human activities as perceiving information with the senses, and the law can no longer recoil from information directed at machines as if it presented an unusual puzzle demanding special care.

IV. Conclusion

The next few decades will bring technological changes to human life. Each will be controversial, and each will rest on an idea—a discovery about how the world works or a proof of what is physically possible.⁶⁴ To those

⁶⁰ See Ian M. Mills et al., *Redefinition of the Kilogram: A Decision Whose Time Has Come*, 42 METROLOGIA 71, 71 (2005).

⁶¹ *Id.*

⁶² *E.g.*, *Universal City Studios v. Corley*, 273 F.3d 429, 445–46 (2d Cir. 2001).

⁶³ See Orin S. Kerr, *Are We Overprotecting Code? Thoughts on First-Generation Internet Law*, 57 WASH. & LEE L. REV. 1287, 1291 (2000).

⁶⁴ *Cf.* Erica Cook, *The Scientific Tragedy of the Atomic Bomb*, ASHBROOK (Dec. 1997), <https://ashbrook.org/publications/respub-v8n1-cook/> (arguing discoveries such as the atomic bomb lead to physical destruction unless confined by regulation and supported by a moral code).

who do not like the changes, the ideas will seem not to be speech. The question is whether they will be able to point to the medium as proof.

In 1791, political speech needed protecting because it posed the greatest threat to the status quo. Today's revolutions come from different sources, but the urge to suppress them is no less real.⁶⁵ The power to choose which media are and are not speech is the power to choose among the ideas they contain. That is precisely the power the First Amendment says the government—whether it be legislators or judges—should not have. Functional speech is an opportunity to make this point clear.

⁶⁵ Cf. James R. Ferguson, *Scientific Inquiry and the First Amendment*, 64 CORNELL L. REV. 639, 665 (1978) (making a First Amendment argument for the advancement of scientific knowledge).