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Scientific Knowledge Fraud

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The tobacco, asbestos, and fossil fuel industries, among others, have misled the public about the dangers posed by their products by lying about the science behind the products. Individuals harmed by these misrepresentations should be able to sue for fraud. Plaintiffs in fraud cases of this kind—where the misrepresentation pertains to scientific knowledge—face far greater obstacles to proving falsity, a required fraud element, than do typical fraud plaintiffs. Accordingly, a different falsity standard should apply in such cases. This Article answers three questions about how that standard should be crafted and applied. First, how should a court determine if a case before it is one to which this new standard should apply? Second, how should the court determine what knowledge the scientific community held at a given time for the purpose of assessing the truthfulness or falsity of a statement or omission? And third, how should courts compare that baseline truth with the defendant's statement or omission to determine falsity? Answering these questions should help make it possible for those harmed by scientific knowledge fraud to obtain relief.

INTRODUCTION

The truth is incontrovertible. Malice may attack it, ignorance may deride it, but in the end, there it is.

—Winston Churchill

Several states' attorneys general and the Security Exchange Commission (SEC) are investigating Exxon Mobil Corporation,[1] the world's largest oil company,[2] for misleading the public about climate change over the past four decades.[3] ExxonMobil's

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[1] In 1998, the Exxon Corporation and Mobil Oil Corporation signed a $80 billion merger agreement forming a new company called ExxonMobil Corporation, the largest company in the world at the time. Allen R. Myerson, *Big Oil: The Overview; Exxon and Mobil Announce $80 Billion Deal to Create World's Largest Company*, N.Y. TIMES (Dec. 2, 1998), https://www.nytimes.com/1998/12/02/business/big-oil-overview-exxon-mobil-announce-80-billion-deal-create-world-s-largest.html. This Article will refer to the company post-merger as "ExxonMobil," and premerger as "Exxon."

[2] *See* Lauren Debter, *The World's Largest Oil and Gas Companies 2016: Exxon Is Still King*, FORBES (May 26, 2016, 3:06 PM), https://www.forbes.com/sites/laurengensler/2016/05/26/global-2000-worlds-largest-oil-and-gas-companies/#7d8e87d228b6.

[3] Ivan Penn, *California to Investigate Whether Exxon Mobil Lied About Climate-Change Risks*, L.A. TIMES (Jan. 20, 2016, 3:00 AM), http://www.latimes.com/business/la-fi-exxon-global-warming-20160120-story.html; John Schwartz, *Exxon Mobil Fraud Inquiry Said to*

alleged actions closely resemble schemes carried out by the tobacco, asbestos, pesticide, leaded gasoline, and fracking industries.[4] Regardless of the kind of industry, the scheme is always the same: the company has a product that is both profitable and harmful. The company then tells the public that the science linking the product to the harm is unsettled, when in fact the science is well established, if not overwhelmingly settled on the matter.[5] Typically, these companies are

Focus More on Future than Past, N.Y. TIMES (Aug. 19, 2016), https://www.nytimes.com/2016/08/20/science/exxon-mobil-fraud-inquiry-said-to-focus-more-on-future-than-past.html.

[4] *See, e.g.*, PAUL BRODEUR, OUTRAGEOUS MISCONDUCT: THE ASBESTOS INDUSTRY ON TRIAL (1985); NAOMI ORESKES & ERIK M. CONWAY, MERCHANTS OF DOUBT: HOW A HANDFUL OF SCIENTISTS OBSCURED THE TRUTH ON ISSUES FROM TOBACCO SMOKE TO GLOBAL WARMING 14, 24, 33 (2010); Kristen van de Biezenbos, *Where Oil Is King*, 85 FORDHAM L. REV. 1631, 1633–38 (2017); Lester Brickman, *On the Theory Class's Theories of Asbestos Litigation: The Disconnect Between Scholarship and Reality*, 31 PEPP. L. REV. 33 (2003); William R. Freudenburg et al., *Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt*, 78 SOC. INQUIRY 2, 11–16 (2008); James A. Henderson, Jr. & Aaron D. Twerski, *Reaching Equilibrium in Tobacco Litigation*, 62 S.C. L. REV. 67, 70–75 (2010); Martha McCabe, *Pesticide Law Enforcement: A View from the States*, 4 J. ENVTL. L. & LITIG. 35, 51 (1989); Jerome O. Nriagu, *Clair Patterson and Robert Kehoe's Paradigm of "Show Me the Data" on Environmental Lead Poisoning*, 78 ENVTL. RES. 71, 71–77 (1998); Elise Gelinas, Comment, *Asbestos Fraud Should Lead to Fairness: Why Congress Should Enact the Fairness in Asbestos Injury Resolution Act*, 69 MD. L. REV. 162 (2009); Lynne Peeples, *Fracking Industry Distorts Science to Deceive Public and Policymakers, Says Watchdog Group*, HUFFPOST (Feb. 21, 2015, 7:30 AM), https://www.huffingtonpost.com/2015/02/21/fracking-research-deceive_n_6724162.html (updated Dec. 6, 2017); Jamie Lincoln Kitman, *The Secret History of Lead*, NATION (Mar. 2, 2000), https://www.thenation.com/article/secret-history-lead/.

[5] Recently, other such schemes have come to light. For instance, the sugar industry paid researchers affiliated with Harvard to publish papers downplaying the link between sugar and heart disease and obesity, directing blame instead to saturated fat. Cristin E. Kearns et al., *Sugar Industry and Coronary Heart Disease Research*, JAMA INTERNAL MED., Sept. 2016, at E1, E2, E4, http://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2548255. The sugar industry's misinformation campaign shaped fifty years of health policy in the United States. Anahad O'Connor, *How the Sugar Industry Shifted the Blame to Fat*, N.Y. TIMES: WELL (Sept. 12, 2016), https://www.nytimes.com/2016/09/13/well/eat/how-the-sugar-industry-shifted-blame-to-fat.html?mcubz=3&_r=0. Similarly, a 2016 *New York Times* article revealed that Coca-Cola paid millions of dollars for research downplaying the link between sugary drinks and obesity. Anahad O'Connor, *Coca-Cola Funds Scientists Who Shift Blame for Obesity Away from Bad Diets*, N.Y. TIMES: WELL (Aug. 9, 2015, 5:25 PM), https://well.blogs.nytimes.com/2015/08/09/coca-cola-funds-scientists-who-shift-blame-for-obesity-away-from-bad-diets/. Even more recently, the Missouri Attorney General filed a lawsuit against three opioid drug manufacturers, seeking hundreds of millions of dollars in damages, alleging that the companies funded a "campaign of fraud and deception" by misleading doctors and consumers about opioids' addictiveness and adverse health effects. Katie Mettler, *In Lawsuit, Missouri Says Big Pharma Caused Opioid Crisis with "Campaign of Fraud and Deception,"* WASH. POST (June 22, 2017), https://www.washingtonpost.com/news/morning-mix/wp/2017/06/22/in-lawsuit-missouri-says-big-pharma-caused-opioid-crisis-with-campaign-of-fraud-and-deception/?utm_term=

aware their message does not square with what scientists know. In other words, these assertions of scientific doubt are, at best, misleading.

Such distortions may, if all the elements are met, constitute fraud.[6] But, in order to prove falsity in these cases, plaintiffs face obstacles that typical fraud plaintiffs do not,[7] because science, by its very nature, can be and often is misleadingly characterized as uncertain.[8] For a number

.d7265fe9beb5. Similar lawsuits have been filed in Mississippi and Ohio. Jerry Mitchell, *Mississippi Sets Tone as Opioid Drugmakers Face Rising Tide of Lawsuit*s, CLARION-LEDGER (June 10, 2017), http://www.clarionledger.com/story/news/2017/06/11/mississippi-sets-tone-opioid-drugmakers-face-rising-tide-lawsuits/346518001/ (updated June 12, 2017, 4:58 PM); Efthimios Parasidis, *A Look Inside Ohio's Lawsuit Against Opioid Manufacturers*, SALON (July 7, 2017, 7:59 AM), http://www.salon.com/2017/07/07/a-look-inside-ohios-lawsuit-against-opioid-manufacturers_partner/.

[6] As used in this Article, the term "fraud" encompasses common law fraud, misrepresentation, deceit, securities fraud, mail fraud, wire fraud, truth in lending laws, truth in advertising laws, and any other fraud or fraud-like claim or defense that has as one of its elements that the wrongdoer made a false representation. *See, e.g.*, 18 U.S.C. § 1341 (2012) (federal mail fraud); 18 U.S.C. § 1343 (2012) (federal wire fraud); CAL. CORP. CODE § 25401 (West 2016) (California securities fraud); FLA. STAT. § 517.301 (2018) (Florida securities fraud); N.Y. GEN. BUS. LAW §§ 352, 353 (McKinney 2016) (New York securities fraud); TEX. REV. CIV. STAT. ANN. art. 581-33-1 (West 2016) (Texas securities fraud); SEC Rule, 17 C.F.R. § 240.10b-5 (2018) (federal securities fraud); West v. JPMorgan Chase Bank, N.A., 154 Cal. Rptr. 3d 285, 295 (Ct. App. 2013) (California common law fraud); GEICO Gen. Ins. Co. v. Hoy, 136 So. 3d 647, 651 (Fla. Dist. Ct. App. 2013) (Florida common law fraud); Norddeutsche Landesbank Girozentrale v. Tilton, 48 N.Y.S.3d 98, 105 (N.Y. App. Div. 2017) (New York common law fraud); Zaidi v. Shah, 502 S.W.3d 434, 441 (Tex. App. 2016) (Texas common law fraud).

[7] A required element of fraud is that the defendant made a statement or omission that misrepresented a material fact. *See, e.g.*, Nichols v. Costa, 794 F. Supp. 165, 168 (W.D. Pa. 1992) (holding that to state a fraud claim under Pennsylvania law, a "plaintiff must allege . . . a false representation of existing fact"); *In re* 80 Nassau Assocs., 169 B.R. 832, 841 (Bankr. S.D.N.Y. 1994) (holding that a "fraud claim requires the plaintiff to plead and prove (1) a misrepresentation, (2) of a material fact, (3) that was false . . ."); Anglo Am. Sec. Fund, L.P. v. S.R. Glob. Int'l Fund, L.P., 829 A.2d 143, 158 (Del. Ch. 2003) (noting that the first element of a common law fraud claim in Delaware is "a false representation of fact (or material omission) by the defendant").

[8] Part of the problem is that scientific theories, like all theories, are "underdeterminative," meaning any body of evidence always has more than one theory that can, in principle, accommodate it. *See* THE CAMBRIDGE COMPANION TO POPPER 120 (Jeremy Shearmur & Geoffrey Stokes eds., 2016). For example, the conclusion "objects near earth fall toward it when dropped" might be opposed by "objects near earth fall toward it when dropped but only when one checks to see that they do." Since one may append this to any conclusion, all conclusions are, at least technically speaking, underdeterminative. For a more in-depth exploration of underdetermination in scientific knowledge theory, see Kyle Stanford, *Underdetermination of Scientific Theory*, STAN. ENCYCLOPEDIA PHIL. (Winter 2017), https://plato.stanford.edu/entries/scientific-underdetermination/. Another problem is that scientific theories (like all theories) are never fully consistent with all available evidence. *See* David E. Adelman, *Scientific Activism and Restraint: The Interplay of Statistics, Judgment, and Procedure in Environmental Law*, 79 NOTRE DAME L. REV. 497, 531 (2004) (applying Popper's and Kuhn's theories to existing debates within the legal

of reasons, it is easy to raise scientific doubt. After all, scientific knowledge generally cannot be labeled as categorically true or false.[9] Moreover, numerous widely held prejudices and misconceptions about science are easy to exploit.[10] For decades, corporate, political, and religious entities have exploited these prejudices and misconceptions to spread misleading pseudoscientific messages that further their agendas.[11] For instance, ExxonMobil (and its predecessor, Exxon) spent forty years claiming that the science behind climate change was "unsettled," when in fact there was a broad consensus among climate scientists that CO_2 emissions were causing the climate to change.[12]

Most scientists would agree that ExxonMobil's statements did not reflect the knowledge held by the scientific community (or, for that matter, by the company) at the time the statements were made.[13] Does

community about scientific evidence); Stephanie Tai, *Uncertainty About Uncertainty: The Impact of Judicial Decisions on Assessing Scientific Uncertainty*, 11 U. PA. J. CONST. L. 671, 675–77 (2009) (discussing scientific uncertainty, including Popper's and Kuhn's theories, in the context of judicial, legislative, and administrative decision-making).

9 *See* Carl J. Wenning, *Scientific Epistemology: How Scientists Know What They Know*, J. PHYSICS TCHR. EDUC. ONLINE, Autumn 2009, at 3, 4 (noting that because science deals with truths we cannot know subjectively for ourselves, such as the fact Earth is round or that it spins on its axis, "[i]t appears that knowledge is to some extent a *justified belief* "); Bert Black et al., *Science and the Law in the Wake of* Daubert*: A New Search for Scientific Knowledge*, 72 TEX. L. REV. 715 (1994).

10 *See, e.g.*, *Understanding Science: How Science Really Works*, U.C.: UNDERSTANDING SCI., http://undsci.berkeley.edu/teaching/misconceptions.php. (last visited May 23, 2018) (listing more than two dozen misconceptions the public holds about what science is and how it works); David Goodstein, *How Science Works*, *in* REFERENCE MANUAL ON SCI. EVIDENCE 37, 47–50 (3d ed. 2011) (articulating several "myths" about science and their corresponding "facts").

11 For instance, leaded gasoline was one product companies peddled to the public using false scientific data. *See* C. Boyden Gray & Andrew R. Varcoe, *Octane, Clean Air, and Renewable Fuels: A Modest Step Toward Energy Independence*, 10 TEX. REV. L. & POL. 9, 15–26 (2005). Other such products include, for instance, artificial sweeteners, *see* Jason Iuliano, Comment, *Killing Us Sweetly: How to Take Industry Out of the FDA*, 6 J. FOOD L. & POL'Y 31, 46–71 (2010), trans fats, *see* Ross Williams, Comment, *Safe but Not Wholesome: The Troubling State of Trans Fat Regulation*, 3 J. FOOD L. & POL'Y 39, 46–51 (2007), and Thalidomide, *see* Anita Bernstein, *Formed by Thalidomide: Mass Torts as a False Cure for Toxic Exposure*, 97 COLUM. L. REV. 2153, 2156–57 (1997). There are many others.

12 *See* Geoffrey Supran & Naomi Oreskes, *Assessing ExxonMobil's Climate Change Communications (1977–2014)*, ENVTL. RES. LETTERS, Aug. 2017, http://iopscience.iop.org/article/10.1088/1748-9326/aa815f/pdf (noting that, based on a review of 187 climate communications from ExxonMobil, the company's climate change denial message to the public conflicted not only with the scientific community's knowledge but with the findings of its own scientists).

13 *See, e.g.*, Philip Shabecoff, *Global Warming Has Begun, Expert Tells Senate*, N.Y. TIMES (June 24, 1988), http://www.nytimes.com/1988/06/24/us/global-warming-has-begun-expert-tellssenate.html.

that mean they were false? Many, including a growing number of states' attorneys general and civil plaintiffs, argue the answer is yes.[14] Under the law, however, the answer is far from clear. Indeed, proving a science-is-unsettled statement to be legally false is very difficult. In most cases, defendants can show that a statement asserting scientific uncertainty was not technically false, even though it was calculated to mislead.[15] Accordingly, although ExxonMobil's statements were calculated to mislead, and in fact did, because the statements pertained to scientific knowledge—as opposed to, say, finance—they were likely not false for the purposes of fraud. ExxonMobil's statements are a good example of how well-funded corporate defendants, like Big Oil, Big Tobacco, and Big Sugar, get away with spreading misleading messages. As a result, the scale is tipped heavily in favor of well-funded corporate defendants in scientific knowledge fraud cases.[16]

To level the playing field, I proposed a new falsity standard for scientific knowledge fraud cases in *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*.[17] Stated simply, the standard is as follows: "A statement or omission that misrepresents knowledge held by the scientific community at the time such statement or omission was made fulfills the falsity element of a fraud claim."[18]

This standard would apply only to falsity, not to knowledge, intent, or any other element of fraud. Accordingly, this Article will address only falsity; all other elements and considerations, including damages, causation, and standing, are beyond the scope of this Article. In addition, the proposal that statements like those made by ExxonMobil should be prohibited raises important First Amendment concerns.[19]

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14 *See infra* note 27 (listing pending lawsuits against and investigations into fossil fuel companies for misleading the public about climate change).

15 Wes E. Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 330 (2017).

16 Scientific knowledge fraud was first recognized as its own distinct category of fraud in *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*. Fraud, however, is only one avenue for holding liable those who mislead the public about the science behind their products. The standard proposed and discussed herein may also be helpful in holding such defendants liable in other kinds of actions, such as those brought under consumer protection, truth in advertising, and racketeering laws.

17 Henricksen, *supra* note 15.

18 *Id.* at 342. Due to the nature of group knowledge, and group scientific knowledge in particular, an alternative wording of the statement might add the following emphasized words: a statement or omission that misrepresents *the state of the* knowledge held by the scientific community at the time such statement or omission was made fulfills the falsity element of a fraud claim.

19 *See, e.g.*, Nat'l Inst. of Family & Life Advocates v. Becerra, 138 S. Ct. 2361, 2371 (2018) (quoting Reed v. Town of Gilbert, 135 S. Ct. 2218, 2226 (2015)) (holding that

These constitutional issues, meriting exploration, are also outside the scope of this Article. The purpose of this Article is solely to propose a new fraud-falsity standard for scientific knowledge fraud cases.

Before any court can adopt and apply the proposed standard, three key questions must be addressed:

1. What constitutes a scientific knowledge fraud case?
2. How should courts determine what knowledge the scientific community held at a given time—that is, the baseline truth—when assessing the truthfulness or falsity of a given statement?
3. What considerations should courts take into account when comparing that baseline truth with the defendant's statement?

This Article attempts to answer these questions.

Authors have addressed how greenhouse gas emitters, like ExxonMobil, might be held liable for climate change damages under nuisance law,[20] but few have done so with regard to fraud, and none have addressed the falsity element.[21] This Article aims to fill that gap in the scholarship. More broadly, it also attempts to contribute to the scholarship concerning how easy it is to mislead the public about science and get away with it.[22] Courts, Congress, and scholars have

governments have "no power to restrict expression because of its message, its ideas, its subject matter, or its content"); United States v. Alvarez, 567 U.S. 709, 722 (2012) (holding, in a plurality opinion written by Justice Kennedy, that false statements generally are not a new category of unprotected speech exempt from the normal prohibition on content-based restriction).

[20] *See* Henricksen, *supra* note 15, at 300 n.22 (citing several law journal articles exploring the topic of climate change liability under nuisance law).

[21] *See, e.g.*, *id.* at 302; Ashley Poon, *An Examination of New York's Martin Act as a Tool to Combat Climate Change*, 44 B.C. ENVTL. AFF. L. REV. 115 (2017); John C. Coffee, Jr., *On Thin Ice: Climate Change, Exxon, NYAG and the Martin Act*, N.Y.L.J. (Nov. 19, 2015, 2:00 AM), https://www.law.com/newyorklawjournal/almID/1202742773121/on-thin-ice-climate-change-exxon-nyag-and-the-martin-act/; JENNIFER KLEIN, COLUMBIA LAW SCH.: SABIN CTR. FOR CLIMATE CHANGE LAW, POTENTIAL LIABILITY OF GOVERNMENTS FOR FAILURE TO PREPARE FOR CLIMATE CHANGE 15–23 (2015), http://wordpress.ei.columbia.edu/climate-change-law/files/2016/06/Klein-2015-08-Liability-US-Gov-Failure-to-Prep Climate-Change.pdf; Chris Erickson, *Climate Change Regulation Through Litigation: New York's Investigation of ExxonMobil Under the Martin Act*, MICH. J. ENVTL. & ADMIN. L. (Feb. 4, 2017), http://www.mjeal-online.org/climate-change-regulation-through-litigation-new-yorks-investigation-of-exxonmobil-under-the-martin-act/.

[22] *See, e.g.*, James Parker-Flynn, *The Fraudulent Misrepresentation of Climate Science*, 43 ENVTL. L. REP. NEWS & ANALYSIS 11098, 11099 (2013) ("[T]he United States should adopt a narrowly tailored civil cause of action for the fraudulent misrepresentation of climate science."); James R. Dillon, *Expertise on Trial*, 19 COLUM. SCI. & TECH. L. REV. 247, 295–310 (2018) (proposing a "social epistemological solution" whereby "scientific adjuncts" would make conclusions of law and fact of issues involving expert witness testimony); Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 56 (1901) (proposing "a board of experts or a single expert, not called

proposed solutions to this dilemma in a number of contexts. For instance, the federal courts twice, first in *Frye* and then in *Daubert*,[23] set forth guidelines to ensure that only expert witness testimony based on valid science is admissible in court, which was codified in Federal Rule of Evidence 702.[24] Authors have argued that new or existing causes of action should be created or construed to hold those who misrepresent science liable for such misrepresentations.[25] And a handful of scholars have proposed structural changes to the judiciary to ensure that scientific experts decide conclusions of law and fact involving scientific issues.[26] None, however, have addressed these issues in the context of fraud.

This Article proceeds in three parts. Part I defines what constitutes a scientific knowledge fraud case, delineating the category of actions where the fraud-falsity standard should apply. Part II addresses how courts should determine what knowledge the scientific community held at a given time for the purpose of assessing the truthfulness or falsity of a statement in a scientific knowledge fraud case. Part III proposes a framework that courts could use to more effectively and accurately compare that baseline truth with the defendant's statement to determine falsity.

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by either side, who shall advise the jury of the general propositions applicable to the case which lie within his province" of scientific or expert knowledge); Michael Hor, *When Experts Disagree*, 2000 SING. J. LEGAL STUD. 241, 261 (2000) (proposing "an expert tribunal to decide between competing expert generalisations" put forth by the parties); Elizabeth Dubats, Note, *An Inconvenient Lie: Big Tobacco Was Put on Trial for Denying the Effects of Smoking; Is Climate Change Denial Off-Limits?*, 7 NW. J.L. & SOC. POL'Y 510, 512–13 (2012) (arguing that fossil fuel companies should be shielded from fraud liability, but held accountable the same way tobacco companies were).

23 Frye v. United States, 293 F. 1013 (D.C. Cir. 1923); Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993).

24 FED. R. EVID. 702. Federal Rule of Evidence 702, which was amended in 2000 in response to *Daubert* and to the many cases applying *Daubert*, including *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999), encapsulates the current evidentiary standard. *See* County of Fresno v. Superior Court, 154 Cal. Rptr. 660, 663 (Ct. App. 1979) ("Public policy favors the use of objective, highly accurate scientific analysis."); Lee v. Martinez, 96 P.3d 291, 297 (N.M. 2004) ("Scientific evidence can only assist the trier of fact if it is 'grounded in valid, objective science' and is [therefore] 'reliable enough to prove what it purports to prove.'"); Daubert v. Merrell Dow Pharms., Inc., 43 F.3d 1311, 1317–18 (9th Cir. 1995) (noting that the party seeking admission of scientific expert testimony must present "objective, verifiable evidence that the testimony is based on scientifically valid principles.") (internal quotation marks omitted).

25 *See, e.g.*, Parker-Flynn, *supra* note 22 (noting the inadequacy of current law, and positing "the United States should adopt a narrowly tailored civil cause of action for the fraudulent misrepresentation of climate science"); Dubats, *supra* note 22.

26 *See* Dillon, *supra* note 22; Hand, *supra* note 22; Hor, *supra* note 22.

Courts will benefit immediately from the guidance and clarity of the proposed standard. To date, at least nine lawsuits have been filed against ExxonMobil and other fossil fuel companies alleging misrepresentations of climate change science.[27] More are sure to come. In addition, other misrepresentations of scientific knowledge have come to light in recent years,[28] spawning litigation against defendants

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27 *See* ExxonMobil Corp. v. Schneiderman, 316 F. Supp. 3d 679 (S.D.N.Y. 2018) (action for declaratory relief); Complaint, City of New York v. BP P.L.C., 325 F. Supp. 3d 466 (S.D.N.Y. 2018) (No. 18 cv 182 (JFK)) (action based upon fundamental principle that a corporation that makes a product causing severe harm when used exactly as intended should shoulder the costs of abating that harm); Complaint, Ramirez v. ExxonMobil Corp., 334 F. Supp. 3d 832 (N.D. Tex. 2018) (No. 3:16-CV-03111-K) [hereinafter Complaint, *Ramirez*] (class action alleging federal securities fraud claims under sections 10(b) and 20(a) of the Securities Exchange Act of 1934, SEC Rule 10b-5 promulgated thereunder, and the Private Securities Litigation Reform Act); Amended Class Action Complaint, Fentress v. ExxonMobil Corp., 304 F. Supp. 3d 569 (S.D. Tex. 2018) (No. 16-CV-03484) (class action alleging claims under Section 502 of the Employee Retirement Income Security Act, 29 U.S.C. § 1132); Complaint, Native Vill. of Kivalina v. ExxonMobil Corp., 663 F. Supp. 2d 863 (N.D. Cal. 2009) (No. C 08-1138 SBA) (action to recover damages from global warming caused by defendant's actions under a federal common law claim of nuisance); Complaint, People v. BP P.L.C., No. RG17875889 (Super. Ct. Alameda Cty. Sept. 19, 2017) (alleging public nuisance and seeking an abatement fund to provide for infrastructure necessary for the people to adapt to global warming impacts such as sea level rise); Complaint, People v. BP P.L.C., No. CGC-17-561370 (Super. Ct. San Francisco Cty. Sept. 19, 2017) (alleging public nuisance and seeking an abatement fund to provide for infrastructure necessary for the people to adapt to global warming impacts such as sea level rise); Complaint & Demand for Jury Trial, Bd. of Cty. Comm'rs v. Suncor Energy (U.S.A.), Inc., No. 2018CV030349 (Dist. Ct. Boulder Cty. Apr. 17, 2018) (bringing claims for nuisance, trespass, unjust enrichment, and violations of consumer protection laws against Suncor and ExxonMobil); Petition of ExxonMobil Corp., *In re* Civil Investigative Demand, No. 2016-EPD-36 (Super. Ct. Suffolk Cty. June 16, 2016), *aff'd sub nom.* ExxonMobil Corp. v. Attorney General, 94 N.E.3d 986 (Mass. 2018), *cert. denied*, ExxonMobil Corp. v. Healey, No. 18-311, 2019 WL 113105 (U.S. Jan. 7, 2019) (action filed by ExxonMobil in response to subpoenas issued by Massachusetts Attorney General); Subpoena Duces Tecum, New York v. PriceWaterhouseCoopers LLP, No. 451962/16 (Sup. Ct. N.Y. Cty. Aug. 19, 2016) (New York Attorney General subpoenas compelling ExxonMobil and PriceWaterhouseCoopers to produce documents pertaining to climate change); Verified Petition for Pre-Suit Depositions, *In re* ExxonMobil Corp., No. 096-297222-18 (Dist. Ct. Tarrant Cty. Jan. 8, 2018). Other parties have filed nonfraud-based claims against ExxonMobil for its role in climate change and sea level rise. *See, e.g.*, Complaint, County of Marin v. Chevron Corp., No. CIV 1702586 (Super. Ct. Marin Cty. July 17, 2017) (alleging nuisance, failure to warn, negligence, design defect, and trespass); Complaint, County of San Mateo v. Chevron Corp., No. 17CIV03222 (Super. Ct. San Mateo Cty. July 17, 2017) (alleging nuisance, failure to warn, negligence, design defect, and trespass); Complaint, City of Imperial Beach v. Chevron Corp., No. C17-01227 (Super Ct. Contra Costa Cty. July 17, 2017) (alleging nuisance, failure to warn, negligence, design defect, and trespass). *See generally* Myanna Dellinger, *See You in Court: Around the World in Eight Climate Change Lawsuits*, 42 WM. & MARY ENVTL. L. & POL'Y REV. 525 (2018) (discussing climate damages lawsuits filed in North America, Europe, and Africa).

28 *See supra* note 5 and accompanying text.

in other industries.[29] Consequently, courts will have to determine whether these corporate defendants made false representations to shareholders, government regulators, policymakers, or the public when they misrepresented the science behind their products and the dangers those products pose.

Moreover, the urgency of implementing a more just standard in scientific knowledge fraud cases is particularly great today because science is under attack. The current administration and Republican leaders have dismantled environmental regulations, gutted the EPA, scrubbed politically inconvenient scientific data from government websites, and attempted to defund scientific research and institutions.[30] Climate change denial and other anti-science initiatives, laws, and policies are being implemented at an alarming rate.[31] By misleading the public on science, those in power increase their wealth and

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29 For instance, opioid manufacturers have been charged by state law enforcement agencies in Missouri, Mississippi, and Ohio. *See* Therese Apel, *Mississippi Attorney General Joins Nationwide Effort to Push Opioid Alternatives*, CLARION-LEDGER (Sept. 20, 2017, 3:49 PM), https://www.clarionledger.com/story/news/2017/09/20/mississippi-attorney-general-insurance-opioid-alternatives/686439001/ (discussing the Mississippi Attorney General's lawsuit against opioid manufacturers) (updated Sept. 20, 2017, 5:48 PM); Richard Pérez-Peña, *Ohio Sues Drug Makers, Saying They Aided Opioid Epidemic*, N.Y. TIMES (May 31, 2017), https://www.nytimes.com/2017/05/31/us/ohio-sues-pharmaceutical-drug-opioid-epidemic-mike-dewine.html (discussing the Ohio Attorney General's lawsuit against opioid manufacturers); Mettler, *supra* note 5 (discussing the Missouri Attorney General's lawsuit against opioid manufacturers).

30 See Nathanael Johnson, *Trump's EPA Is Rolling Back Another Anti-Coal Regulation*, GRIST (Jan. 3, 2019), https://grist.org/article/trumps-epa-is-rolling-back-another-anti-coal-regulation/ (discussing the Trump Administration's rollback of coal environmental regulations); Scott Waldman, *Climate Web Pages Erased and Obscured Under Trump*, SCI. AM. (Jan. 10, 2018), https://www.scientificamerican.com/article/climate-web-pages-erased-and-obscured-under-trump/ (discussing the Trump Administration's scrubbing of large amounts of climate change and other information from the EPA website); Scott Waldman, *Trump Budget Would Slash Science Across Agencies*, SCI. AM. (Feb. 13, 2018), https://www.scientificamerican.com/article/trump-budget-would-slash-science-across-agencies/ (discussing how the Trump Administration's 2018 budget proposed deep cuts to various scientific research projects and institutions).

31 For example, Florida House Bill 989, which was signed into law by Governor Rick Scott on June 26, 2017, allows any county resident to file a complaint about instructional materials in the county's public schools. H.R. 989, 2017 Leg., 119th Sess. (Fla. 2017). A hearing officer is appointed, and a hearing is held before the hearing officer after which the board, if it deems the challenge justified, may remove those materials from the curriculum. *Id.* This law has been widely derided as "anti-science" because it opens the door to removing evolution and climate change instructional materials, among others, to those who oppose valid scientific teachings in school. *See* Marshal Shepherd, *Two Sad Ironies in Florida Passing Its "Anti-Science" Law*, FORBES (July 1, 2017, 10:06 AM), https://www.forbes.com/sites/marshallshepherd/2017/07/01/two-sad-ironies-in-florida-passing-its-anti-science-law/#7a97fc065089.

influence at the expense of the health, prosperity, and security of everyone else.[32] At the same time, society's dependence on science, engineering, and technology is growing more rapidly than ever.[33] Accordingly, we need to reaffirm our commitment to objective truth by calling falsehoods false.

I
DEFINING SCIENTIFIC KNOWLEDGE FRAUD

A. Fraud and Falsity

The elements of common law fraud are[34] (1) a representation of fact; (2) falsity of the representation; (3) materiality of the representation; (4) the speaker's knowledge of the falsity of the representation, or reckless disregard for the truth or falsity of it; (5) the speaker's intent that the hearer rely upon it; (6) the hearer's ignorance of the falsity of the representation; (7) the hearer's reliance on the representation; (8)

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32 While everyone suffers from big corporations getting away with misleading the public about science, it is the poor and middle classes that bear the greatest burden. *See, e.g.*, Martin Wolf, *Why Climate Change Puts the Poorest Most at Risk*, FIN. TIMES (Oct. 17, 2017), https://www.ft.com/content/f350020e-b206-11e7-a398-73d59db9e399 (describing how global warming disproportionately affects lower-income nations); Robert Reich, *Climate and Inequality*, YOUTUBE (Apr. 28, 2017), https://www.youtube.com/watch?v=3gON68n8ko0 ("The people who are bearing the brunt of climate change here and around the world are the poor and working-class who live in areas increasingly prone to flooding, who rely on croplands susceptible to ever more frequent droughts, who depend on outdated water and sewage systems and older roadways and power grids that are falling apart under the strains of more severe weather, who live in fragile structures particularly vulnerable to intensifying hurricanes and violent storms, whose health is especially compromised by airborne contaminants, infections, and other diseases that are accompanying climate change.").

33 *See, e.g.*, Christine Norton, Book Review, 6 J. HIGH TECH. L. 1 (2006–2007) (reviewing ALAN I. MARCUS & AMY SUE BIX, THE FUTURE IS NOW: SCIENCE AND TECHNOLOGY POLICY IN AMERICA SINCE 1950 (2007)) (noting that World War II was "the starting point of America's realization that continued dominance in the international scene depends upon scientific and technological supremacy"); Stephen Breyer, *The Interdependence of Science and Law*, 82 JUDICATURE 24, 24 (Aug. 1998) ("[T]he law itself increasingly needs access to sound science. . . . [A]s society becomes more dependent for its well being upon scientifically complex technology, we find that this technology increasingly underlies legal issues of importance to all of us."); Barack Obama, U.S. President, Remarks by the President at the National Academy of Sciences Annual Meeting (Apr. 27, 2009) ("Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before."), https://obamawhitehouse.archives.gov/the-press-office/remarks-president-national-academy-sciences-annual-meeting.

34 Although the proposed standard could apply to a wide range of fraud claims mentioned earlier in this Article, any discussion of common law fraud (or intentional misrepresentation or deceit) principles is meant to give guidance on fraud law generally, and on the falsity element specifically.

the hearer's right to rely on the representation; and (9) the hearer's consequent and proximate injury caused by reliance on the representation.[35] All elements must typically be pleaded with heightened specificity and proven by clear and convincing evidence.[36]

To satisfy the falsity element, a plaintiff must prove the defendant's representation was false under the law.[37] A false representation consists of "any oral or written words, conduct, or combination of words and conduct that creates an untrue or misleading impression in the mind of another."[38] Because knowledge and intent are separate

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35 The elements of fraud are presented in slightly different forms in different jurisdictions. Some jurisdictions list five elements, for instance, while others list seven, eight, or nine. But all jurisdictions include some version of these core fraud elements. V. John Ella, *Common Law Fraud Claims: A Critical Tool for Litigators*, BENCH & B. MINN., Sept. 2006, at 18, 19 ("There are many types of fraud — insurance fraud, welfare fraud, election fraud, healthcare fraud, securities fraud, bank fraud, immigration fraud, consumer fraud, internet fraud, patent fraud, accounting fraud, tax fraud, and mail fraud — to name a few. But for the most part, all fraud-type claims have similar elements."); *see also* West v. JPMorgan Chase Bank, N.A., 154 Cal. Rptr. 3d 285, 295 (Ct. App. 2013) (California fraud elements: "(1) the defendant made a false representation as to a past or existing material fact; (2) the defendant knew the representation was false at the time it was made; (3) in making the representation, the defendant intended to deceive the plaintiff; (4) the plaintiff justifiably relied on the representation; and (5) the plaintiff suffered resulting damages."); Norddeutsche Landesbank Girozentrale v. Tilton, 48 N.Y.S.3d 98, 105 (App. Div. 2017) (New York fraud elements: "Such a claim is stated when a plaintiff pleads a material misrepresentation of a fact, knowledge of its falsity, an intent to induce reliance, justifiable reliance by the plaintiff and damages flowing therefrom."); GEICO Gen. Ins. Co. v. Hoy, 136 So. 3d 647, 651 (Fla. Dist. Ct. App. 2013) (Florida fraud elements: "1) a false statement concerning a material fact, 2) knowledge by the person making the statement that the representation is false, 3) intent by the person making the statement that the representation will induce another to act upon it, and 4) reliance on the representation to the injury of the other party") (quoting Mettler, Inc. v. Ellen Tracy, Inc., 648 So. 2d 253, 255 (Fla. Dist. Ct. App. 1994)) (emphasis omitted); Zaidi v. Shah, 502 S.W.3d 434, 441 (Tex. App. 2016) (Texas fraud elements: "(1) the speaker made a material representation; (2) the representation was false; (3) when the representation was made, the speaker either knew it was false or made it recklessly without any knowledge of its truth and as a positive assertion; (4) the speaker intended the plaintiff to act upon the representation; (5) the plaintiff acted in reliance on the representation; and (6) the plaintiff suffered injury thereby").

36 *See, e.g.*, *In re* Ogden, 314 F.3d 1190, 1198 (10th Cir. 2002); Mayberry v. Ememessay, Inc., 201 F. Supp. 2d 687, 698 (W.D. Va. 2002); *see also* 37 C.J.S. *Fraud* § 12 (2018).

37 United States v. Beebe, 180 U.S. 343, 349 (1901); Turner v. Milliman, 708 S.E.2d 766, 770 (S.C. 2011); Prestwood v. City of Andalusia, 709 So. 2d 1173, 1175 (Ala. 1997); Adams v. Gillig, 92 N.E. 670, 671 (N.Y. 1910); Hennig v. Ahearn, 601 N.W.2d 14, 22 (Wis. Ct. App. 1999); 37 AM. JUR. 2D *Fraud and Deceit* § 106 (2013).

38 T.A. Pelsue Co. v. Grand Enters., Inc., 782 F. Supp. 1476, 1488 (D. Colo. 1991); *see also* Church & Dwight Co. v. SPD Swiss Precision Diagnostics, GmBH, 843 F.3d 48, 65 (2d Cir. 2016) (noting that, under the Lanham Act, "[i]f a message is not literally false, a plaintiff may nonetheless demonstrate that it is impliedly false if the message leaves an

fraud elements, the person making the representation does not need to know the representation is untrue or intend to mislead to prove falsity.[39] Falsity only requires the representation to be, at the time it is made, objectively untrue or misleading.[40]

In scientific knowledge fraud cases, falsity is uniquely difficult to prove.[41] First, science does not operate on certainties.[42] This makes it easy for a wrongdoer to assert that the science on a particular topic is uncertain or unsettled, giving the impression "we don't know," when in fact scientists within that field know enough to warrant action or precautions, if not liability. The tobacco industry did this for half a century. Specifically, tobacco industry executives and affiliates told the public and policymakers that the scientific link between smoking and cancer was unclear.[43] This statement, and all its permutations, was a

impression on the listener or viewer that conflicts with reality") (internal quotation marks omitted).

39 *See* Davis v. Sterne, Agee & Leach, Inc., 965 So. 2d 1076, 1091 (Ala. 2007) ("[A] false representation, even if made innocently or by mistake, operates as a legal fraud if it is a material fact that is acted upon with belief in its truth."); Monroe v. Mercer, 414 S.W.2d 756, 760–61 (Tex. Civ. App. 1967).

40 *See generally* Spreitzer v. Hawkeye State Bank, 779 N.W.2d 726 (Iowa 2009); Mukhopadhyay v. Genesis Corp., 894 N.Y.S.2d 430 (N.Y. App. Div. 2010); Parker v. Byrne, 996 A.2d 627 (R.I. 2010). There are other nuances to the falsity standard this Article will not address, but which are relevant to the analysis herein, such as where the representation contains a half-truth, *see* United Parcel Serv. Co. v. Rickert, 996 S.W.2d 464 (Ky. 1999); Knights of Columbus Council 3152 v. KFS BD, Inc., 791 N.W.2d 317 (Neb. 2010); Farnsworth v. Feller, 471 P.2d 792 (Or. 1970); Am. Empire Life Ins. Co. v. Long, 344 S.W.2d 513 (Tex. Civ. App. 1961); 37 AM. JUR. 2D *Fraud and Deceit* § 107 (2013), where the representation is technically accurate, yet still misleading for the purposes of a fraud claim, *see* Grove Holding Corp. v. First Wis. Nat'l Bank of Sheboygan, 12 F. Supp. 2d 885, 890 (E.D. Wis. 1998); W. PAGE KEETON ET AL., PROSSER & KEETON ON THE LAW OF TORTS 736–37 (5th ed. 1984), and where no false statement is made, but overall impression of representations are misleading, *see* Downey v. Finucane, 98 N.E. 391 (N.Y. 1912); 37 *Fraud and Deceit* § 106, *supra* note 37; 60A LAURA HUNTER DIETZ ET AL., NEW YORK JURISPRUDENCE: FRAUD AND DECEIT § 121 (2d ed. 2019).

41 Henricksen, *supra* note 15, at 317–33.

42 Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 590 (1993) ("Of course, it would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty; arguably, there are no certainties in science.").

43 The tobacco industry's campaign to cast doubt on the scientific link between smoking and cancer is well documented. *See, e.g.*, PHILIP J. HILTS, SMOKE SCREEN: THE TRUTH BEHIND THE TOBACCO INDUSTRY COVER-UP (1996) (outlining the history of the tobacco industry's attempts to escape regulation); RICHARD KLUGER, ASHES TO ASHES: AMERICA'S HUNDRED-YEAR CIGARETTE WAR, THE PUBLIC HEALTH, AND THE UNABASHED TRIUMPH OF PHILIP MORRIS (1996) (outlining the history of the tobacco industry's attempts to escape regulation); ROBERT N. PROCTOR, GOLDEN HOLOCAUST: ORIGINS OF THE CIGARETTE CATASTROPHE AND THE CASE FOR ABOLITION (2012). The tobacco industry's scientific misrepresentations have also become well known in popular culture. *See, e.g.*, THANK YOU FOR SMOKING (Fox Searchlight Pictures 2006); ORESKES & CONWAY, *supra* note 4. One

lie.[44] But it worked. By convincing millions of people there was genuine doubt about the link between smoking and cancer, the tobacco industry increased sales, causing millions of deaths and chronic and acute illnesses.[45] The tobacco industry's false statement also evaded fraud laws because, although the message misled the public, it was not legally false.[46]

Second, due to the lack of absolute objectivity and certainty in scientific research, a great number of people have misconceptions about science—like how the scientific method works and what a "theory" is.[47] Many biases, based on religious, social, political, or financial conflicts of interests, also warp people's conception of scientific assertions.[48] Because of these misunderstandings and biases,

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now-famous tobacco industry memorandum from 1969 stated the industry's goal explicitly: "Doubt is our product." Rahul Kanakia, *Tobacco Companies Obstructed Science, History Professor Says*, STAN. NEWS SERV. (Feb. 13, 2007), http://news.stanford.edu/pr/2007/pr-proctor-021407.html.

44 *See Harms of Cigarette Smoking and Health Benefits of Quitting*, NAT'L CANCER INST., https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/cessation-fact-sheet (last updated Dec. 17, 2017) ("Smoking causes cancers of the lung, esophagus, larynx, mouth, throat, kidney, bladder, liver, pancreas, stomach, cervix, colon, and rectum, as well as acute myeloid leukemia."); Celeste Katz, *Tobacco Companies Admit Smoking Will Kill You, Thanks to Federally Mandated Ads*, NEWSWEEK (Nov. 25, 2017, 7:00 AM), http://www.newsweek.com/big-tobacco-companies-corrective-ads-justice-department-smoking-722227; *Tobacco Companies Lied About Smoking Dangers, D.C. Circuit Finds*, 24 NO. 20 ANDREWS TOBACCO INDUS. LITIG. REP. 2 (2009).

45 *See* U.S. DEP'T OF HEALTH AND HUMAN SERV.: TOBACCO FACTS AND FIGURES, https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/index.htm [https://betobaccofree.hhs.gov/about-tobacco/facts-figures/] (last visited Sept. 3, 2017) ("More than 20 million Americans have died because of smoking since 1964, including approximately 2.5 million deaths due to exposure to secondhand smoke."). As Stanford professor Robert Proctor points out, "It's still the leading cause of death. It still kills over 400,000 Americans per year. It's still two jumbo jets crashing every day." Michael Mechanic, *"Golden Holocaust" is the Book Big Tobacco Doesn't Want You to Read*, MOTHER JONES, http://www.motherjones.com/politics/2012/05/tobacco-book-golden-holocaust-robert-proctor (last visited Feb. 6, 2019). Worldwide, the number is even more grim; it is estimated 100 million people were killed by tobacco in the twentieth century, and that as many as 1 billion are expected to die from tobacco in this century. THE TOBACCO ATLAS: DEATHS, http://www.tobaccoatlas.org/topic/smokings-death-toll/ (last visited Feb. 6, 2019).

46 *See generally* Melancon v. Brown & Williamson Tobacco Corp., 621 F. Supp. 567 (W.D. Ky. 1985) (holding that the case, where a smoker brought action against a tobacco company for alleged injuries caused by cigarette tobacco sold without a warning label, was frivolous on its face); Hudson v. R.J. Reynolds Tobacco Co., 427 F.2d 541 (5th Cir. 1970) (finding for defendant because plaintiff did not offer proof that defendant could or should have known that smoking could cause cancer in an action brought against a cigarette manufacturer for larynx and lung cancer caused from smoking).

47 *See supra* note 10.

48 Henricksen, *supra* note 15.

industry defendants enjoy an unfair advantage in scientific knowledge fraud cases. The defendant need only raise doubt about the scientific idea, something relatively easy to do, while the plaintiff is tasked with proving the idea—for example, the link between smoking and cancer—with certainty, something extraordinarily difficult, if not impossible, to do.[49] Indeed, plaintiffs have routinely been denied compensation in suits against the tobacco,[50] asbestos,[51] and other industries because it is extraordinarily difficult to hold industry defendants liable.[52]

To level the playing field, courts should apply the proposed falsity standard mentioned above in scientific knowledge fraud cases.[53] This standard should apply, however, only to cases where falsity is at issue and where the alleged misrepresentation pertains to scientific knowledge. Accordingly, to determine whether to apply the standard in any particular case, courts must understand what scientific knowledge is and how particular representations should be construed as pertaining to, or not pertaining to, scientific knowledge.

B. Scientific Knowledge

The fossil fuel industry misled the public about the link between CO_2 emissions and global warming.[54] The asbestos industry misled the

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49 *See infra* notes 50–52.

50 *See* Henderson, Jr. & Twerski, *supra* note 4; ORESKES & CONWAY, *supra* note 4.

51 *See, e.g.*, BRODEUR, *supra* note 4; Brickman, *supra* note 4 (giving a brief overview of asbestos litigation); Gelinas, *supra* note 4 (discussing history of asbestos litigation); Bragg v. Owens-Corning Fiberglass Corp., 734 A.2d 643 (D.C. 1999) (recounting the history of asbestos use and litigation); Findley v. Blinken (*In re* Joint E. & S. Dist. Asbestos Litig.), 129 B.R. 710, 735 (E. & S.D.N.Y. 1991) (recounting a detailed history of asbestos use), *vacated*, 982 F.2d 721 (2d Cir. 1992), *modified on reh'g*, 993 F.2d 7 (2d Cir. 1993); Jackson v. Johns-Manville Sales Corp., 750 F.2d 1314 (5th Cir. 1985); Special Project, *An Analysis of the Legal, Social, and Political Issues Raised by Asbestos Litigation, Part I*, 36 VAND. L. REV. 573 (1983).

52 David G. Owen, *Inherent Product Hazards*, 93 KY. L.J. 377, 392–93 (2004); Alan L. Calnan, *Distributive and Corrective Justice Issues in Contemporary Tobacco Litigation*, 27 SW. U. L. REV. 577, 672 (1998); Robert L. Rabin, *A Sociolegal History of the Tobacco Tort Litigation*, 44 STAN. L. REV. 853, 856 (1992); Richard Doll & A. Bradford Hill, *A Study of the Aetiology of Carcinoma of the Lung*, 2 BRIT. MED. J. 1271 (1952), http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2022425/pdf/brmedj03472-0009.pdf; Ernest L. Wynder & Evarts A. Graham, *Tobacco Smoking as a Possible Etiologic Factor in Bronchiogenic Carcinoma: A Study of Six Hundred and Eighty-Four Proved Cases*, 143 JAMA 458 (1950). For more information on the harms of smoking see Ray Norr, *Cancer by the Carton*, READER'S DIG., Dec. 1952, at 7–8, https://www.industrydocumentslibrary.ucsf.edu/tobacco/docs/#id=nyyp0092, and its effect, see KLUGER, *supra* note 43, at 129–30.

53 *See supra* note 18 and accompanying text.

54 Penn, *supra* note 3.

public about the health hazards of asbestos.[55] The sugar industry misled the public about the health dangers of sugar.[56] Again and again, the same scheme is repeated: a company sells a profitable but dangerous product. It hides the product's dangers by lying about the science linking the product to the harm it causes. This scheme allows the company to continue selling the dangerous product. Profits are tied to how well companies in these industries can mislead the public about the science behind a product.

What these companies and their allies misrepresented was, in each case, a fact drawn from a body of scientific knowledge.[57] That is, whether CO_2 emissions cause global warming is an epistemic question more than it is a fact question. And the only way to answer that, or any other question that arises from recent scientific inquiry, is to point to the scientific knowledge on the topic. To do that though, courts must first grasp what scientific knowledge is.

In *Daubert*, the United States Supreme Court defined "scientific knowledge" within the evidence context when it explained what constitutes admissible expert witness testimony:

> The adjective "scientific" implies a grounding in the methods and procedures of science. Similarly, the word "knowledge" connotes more than subjective belief or unsupported speculation. The term "applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds." Of course, it would be unreasonable to conclude that the subject of scientific testimony must be "known" to a certainty; arguably, there are no certainties in science. But, in order to qualify as "scientific knowledge," an inference or assertion must be derived by the scientific method. Proposed testimony must be supported by appropriate validation—i.e., "good grounds," based on what is known.[58]

The Supreme Court made clear that there is a bright-line division between valid scientific knowledge, which is adequately supported and

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[55] *See* Henricksen, *supra* note 15, at 328–29.

[56] *See* Camila Domonoske, *50 Years Ago, Sugar Industry Quietly Paid Scientists to Point Blame at Fat*, NPR: TWO-WAY (Sept. 13, 2016, 9:59 AM), https://www.npr.org/sections/thetwo-way/2016/09/13/493739074/50-years-ago-sugar-industry-quietly-paid-scientists-to-point-blame-at-fat.

[57] Henricksen, *supra* note 15, at 296 n.4 ("[T]o qualify as 'scientific knowledge,' an assertion must be derived by scientific methods and supported by adequate validation.") (citing Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 590 (1993); *Scientific Knowledge*, BLACK'S LAW DICTIONARY (10th ed. 2014)).

[58] *Daubert*, 509 U.S. at 590 (citations omitted). The Court noted that the determination entails an "assessment of whether the reasoning or methodology underlying the testimony is scientifically valid." *Id.* at 592–93.

derived from scientific methods, and invalid scientific knowledge, which is subjective belief and unsupported speculation.[59] The Court laid out four factors for determining whether an assertion qualifies as scientific knowledge. Those factors are incorporated into the definition of "scientific knowledge" provided in Black's Law Dictionary:

> (1) whether it has been tested; (2) whether it has been subjected to peer review and publication; (3) the known or potential rate of error; and (4) the degree of acceptance within the scientific community.[60]

No single factor is determinative. Moreover, courts have not applied these four factors in enough cases to give a complete picture of the parameters of what scientific knowledge comprises.[61] Clearly, ExxonMobil purports to assert scientific knowledge through assertions like "scientists remain unable to confirm" if humans are causing global warming or "fundamental gaps in knowledge leave scientists unable to make reliable predictions about future changes."[62] They were assertions of fact about science, but did they square with the scientific knowledge they purported to assert?

This question is further complicated by the fact that the scientific knowledge at issue is not a single scientist's opinion, as is often the case when determining whether a particular expert's opinion is based on scientific knowledge under *Daubert* and Federal Rule of Evidence 702.[63] Rather, it is, epistemologically speaking, a matter of group knowledge.[64] Accordingly, whether or not ExxonMobil's above

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59 *Id.* at 589–90.

60 *Scientific Knowledge*, BLACK'S LAW DICTIONARY (10th ed. 2014).

61 *See, e.g.*, Allison v. McGhan Med. Corp., 184 F.3d 1300 (11th Cir. 1999) (granting defendant's motion to exclude plaintiff's expert causation witnesses after doing a full *Daubert* analysis without witnesses. Plaintiff was unable to establish causation and the court granted final summary judgment to defendants); Payne v. Wyeth Pharm., Inc., No. 2:08CV119, 2008 WL 5586824, at *1 (E.D. Va. Nov. 17, 2008) (adding an additional factor to the *Daubert* factors to evaluate "whether the expert testimony was prepared solely for purposes of litigation, or whether it flowed naturally from the expert's research or technical work"); Quintana v. Acosta, 316 P.3d 912 (N.M. Ct. App. 2013) (holding that plaintiff's expert witness testimony was admissible because it was based not on scientific knowledge but rather on the witness's own knowledge, training, and experience, and was therefore not subject to the *Daubert* factors analysis).

62 *Unsettled Science*, N.Y. TIMES, *in* Geoffrey Supran & Naomi Oreskes, Opinion, *What Exxon Mobil Didn't Say About Climate Change*, N.Y. TIMES (Aug. 22, 2017) [hereinafter ExxonMobil Advertorial], https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html.

63 *See Daubert*, 509 U.S. at 579; FED. R. EVID. 702.

64 *See, e.g.*, Kristina Rolin, *Science as Collective Knowledge*, 9 COGNITIVE SYS. RES. 115 (2008) [hereinafter Rolin, *Collective Knowledge*] (discussing scientific knowledge as group knowledge).

assertions are true hinges on whether they square with the knowledge of the scientific community, not whether they square with a single scientist's knowledge.[65]

The concept of group knowledge is based on "[t]he idea that groups can be treated as collective agents capable of knowledge and beliefs."[66] Today, many epistemologists endorse the idea that collective knowledge is valid and obtainable; "groups can *have* knowledge."[67] Naturally, however, "[g]roups that qualify as epistemic groups must at least be partly defined on the basis of epistemic properties related to knowledge possession, which allows them to behave like (individual) epistemic agents, and explains how it can achieve its knowledge."[68]

Scholars disagree about which groups of scientists can hold group knowledge,[69] but widely agree that scientific knowledge *can* be group knowledge.[70] As such, the debate hinges on how restrictive that designation should be (e.g., scientific research teams versus the entire scientific community).[71]

But the question about which groups of scientists can have knowledge must be tailored to the context in which it is asked. It is one thing to ask it in the realm of philosophy or epistemology; it is quite another thing to ask it in a court of law. Within the very limited scope of this Article, which pertains to the falsity element in scientific knowledge fraud cases, it is most appropriate to adopt Dr. Kristina

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65 *See* Henricksen, *supra* note 15, at 298–99.

66 A. Baltag, R. Boddy & S. Smets, *Group Knowledge in Interrogative Epistemology*, *in* JAAKKO HINTIKKA ON KNOWLEDGE AND GAME-THEORETICAL SEMANTICS 131, 131 (Hans van Ditmarsch & Gabriel Sandu eds., 2018).

67 Chris Dragos, *Which Groups Have Scientific Knowledge? Wray vs. Rolin*, 30 SOC. EPISTEMOLOGY 611, 611 (2016); *see also id.* at n.1 (citing to thirty-four papers supporting the quoted assertion).

68 Rachel Boddy, Epistemic Issues and Group Knowledge, (June 20, 2014) (unpublished M.Sc. thesis, University of Amsterdam), https://www.illc.uva.nl/Research/Publications/Reports/MoL-2014-03.text.pdf.

69 *See, e.g.*, Dragos, *supra* note 67, at 611–12 (discussing the disagreement between Brad Wray and Kristina Rolin on how restrictive the kinds of groups to which collective knowledge can be attributed should be); Alexander Bird, *When Is There a Group That Knows?*, *in* ESSAYS IN COLLECTIVE EPISTEMOLOGY 42, 44–47 (Jennifer Lackey ed., 2014) (addressing the question more broadly by asking "When is there a 'group', 'collectivity', or 'social system' that knows?").

70 *Compare* Rolin, *Collective Knowledge*, *supra* note 64, *and* Kristina Rolin, *Group Justification in Science*, 7 EPISTEME 215 (2010) [hereinafter Rolin, *Group Justification*], *with* K. Brad Wray, *Who Has Scientific Knowledge?*, 21 SOC. EPISTEMOLOGY 337 (2007).

71 *See* sources cited *supra* notes 69 and 70.

Rolin's framework, set forth in a recent series of papers.[72] Building on Professor Michael Williams's analysis of epistemic responsibility,[73] Rolin articulated that "a scientific community as a whole can be epistemically responsible for some knowledge claims."[74] Under Rolin's framework, the knowledge underlying the myriad of scientific principles behind sweeping assertions pertaining to, for instance, the causes of global warming, need not be entirely known by any individual scientist.[75] Rather, group knowledge held by the scientific community will suffice. The scientific community could then designate specific scientists—who are most knowledgeable in a particular area—to defend particular assertions or attacks.[76] A designated scientist would be capable of defending something like global warming on behalf of the whole community, even though she or he would not necessarily possess knowledge of every underlying principle that global warming rests on.[77]

In order to satisfy the falsity element, a plaintiff must prove that the representation was false or created an untrue or misleading impression.[78] And given the sophisticated and complex nature of the science behind many of the misleading assertions made in recent history,[79] the answer to questions on whether something like global

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72 *See* Kristina Rolin, *Collective Epistemic Responsibility: A Reply to Chris Dragos*, 5 SOC. EPISTEMOLOGY REV. & REPLY COLLECTIVE 7 (2016) [hereinafter Rolin, *Collective Epistemic Responsibility*]; Rolin, *Collective Knowledge*, *supra* note 64; Wray, *supra* note 70.

73 *See* MICHAEL WILLIAMS, PROBLEMS OF KNOWLEDGE: A CRITICAL INTRODUCTION TO EPISTEMOLOGY 22 (2001) ("[W]e focus on whether a belief has been responsibly formed or is responsibly held. From this angle, justified belief is what we get by living up to appropriate standards of epistemic behaviour. For example, we can ask whether, in forming a certain belief, I have negligently ignored important counter-evidence. Call this 'epistemic responsibility' or 'personal justification.'"); *id.* at 22–25 (elaborating on the concept of epistemic responsibility).

74 Rolin, *Collective Epistemic Responsibility*, *supra* note 72.

75 *Id.*; Rolin, *Collective Knowledge*, *supra* note 64, at 121.

76 Rolin, *Collective Epistemic Responsibility*, *supra* note 72, at 7–8; Rolin, *Collective Knowledge*, *supra* note 64, at 121–22.

77 *See* Rolin, *Collective Epistemic Responsibility*, *supra* note 72, at 8.

78 United States v. Beebe, 180 U.S. 343, 349 (1901); T.A. Pelsue Co. v. Grand Enters., Inc., 782 F. Supp. 1476, 1488 (D. Colo. 1991); Turner v. Milliman, 708 S.E.2d 766, 770 (S.C. 2011); Prestwood v. City of Andalusia, 709 So. 2d 1173, 1175 (Ala. 1997); Adams v. Gillig, 92 N.E. 670, 671 (N.Y. 1910); Hennig v. Ahearn, 601 N.W.2d 14, 25 (Wis. Ct. App. 1999); 37 *Fraud and Deceit* § 106, *supra* note 37.

79 *See, e.g.*, Joanna K. Sax, *The Tobacco Diaries: Lessons Learned and Applied to Regulation of Dietary Supplements*, 73 MD. L. REV. ENDNOTES 20, 28–31 (2013) (outlining the history of attempts by the tobacco industry to escape regulation); Complaint, People v. Purdue Pharma L.P., No. CGC-13-534108 (Super. Ct. Orange Cty. May 21, 2014) (lawsuit

warming is true or false comes from the community, rather than any individual.[80]

Accordingly, a scientific knowledge fraud case arises when a defendant allegedly misrepresents knowledge held by the scientific community. The misrepresentation could be by statement or omission, and it must pertain to knowledge—or the state of the knowledge—held by the scientific community.

C. The Parameters of Scientific Knowledge Fraud

Industry denial of the link between smoking and cancer, or CO_2 emissions and global warming, would be textbook scientific knowledge fraud cases. A court addressing such a claim should apply the proposed fraud-falsity standard: if a fraud defendant's alleged statement or omission contradicted a clear body of scientific knowledge—in other words, is objectively untrue—then the falsity element would be satisfied. Similar to the link between smoking and cancer, or CO_2 emissions and global warming, other cases where the falsity element is clearly satisfied, based on the underlying facts and not on the actual causes of action pleaded, include

A. an action by the United States alleging that cigarette manufacturers and tobacco-related trade organizations violated the Racketeer Influenced and Corrupt Organizations Act by conspiring "to deceive the American public about the health effects of smoking and environmental tobacco smoke, addictiveness of nicotine, [and] the health benefits from low tar, 'light' cigarettes;"[81]

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alleging opioid manufacturers knew that opioids were addictive); Brickman, *supra* note 4, at 54–59 (giving a brief overview of asbestos litigation); Penn, *supra* note 3 (discussing how ExxonMobil and its predecessor, Exxon, knew that the fossil fuel industry was causing climate change, yet denied this information to the public).

80 Rolin, *Collective Epistemic Responsibility*, *supra* note 72.

81 United States v. Philip Morris USA, Inc., 449 F. Supp. 2d 1, 26 (D.D.C. 2006), *aff'd in part vacated in part*, 566 F.3d 1095 (D.C. Cir. 2009). After a trial, the court ruled that the defendant tobacco companies deliberately deceived the American public about the health effects of smoking. *Id.* at 146 ("Cigarette smoking causes disease, suffering, and death. Despite internal recognition of this fact, Defendants have publicly denied, distorted, and minimized the hazards of smoking for decades."); *id.* at 208 ("From at least 1953 until at least 2000, each and every one of these Defendants repeatedly, consistently, vigorously—and falsely—denied the existence of any adverse health effects from smoking."); *id.* at 856 ("Defendants fraudulently denied the adverse health effects of smoking for at least 40 years in order to sustain the appearance of an open controversy about the link between smoking and disease, and thereby maintain and enhance the cigarette market and their collective revenues.").

B. an action alleging that a pharmaceutical company made "a bad faith misrepresentation of scientific data" by misrepresenting a long-term clinical study of a drug it manufactures, making it appear that the drug would cause fewer gastrointestinal side-effects than the less costly competitors' drug alternatives;[82]
C. an action alleging that a tobacco manufacturer, supplier, and distributor violated Ohio's consumer protection statutes by manipulating nicotine levels, distorting medical and scientific research, and falsely representing that nicotine is not addictive;[83]
D. an action alleging pharmaceutical manufacturers actively suppressed knowledge that opioids posed a risk of addiction when used long-term while continuing to promote wider use of the drugs and without disclosing the serious known risks;[84] and
E. an action alleging that opioid makers and distributors spent millions of dollars on marketing campaigns that "trivialize the risks of opioids while overstating the benefits of using them for chronic pain."[85]

In each of these cases, the facts alleged include a purported misrepresentation of scientific knowledge. These are easy "yes" cases. On the flip side of this coin are easy "no" cases, such as an action alleging election fraud arising out of alleged absentee vote buying,[86] a securities fraud claim centered on the terms of a stock option agreement,[87] or a fraud claim arising out of the purchase of allegedly counterfeit espresso machines.[88]

Other cases, however, cannot be so easily categorized as involving (or not involving) an alleged misrepresentation of scientific knowledge. For instance, a Rule 10b-5 securities fraud action against

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82 Al. Elec. Pension Fund v. Pharmacia Corp., 554 F.3d 342, 352 (3d Cir. 2009).

83 Chamberlain v. Am. Tobacco Co., 70 F. Supp. 2d 788, 800–01 (N.D. Ohio 1999).

84 Complaint, *supra* note 79, at 1–2. The complaint further alleged, "There was and is no reliable scientific evidence supporting Defendants' marketing claims at issue, and there is a wealth of scientific evidence to the contrary." *Id.* at 2.

85 Complaint at 2, Ohio v. Purdue Pharma L.P., (Ross Cty. Ct. Com. Pl. May 31, 2017), http://www.ohioattorneygeneral.gov/Files/Briefing-Room/News-Releases/Consumer-Protection/2017-05-31-Final-Complaint-with-Sig-Page.aspx.

86 Bolden v. Potter, 452 So. 2d 564, 565–66 (Fla. 1984).

87 First Hanover Sec., Inc. v. Sulcus Comput. Corp., 871 F. Supp. 700, 701 (S.D.N.Y. 1995).

88 Jacobs Trading, LLC v. Ningbo Hicon Int'l Indus. Co., 872 F. Supp. 2d 838, 838 (D. Minn. 2012).

ExxonMobil,[89] where shareholders allege the company overstated the number of oil reserves it had because the company failed to subtract the reserves that did not count due to the additional warming that burning the oil would cause.[90] Although the alleged fraud centered on ExxonMobil's failure to account for global warming,[91] ExxonMobil's statements pertained to the number of oil reserves reported in its financial statements[92] and, as such, only implicated the science of anthropogenic global warming indirectly. A court will determine whether a case like this involves an alleged misrepresentation of scientific knowledge as a matter of law.[93]

A case brought against a university, its cancer research center, and its researchers, alleging its research relied on inaccurate scientific studies when applying for federal research funding, although constituting false claims in violation of the False Claims Act, also cannot be easily categorized as a scientific knowledge fraud case.[94] Although the funding application misrepresents scientific studies and data, it is not the kind of claim the proposed standard was created to address—namely, cases where a defendant misrepresents scientific knowledge to the public, the government, or policymakers to gain or retain the ability to sell a product that harms the public or the environment, such as tobacco, asbestos, sugar, or fossil fuels.[95] This case, by contrast, involves the misrepresentation of specific studies or data to a narrow audience unrelated to selling goods of any kind.[96]

If a case involves an alleged misrepresentation of scientific knowledge, the standard should apply. If not, it should not.

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89 Complaint, *Ramirez*, *supra* note 27; *see also* SEC Rule, 17 C.F.R. § 240.10b-5 (2018).

90 Complaint, *Ramirez*, *supra* note 27, at 2–3, 9–10.

91 *See id.* at 13–14.

92 *Id.* at 9–10.

93 It is likely a question of law on one or more of the following grounds: as a preliminary question of fact, *see, e.g.*, Phillips v. Mirac, Inc., 685 N.W.2d 174, 181–83 (Mich. 2004); Harris v. Toys "R" Us-Penn, Inc., 880 A.2d 1270, 1278 (Pa. Super. Ct. 2005); as an interpretation of the pleadings, *see, e.g.*, Parsons v. United Techs. Corp., Sikorsky Aircraft Div., 700 A.2d 655, 664 (Conn. 1997); Carnegie v. Carnegie, 55 S.E.2d 583, 585 (Ga. 1949); Wells v. Clayton, 72 S.E.2d 16, 18 (N.C. 1952); or as a determination of whether a duty exists, *see, e.g.*, Hoida, Inc. v. M & I Midstate Bank, 717 N.W.2d 17, 26–27 (Wis. 2006). *See generally* 75A AM. JUR. 2D *Trial* § 599 (2018).

94 United States *ex rel.* Milam v. Regents of Univ. of Cal., 912 F. Supp. 868 (D. Md. 1995).

95 *See generally supra* INTRODUCTION.

96 *See United States ex rel. Milam*, 912 F. Supp. at 873 (noting the claim centered on allegations that the defendants "submitted false data and false claims for payment in connection with grant applications to the United States between 1982 and the time the suit was filed").

II
DETERMINING THE SCIENTIFIC COMMUNITY'S KNOWLEDGE AS THE BASELINE TRUTH

If someone told you it is raining outside, the measure of whether that statement is true or false would be whether it squares with objective reality: *Is it, in fact, raining?* If it is, the statement was true. If it is not, it was false. This is the basis of the fraud-falsity element; to satisfy it, the defendant's representation must be objectively untrue.[97]

To find out if it is raining, you can simply step outside (or glance out a window) to look and see. But what if you were inside a soundproof building with no windows, and what if you had no way to get outside to check? In that case, you would have no way to learn firsthand if it is raining. Instead, you would need to rely on others. You could ask someone who recently arrived if it was raining when he or she entered the building. You could, assuming you had access to the internet, go online and check the weather on one or more websites. But what if you received conflicting reports? What if one source said yes, another said no, and yet another said it depends on what your definition of "raining" is?

Suppose the weather outside is wet, but not necessarily raining. It may be drizzling, or it may just be foggy; like the weather in the Pacific Northwest during much of the winter, it may arguably be either one. Now imagine there are financially motivated companies putting out inaccurate weather information targeted at misleading people into believing it is raining when it is not, or that it is not raining when it is. Under these circumstances, a simple and straightforward question like *Is it raining?* becomes difficult, if not impossible, to answer.

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[97] Spreitzer v. Hawkeye State Bank, 779 N.W.2d 726 (Iowa 2009); Mukhopadhyay v. Genesis Corp., 894 N.Y.S.2d 430 (App. Div. 2010); Parker v. Byrne, 996 A.2d 627 (R.I. 2010); *see also* United States *ex rel.* Bahnsen v. Bos. Sci. Neuromodulation Corp., No. 11-CV-1210, 2017 WL 6403864, at *5 (D.N.J. Dec. 15, 2017) ("The Third Circuit has found that in the context of a FCA [False Claims Act] case, '[a] statement is "false" when it is objectively untrue.'" (quoting United States *ex rel.* Thomas v. Siemens AG, 593 Fed. App'x 139, 143 (3rd Cir. 2014))); RESTATEMENT (SECOND) OF CONTRACTS § 159 (AM. LAW. INST. 1981) ("A misrepresentation is an assertion that is not in accord with the facts."). A representation can also fulfill the falsity element if it creates an untrue or misleading impression in the mind of the listener. T.A. Pelsue Co. v. Grand Enters., Inc., 782 F. Supp. 1476, 1488 (D. Colo. 1991); Wilson v. Neighborhood Restore Hous., 12 N.Y.S.3d 166, 168 (App. Div. 2015) (holding that, in a fraud action, a plaintiff must plead and prove "the defendant made a representation concerning a material fact which was false and known by the defendant to be false at the time it was made"); Coffield v. Cox, 162 S.W.2d 741, 743 (Tex. Civ. App. 1942) ("[T]o constitute actionable fraud the representations relied on must be material and must be false at the time they were made.").

The problem is that without a baseline truth (*it is raining* or *it is not raining*) to compare with the company's representation (*it is raining*), there is no accurate way to determine whether the representation is true or false. And courts addressing the falsity element of a scientific knowledge fraud claim face a worse dilemma than this. Not only must a court grapple with competing sources of purported scientific knowledge, which often contradict one another, but it must do so with regard to questions far more complex and difficult than a question like *Is it raining?*

Determining the baseline truth in these cases requires wading into the muddy waters of scientific knowledge. Take, for instance, ExxonMobil's March 23, 2000, *New York Times* advertorial entitled "Unsettled Science."[98] In it, ExxonMobil asserted that "scientists remain unable to confirm" that humans are causing global warming and that "fundamental gaps in knowledge leave scientists unable to make reliable predictions" about the climate.[99] These statements cause countless problems for any court tasked with determining the truthfulness or falsity of a statement. However, before examining these statements to verify or debunk them, a court must first identify the precise subject matter the company was speaking about, and second, come up with a baseline truth corresponding to the subject matter addressed. Each task presents unique challenges to the court.

A. First, Identify the Subject Matter of the Representation

If a company misrepresents its net income in a given year, or a for-profit institution misrepresents the likelihood that its students find a job after graduating, determining the baseline truth is easy. A court must simply ask, *What was that company's net income that year?* Or, it can ask, *What were the true employment statistics for graduates of that for-profit school?*

In a scientific knowledge fraud case, this question is typically far less straightforward. For example, consider ExxonMobil's advertorial statements stated above: "scientists remain unable to confirm" that humans are causing global warming, and "fundamental gaps in knowledge leave scientists unable to make reliable predictions" about the climate.[100] Both assertions pertain not to the underlying scientific fact (whether or not global warming is happening) but to scientists'

98 ExxonMobil Advertorial, *supra* note 62.

99 *See id.*

100 *Id.*

knowledge of it.[101] This is an important distinction in regard to the fraud-falsity element: it dictates what baseline truth must be uncovered and how the truth compares with the company's statement to determine whether the statement is true or false. The baseline truth that corresponds to ExxonMobil's advertorial statement is determined by what scientists knew at the time the statement was made—not by whether global warming was happening, per se.[102] ExxonMobil's representations pertained to (1) scientists' knowledge of whether humans are causing global warming and (2) scientists' ability to make reliable predictions about the climate. Having identified the representation's subject matter, the court's next step is to determine the baseline truth.

B. Second, Come Up with a Baseline Truth Statement to Compare with the Defendant's Representation to Determine the Representation's Truthfulness or Falsity

As numerous authors have noted, courts are ill-equipped to determine scientific truth.[103] Nevertheless, courts must. Subsection II.B.1 discusses how courts can come up with an accurate baseline truth statement to apply in scientific knowledge fraud claims. Alternatively, courts could implement a new guideline standard to help make this determination. Subsection II.B.2 discusses this guideline standard and how it could be crafted by combining components of the *Frye* standard, the *Daubert* standard, and Federal Rule of Evidence 702. A final option would be for scientific experts, as opposed to judges, to decide scientific issues of law and assist the jury in deciding issues of fact. This option is discussed in Subsection II.B.3.

1. Baseline Truth Under Current Law

Courts tasked with determining the baseline truth pertaining to a defendant's representation of scientific knowledge have a difficult

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101 This is consistent with the message put out by a great number of other climate-change deniers, some of them funded by ExxonMobil, which made similar remarks throughout the 1990s and 2000s. *See* Henricksen, *supra* note 15, at 312–13 n.99–100 (2017).

102 Scientifically, this distinction may be irrelevant or nonexistent since the only "facts" that exist about global warming and its effects exist in the knowledge of the scientific community. *See generally* LISA V. ALEXANDER ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS: SUMMARY FOR POLICYMAKERS 3 (2013), http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.

103 *See, e.g.*, Parker-Flynn, *supra* note 22, at 11118.

job.[104] Most judges are not scientists.[105] Neither are most jurors. Nevertheless, judges and jurors must decide scientific issues when addressing scientific knowledge fraud claims. Judges, for instance, must decide whether evidence that may discern the baseline truth is admissible under *Daubert* and its progeny,[106] Federal Rule of Evidence 702,[107] or *Frye* and its progeny.[108] Once the court determines which evidence is admissible regarding what the scientific community knew at the time of the defendant's representation,[109] the trier of fact decides what that baseline truth was.[110]

In addition to determining the baseline truth, the court should make a baseline truth statement (BTS). A BTS allows the trier of fact to more clearly understand the scientific knowledge, or state of the scientific knowledge, at the time of the defendant's representation.[111] A BTS

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104 *See supra* notes 8, 9, and 11 and accompanying text.

105 *See* Transcript of Oral Argument at 22–23, Massachusetts v. EPA, 549 U.S. 497 (2007) (No. 05-1120) (Justice Scalia noting that because he is not a scientist he does not want to deal with scientific issues).

106 *See* Nease v. Ford Motor Co. 848 F.3d 219, 228–29 (4th Cir. 2017) (discussing *Daubert* and its progeny); To Hear or Not to Hear: When Are Daubert Hearings Appropriate?, SF78 ALI-ABA 371 (2001).

107 *See* FED. R. EVID. 702; To Hear or Not to Hear: When Are Daubert Hearings Appropriate?, SF78 ALI-ABA 371 (2001).

108 Under the *Frye* standard, "The proponent of the evidence bears the burden of establishing by a preponderance of the evidence the general acceptance of the underlying scientific principles and methodology." Castillo v. E.I. Du Pont De Nemours & Co., 854 So. 2d 1264, 1268 (Fla. 2003); *see also* Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).

109 *See, e.g.*, Wilson v. Neighborhood Restore Hous., 12 N.Y.S.3d 166, 168 (N.Y. App. Div. 2015) (holding that, in a fraud action, a plaintiff must plead and prove "the defendant made a representation concerning a material fact which was false and known by the defendant to be false at the time it was made"); Coffield v. Cox, 162 S.W.2d 741, 743 (Tex. Civ. App. 1942) ("[T]o constitute actionable fraud the representations relied on must be material and must be false at the time they were made.").

110 *See, e.g.*, Jackson *ex dem.* Bigelow v. Timmerman, 7 Wend. 436, 438 (N.Y Sup. Ct. 1831) (fraud elements are ruled on as questions of fact for the jury).

111 Written words can have different meanings to different people, as evidenced, for instance, by the wildly divergent interpretations of the Second Amendment. *See* U.S. CONST. amend. II ("A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed."). *Compare* District of Columbia v. Heller, 554 U.S. 570, 612 (2008) (holding that an individual has a right to own a firearm for reasons "unconnected to militia service," such as for self-defense within the home), *with Interview with Former Chief Justice of the Supreme Court Warren Burger on the MacNeil/Lehrer NewsHour by Charlayne Hunter-Gault* at 7:49 (PBS television broadcast Dec. 16, 1991), https://vimeo.com/157433062 ("If I were writing the Bill of Rights now there wouldn't be any such thing as the Second Amendment. . . . This has been the subject of one of the greatest pieces of fraud, I repeat the word fraud, on the American public by special interest groups that I have ever seen in my lifetime."). But when words are written down, most people can at least agree what the words are. On the other hand, as

allows the juror to read, reread, and ponder the scientific knowledge. Although still open to differing interpretations, putting a BTS in writing removes at least the confusion of jurors coming up with differently worded baseline truths.[112] It also gives the juror a more tangible statement to compare with the defendant's representation. While a BTS may have a very high utility, writing a BTS presents enormous challenges. Namely, a court must carefully craft a BTS because it requires the trier of fact to adopt exact language to encapsulate ideas and concepts not easily reduced to short or easily digested words or phrases.[113]

Nevertheless, courts are not helpless in this endeavor. Consider again ExxonMobil's advertorial where it stated that "scientists remain unable to confirm" that humans are causing global warming.[114] Assuming a plaintiff in a fraud case alleged that statement was a misrepresentation, the court must ask: *Were scientists able to confirm if humans were causing global warming on March 23, 2000?*

A court could adopt the BTS from an existing document.[115] Alternatively, it could create a BTS based on the evidence presented to it, most likely through expert witness testimony and documents such as scientific papers, studies, and data.[116] Returning to the ExxonMobil advertorial hypothetical, a court might adopt the following BTS:

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anyone who has ever played the childhood game telephone would attest, when the words are merely spoken the probability of misunderstanding what those words mean, or even what those words *are*, multiplies. *See, e.g.*, Ingrid Wickelgren, *Speaking Science: Why People Don't Hear What You Say*, SCI. AM. (Nov. 8, 2012), https://www.scientificamerican.com/article/bring-science-home-speaking-memory.

112 *See* Wickelgren, *supra* note 111.

113 To give one example, the IPCC publishes its Assessment Report every six to eight years. These reports consist of many hundreds of pages of dense information. Within those pages, dozens or hundreds of pages pertain to individual questions such as, "Is global warming happening?" or "Are humans causing global warming?" *See* ALEXANDER ET AL., *supra* note 102; THOMAS G. FARMER & JOHN COOK, CLIMATE CHANGE SCIENCE: A MODERN SYNTHESIS: VOLUME 1: THE PHYSICAL CLIMATE (2015). Thus, trying to come up with a concise BTS on those questions poses a legitimately difficult problem.

114 ExxonMobil Advertorial, *supra* note 62.

115 This would be, for instance, from a document accurately representing sentiments held by the scientific community at large in that area of science such as the IPCC Assessment Reports. *See, e.g.*, ALEXANDER ET AL., *supra* note 102; FARMER & COOK, *supra* note 113. Or, the statement could come from a leading private or public organization that brings together scientists of a particular field, such as the Geological Society of America, the National Aeronautics and Space Administration, or the National Oceanic and Atmospheric Administration. Although climate science offers helpful summaries on how the global scientific community is addressing climate change, it is unclear how many other areas of science offer similar cheat sheets for courts.

116 This is what the trier of fact does in every case. It comes up with what happened

> CO_2 is accumulating in Earth's atmosphere as a result of human activities, causing air and ocean temperatures to rise. Natural forces do not explain the warming. Increases in CO_2 concentrations are virtually certain to be due to fossil fuel emissions.

This language, which contains direct quotes and paraphrases from a report by the National Academy of Sciences' Committee on the Science of Climate Change and from the Intergovernmental Panel on Climate Change's Third Assessment from 2001,[117] reflects climate scientists' view on the topic at about the time of ExxonMobil's statement.

Whether a court adopts a BTS from an existing document or documents, or comes up with its own language, the exercise would entail a potentially burdensome and time-consuming use of judicial resources, often seen when courts are tasked with determining scientific truths.[118] For that reason, courts should implement a guideline standard for creating or adopting a BTS, making the task easier and less draining on judicial resources.

2. Baseline Truth Under a Truth-Determination Guideline

There appears to be no specific guidance in either scholarship or case law regarding how courts should determine the BTS used to compare to a defendant's allegedly false representation.[119] However, there is ample guidance regarding which scientific expert testimony should be

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based on the evidence and arguments of the two (or more) parties to the case. *See* Jurick v. British Airways, No. 86 C 2674, 1987 WL 12035, at *1 (E.D.N.Y. May 22, 1987) (noting that the trier of fact "determines what happened" in the case before it).

117 NAT'L RES. COUNCIL, CLIMATE CHANGE SCIENCE: AN ANALYSIS OF SOME KEY QUESTIONS 1 (2001) ("Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise."); K.S. WHITE ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY: TECHNICAL SUMMARY 19, 21 (2001) ("Human activities . . . are modifying the concentration of atmospheric constituents . . . that absorb or scatter radiant energy. . . . [M]ost of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations."); DANIEL L. ALBRITTON ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: THE SCIENTIFIC BASIS: SUMMARY FOR POLICYMAKERS 1, 7 (2001), http://webpages.icav.up.pt/PTDC/CVT/098487/2008/IPPC, %202001.pdf ("Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.").

118 This can be seen, for instance, in the difficulty, time, and expense involved in *Daubert* evidentiary hearings. *See* To Hear or Not to Hear: When Are Daubert Hearings Appropriate?, SF78 ALI-ABA 371 (2001).

119 A search of cases and scholarship revealed no on-point authorities.

admitted and which should be excluded.[120] Evidence submitted to the trier of fact will already have passed through the scientific "gate" in an FRE 702 or *Daubert* jurisdiction[121] or passed through the *Frye* generally accepted test in a jurisdiction that applies that standard.[122] The scientific evidence that crosses these hurdles, however, is not all equally valid or necessarily scientifically valid at all. Accordingly, not all evidence should be given equal weight.[123] As a result, the guidelines given to the trier of fact for determining the BTS must necessarily be narrower than either of these evidentiary standards. The guidelines must further filter out bad or misleading scientific assertions.

First, the trier of fact must ensure that the baseline truth reflects the entire scientific community's opinion rather than a minority, or even majority, one.[124] There is only one baseline truth. Turning again to ExxonMobil's statement that "scientists remain unable to confirm" if humans are causing global warming, the baseline truth concerns the knowledge of the whole scientific community. Accordingly, disagreements can and should be built into the BTS. Disagreement among scientists is as much a part of scientific knowledge as is a degree of uncertainty.[125] Whether the statement says "majority of scientists," "vast majority of scientists," or "ninety-seven percent of scientists," for

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120 For a discussion regarding the *Daubert* standard and Federal Rule of Evidence 702, see Nease v. Ford Motor Co., 848 F.3d 219, 228–29 (4th Cir. 2017) (discussing *Daubert* and its progeny); To Hear or Not to Hear: When Are Daubert Hearings Appropriate?, SF78 ALI-ABA 371 (2001). For a discussion of the *Frye* standard, see Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923); Castillo v. E.I. Du Pont De Nemours & Co., 854 So. 2d 1264, 1268 (Fla. 2003).

121 *See Nease*, 848 F.3d at 228 (discussing *Daubert* and its progeny); To Hear or Not to Hear: When Are Daubert Hearings Appropriate?, SF78 ALI-ABA 371 (2001); FED. R. EVID. 702.

122 *See Castillo*, 854 So. 2d at 1268; *Frye*, 293 F. at 1013.

123 *See* People v. Brown, 110 Cal. Rptr. 2d 750 (Ct. App. 2001) (where the prosecution shows that the correct procedures were followed in the generation of evidence by a new scientific technique, criticisms of the techniques go to the weight of the evidence, not its admissibility); United States v. Bonds, 12 F.3d 540, 559 (6th Cir. 1993) ("'[F]laws in methodology' uncovered by peer review do not necessarily equate to a lack of scientific validity, since the methods may be based on scientific principles and the alleged flaws go merely to the weight, not the admissibility, of the evidence and the testimony.").

124 This is because the proposed standard clarifies that for a representation of scientific knowledge to be false, it must "misrepresent[] knowledge held by the scientific community at the time such statement or omission was made." *Supra* INTRODUCTION; Henricksen, *supra* note 15, at 342.

125 *See, e.g.*, Susan T. Fiske & Eugene Borgida, *Providing Expert Knowledge in an Adversarial Context: Social Cognitive Science in Employment Discrimination Cases*, 4 ANN. REV. L. & SOC. SCI. 123, 124 (2008) ("All science builds on disagreements.").

instance, is a matter of discretion left to the trier of fact.[126] It, like all components of the BTS, must be objectively true.

Because the BTS must, in most cases, reflect the scientific community as a whole, the *Frye* standard of "general acceptance" of a scientific idea can be a helpful guide.[127] However, the *Frye* standard's particular focus is on propositions that either are or are not generally accepted as a threshold inquiry regarding admissibility of evidence.[128] When creating the BTS, however, the trier of fact's inquiry is not whether any particular theory is generally accepted but rather what *was* generally accepted at the time of the representation, regardless of whether there was any particular consensus or how the percentage of acceptance of competing viewpoints may have looked at the time.[129]

Second, the trier of fact must be precise. For instance, there are material differences between scientists believing a phenomenon is somewhat likely, likely, very likely, or virtually certain to occur. These words may have different meanings depending on what phenomenon they describe.[130] Like lawyers, scientists carefully craft the language used in studies and reports to convey exactly what knowledge the phenomenon represents.[131] The terms used in the BTS should reflect exactly, or otherwise accurately, the words used in the source materials or evidence from which the statement is adopted or crafted.[132]

Third, to avoid tainting the BTS, the trier of fact should craft the BTS without referring to the defendant's representation of the truth. Exposure to the defendant's representation while crafting the BTS would likely create a tendency, or at least a temptation, to tailor the

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126 *See, e.g.*, Jackson *ex dem.* Bigelow v. Timmerman, 7 Wend. 436, 438 (N.Y. Sup. Ct. 1831) (fraud elements are ruled on as questions of fact for the jury).

127 *Castillo*, 854 So. 2d at 1268; *see also Frye*, 293 F. at 1014.

128 *Castillo*, 854 So. 2d at 1268.

129 *See* Henricksen, *supra* note 15, at 342.

130 *See* ALBRITTON ET AL., *supra* note 117, at 2 n.7 ("[T]he following words have been used where appropriate to indicate judgmental estimates of confidence: *virtually certain* (greater than 99% chance that a result is true); *very likely* (90−99% chance); *likely* (66−90% chance) . . . .").

131 *See, e.g.*, Cathleen O'Grady, *Climate Scientists Write Tentatively; Their Opponents Are Certain They're Wrong*, ARS TECHNICA (Oct. 9, 2015, 9:50 AM), https://arstechnica.com/science/2015/10/climate-scientists-are-tentative-their-opponents-are-certain-theyre-wrong/ (noting how careful and cautious climate scientists are with their words, particularly when compared with climate science denialists).

132 One way to accomplish this would be to apply a uniform scale of scientific certainty to baseline truth statements, so that any BTS would express a clear level of scientific certainty. *See* Charles Weiss, *Expressing Scientific Uncertainty*, 2 LAW, PROBABILITY & RISK 25 (2003). Weiss articulated an eleven-level scale to facilitate expressions of opinion regarding the certainty or uncertainty of a given scientific assertion. *Id.* at 30–31.

BTS to conform to or otherwise reflect the defendant's representation.[133]

3. Baseline Truth Determined by an Expert Tribunal

In his article *Expertise on Trial*, James R. Dillon proposed having scientific experts decide scientific issues of law and fact.[134] Other authors, including Judge Learned Hand, have made similar proposals.[135] Studies reveal that judges generally cannot apply the *Daubert* test with a level of competence necessary to satisfy intellectual due process.[136] In fact—on numerous occasions dating back more than a hundred years—judges have recognized their own inability to adequately grasp and decide scientific issues.[137] Dillon suggests a

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133 There are a number of biases that support this proposition, including confirmation bias and illusory truth effect. *See, e.g.*, Bill Kanasky, Jr., *Juror Confirmation Bias: Powerful, Perilous, Preventable*, TRIAL ADVOC. Q., Spring 2014, at 35 (confirmation bias) ("There is a tendency for jurors to search for, interpret, or remember information in a way that 'confirms' their preconceptions, biases or beliefs."); Jeremy N. Sheff, *The Myth of the Level Playing Field: Knowledge, Affect, and Repetition in Public Debate*, 75 MO. L. REV. 143, 161 (2010) (illusory truth effect) (discussing a study where "a group of experimental psychologists discovered that, simply by repeating a plausible proposition two or three times, they could impart to their hearers significantly increased confidence in the truth of that proposition, regardless of its actual truth or falsity").

134 Dillon, *supra* note 22.

135 *See, e.g.*, Hand, *supra* note 22 (proposing "a board of experts or a single expert, not called by either side, who shall advise the jury of the general propositions applicable to the case which lie within his province" of scientific or expert knowledge); Hor, *supra* note 22 (proposing "an expert tribunal to decide between competing expert generalisations" put forth by the parties).

136 Dillon, *supra* note 22, at 272.

137 *See, e.g.*, Parke-Davis & Co. v. H.K. Mulford Co., 189 F. 95, 115 (C.C.S.D.N.Y. 1911), *aff'd in part, rev'd in part*, 196 F. 496 (2d Cir. 1912); Commonwealth v. Jacoby, 170 A.3d 1065, 1093 (Pa. 2017) (the trial judge stated, "That's my understanding. I'm not a scientist. I could be wrong about that."); Petition for Certiorari, Lab. Corp. of Am. Holdings v. Metabolite Labs., Inc., 548 U.S. 124 (2006) (No. 04-607), 2005 WL 3939545, at *62–63 (the petition contained a transcript of U.S. District Court proceedings in which the district judge stated, "I could be wrong; I'm not a scientist, certainly."). The oral argument from *Massachusetts v. Environmental Protection Agency*, *see* Transcript of Oral Argument, *supra* note 105, provides an additional illustration that jurists are not scientists and might be uncomfortable addressing difficult scientific issues. In that case, the United States Supreme Court was asked to decide whether carbon dioxide was a pollutant that could be regulated under the Clean Air Act. Massachusetts v. EPA, 549 U.S. 497, 532 (2007). During oral argument, Associate Justice Antonin Scalia had the following colloquy with counsel for the State of Massachusetts:

> JUSTICE SCALIA: Mr. Milkey . . . . I always thought an air pollutant was something different from a stratospheric pollutant, and your claim here is not that the pollution of what we normally call "air" is endangering health. That isn't, that isn't—your assertion is that after the pollutant leaves the air and goes up into the stratosphere it is contributing to global warming.

solution to this problem by proposing a "social epistemological solution" (SES) where "scientific adjuncts," not judges, make conclusions of law and fact on issues involving expert witness testimony.[138] Dillon acknowledges that the SES "could be implemented in countless ways."[139] But—"[f]or reasons of political viability as well as to preserve the values embedded in the [existing] institutional structure" of American courts—he proposes implementing the SES in a manner that both maintains as much of the existing structure as possible and establishes an epistemologically valid solution to the epistemic competence problem.[140]

Using scientific experts to decide scientific issues is not a new idea. In 1911, Judge Learned Hand lamented, "How long we shall continue to blunder along without the aid of unpartisan and authoritative scientific assistance in the administration of justice, no one knows; but all fair persons not conventionalized by provincial legal habits of mind ought, I should think, unite to effect some such advance."[141] In that same opinion, Judge Hand noted that courts in at least one other country, Germany, summon "technical judges to whom technical questions are submitted and who can intelligently pass upon the issues without blindly groping among testimony upon matters wholly out of their ken[,]" while U.S. courts still task generalist judges with scientific and technical questions.[142] Additionally, commentators have noted the urgent need to integrate science into the law[143]—not only because

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> MR. MILKEY: Respectfully, Your Honor, it is not the stratosphere. It is the troposphere.
>
> JUSTICE SCALIA: Troposphere, whatever. *I told you before I'm not a scientist*.
>
> (Laughter)
>
> JUSTICE SCALIA: *That's why I don't want to have to deal with global warming, to tell you the truth*.

Transcript of Oral Argument, *supra* note 105 (emphasis added).

138 Dillon, *supra* note 22.

139 *Id.* at 295.

140 *Id.* at 295–96.

141 *Parke-Davis & Co.*, 189 F. at 115.

142 *Id.*

143 *See, e.g.*, Pauline Newman, *Law and Science: The Testing of Justice*, 57 N.Y.U. ANN. SURV. AM. L. 419, 427 (2000) ("[W]e must recognize and accommodate the needs of science in the rule of law. The complexity of the interaction between law and science remains to be understood. As we enter this intellectual endeavor with greater urgency, the judge and the scientist must take strong steps to understand each other, the better to serve each other."); Breyer, *supra* note 33 ("[T]he law itself increasingly needs access to sound science. . . . [A]s society becomes more dependent for its wellbeing upon scientifically complex technology, we find that this technology increasingly underlies legal issues of importance to all of us.").

science is increasingly important to our health, wealth, and security,[144] but also because it is under attack.[145]

By implementing the SES,[146] scientific experts—rather than judges—could make a more accurate and just determination of the BTS. Additionally, courts would handle other components of the fraud-falsity analysis more accurately and efficiently. Unlike judges,

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144 *See, e.g.*, Norton, *supra* note 33 (noting that World War II was "the starting point of America's realization that continued dominance in the international scene depends upon scientific and technological supremacy"); Obama, *supra* note 33 ("Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.").

145 The reports of how the new administration attacks science are widespread and troubling. *See, e.g.*, Matthew C. Nisbet, *Ending the Crisis of Complacency in Science*, AM. SCI., Jan.–Feb. 2017, at 18, https://www.americanscientist.org/article/ending-the-crisis-of-complacency-in-science ("As newly elected president Donald Trump takes office, the scientific community faces the likelihood not only of unprecedented cuts in government funding for research, but also of bold new attacks on scientific expertise as a basis for policy making and decisions. Trump campaigned on a pledge to eliminate as much as $100 million in 'wasteful climate change spending,' and there have been reports of plans to severely cut funding for NASA and other agencies."); Television Interview with Bill McKibben, *Real Time with Bill Maher*, Episode 417 (HBO television broadcast Mar. 3, 2017) ("The level of just complete corruption from the fossil fuel industry that marks this administration is like nothing we've ever seen."). The Department of Interior recently demanded that language connecting sea level rise and coastal flooding to climate change be removed from a press release announcing a new publication by scientists working for the United States Geological Survey. *See Department of Interior Censors Press Release on USGS Study*, UNION CONCERNED SCIENTISTS, http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/department-interior-censors-press-release-usgs-study#.WW-9MOmQzIU (last updated May 25, 2017). At the Department of Energy, Trump Administration officials are systematically editing departmental websites to strip references to climate change, downplay impacts of fossil fuels, and scale back benefits of clean energy. *Climate Change Language Altered on DOE Webpages*, UNION CONCERNED SCIENTISTS, http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/climate-change-language-altered-doe-webpages#.WW-96emQzIU (last updated May 25, 2017). In March 2017, EPA Administrator Scott Pruitt falsely claimed that carbon dioxide is not a primary contributor to global warming. *EPA Administrator Scott Pruitt Lies About the Causes of Climate Change*, UNION CONCERNED SCIENTISTS, http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/epa-administrator-scott-pruitt-lies-about-causes#.WW-_cOmQzIU (last updated March 10, 2017); *see also* WENDY WAGNER & RENA STEINZOR, CTR. FOR PROGRESSIVE PUBL'N, RESCUING SCIENCE FROM POLITICS: REGULATION AND THE DISTORTION OF SCIENTIFIC RESEARCH 4 (2006) (stating that "[e]ven large, apolitical societies such as the American Association of the Advancement of Science have passed resolutions and filed comments on the increasing problems of biased research and literature reviews that damage scientific credibility," and noting "how far the legal system has strayed in its use of science, threatening scientific integrity at its core").

146 Dillon, *supra* note 22. Dillon's proposal calls for lay jurors to remain the finder of fact in the first instance, subject to the scientific adjuncts' authority to enter a scientific judgment as a matter of law, or JMOL, where the scientific evidence is insufficient to sustain the judgment. *Id.* at 303. That authority is intended to parallel judges' existing authority to enter a JMOL. *Id.* at 303–04.

scientific experts could more accurately identify the scientific community's knowledge on any given scientific topic, compare the BTS with the defendant's representation, and determine whether the defendant's representation was true or false.

III
A FRAMEWORK FOR COURTS APPLYING THE PROPOSED STANDARD

To determine falsity, a question of fact for the jury,[147] the BTS should be put side by side with the defendant's representation to see if they say the same thing. Or, in other words, to see whether each statement gives the reader the same impression.[148] If it does, the defendant's representation was true. If it does not, the representation was false. This should be done with each alleged misrepresentation of scientific knowledge; if there are twenty-seven allegedly false statements, each must be juxtaposed with its corresponding BTS to determine its truthfulness or falsity. Turning again to the ExxonMobil advertorial hypothetical, the two statements side by side would look like this:

Baseline Truth Statement	**Defendant's Statement**
CO_2 is accumulating in Earth's atmosphere as a result of human activities, causing air and ocean temperatures to rise. Natural forces do not explain the warming. Increases in CO_2 concentrations are virtually certain to be due to fossil fuel emissions.[149] [IPCC 2001, NAS 2001]	Scientists are unable to confirm whether humans are causing global warming.[150] [March 23, 2000]

Given that the statement in the left-hand column is true, the court must ask whether the defendant's statement in the right-hand column

147 *See, e.g.*, Martin v. Sixty-Third & Halsted State Sav. Bank, 19 N.E.2d 634, 636 (Ill. App. Ct. 1939) (noting that in a fraud action the determination of the words used in defendant's representation is a question of fact for the jury).

148 Even if there was no false statement, if the overall impression of representations is misleading, it can fulfill the falsity element. *See* Downey v. Finucane, 98 N.E. 391, 393 (N.Y. 1912); 37 *Fraud and Deceit* § 106, *supra* note 37; 60A *Fraud and Deceit*, *supra* note 40.

149 *See* sources cited *supra* note 117 and accompanying text.

150 *See* ExxonMobil Advertorial, *supra* note 62.

is false. Materiality, knowledge, intent, and all fraud elements other than falsity should be ignored for the purpose of this analysis. The only question is whether the two statements say the same thing. On its face, this analysis appears straightforward. However, because courts are confronted with unique challenges when deciding scientific knowledge fraud cases,[151] the trier of fact should take into account a number of other considerations. Those considerations should more precisely focus on the idiosyncratic difficulties of parsing statements pertaining to scientific knowledge. When comparing the two statements, the trier of fact should ask the eight questions discussed below.[152] A "yes" answer to a single question should, at a minimum, raise red flags. Depending on the facts of the particular case, a single "yes" answer might tip the scale irretrievably in favor of finding that the defendant's statement was false.

Question One: At the time of the representation, does the defendant have an economic, political, ideological, or religious motive to make a statement inconsistent with the opinion of the scientific community?

If the fact at issue is the link between CO_2 emissions and climate change, a fossil fuel company, or any individual or entity closely affiliated with it, would benefit from raising doubt about the link between CO_2 emissions and global warming. Because the defendant benefits as a result of raising doubt about global warming and, as a result, is likely biased, the court should consider this bias when addressing the remaining questions, as well as when answering the overall question of whether the representation was false.

Notably, this question is particularly relevant, as it goes to the heart of the problem in scientific knowledge fraud cases: corporations are motivated to mislead the public about the science behind their products in order to make a profit.

Question Two: Is the evidentiary support, if any, underlying the defendant's representation biased?

The answer to this question should be "yes" if any of the biases discussed in Question One above are present in the evidentiary support or if the defendant cited or relied on biased authority to make its representation. Scientific knowledge representations are often made without reference to any support at all. But if support is cited, the

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151 *See* THE CAMBRIDGE COMPANION TO POPPER, *supra* note 8 and accompanying text.

152 *See* Henricksen, *supra* note 15, at 349–53 (discussing five questions resembling those I propose here). Here, however, I have further developed, refined, revised, and expanded each question, as well as added three new questions to the list.

support should be assessed for bias and authority: Is the support or authority derived from objective sources or biased ones? Are the authorities underlying the BTS different from those underlying the defendant's statement? How do the authorities relied on by the defendant differ from those relied on to create the BTS?

As with Question One, if the court answers "yes" to this question, it should consider the biased information underlying the defendant's representation when addressing the remaining questions.

Question Three: Does the defendant's representation misstate or misconstrue the scientific authority it purports to rely on?

The answer to this question should be "yes" if the defendant cites scientific authority for its statement, but the statement itself is not fully supported by the underlying authority it relies on. Companies seeking to raise scientific doubt commonly misstate or misconstrue the underlying science as a tactic. To determine whether a company did so, the court must examine the underlying scientific authority. The court need not inquire whether the defendant quoted word-for-word what is stated in the underlying authority. Instead, the inquiry hinges on whether the defendant's statement is consistent with, and is a reasonable representation of, the underlying authority. If the defendant's statement leads the listener to believe something different from what is contained in the underlying authority, then its statement should be considered misleading, and this question should be answered "yes."

Question Four: Does the defendant's statement contain any words or phrases that make its statement mean something different than the baseline truth statement?

This question is aimed at whether the defendant's wording in its statement conflicts with the wording in the BTS in a manner that describes the same thing but means something different. Such words with conflicting meanings could pertain to, for example, the likelihood of a phenomenon happening or the strength of evidence supporting a particular theory. For instance, if the BTS stated that CO_2 emissions "likely" cause global warming, and the defendant's statement said that CO_2 emissions "possibly" cause global warming, then the terms are inconsistent. Such an inconsistency would merit a "yes" answer to this question.

Again, the bar here is low because this inquiry is strictly limited to truthfulness or falsity, not knowledge, intent, or any other element. The two statements either do or do not say the same thing.

Question Five: Does the defendant's statement, taken as a whole, present the fact at issue in a manner inconsistent with the baseline truth statement?

Even if there are no explicitly inconsistent words or phrases between the two statements, the defendant's statement might nevertheless give a different overall impression than the BTS. For instance, if the BTS asserted that "scientists are in virtually unanimous agreement that CO_2 emissions cause global warming," while the defendant's statement asserted that "a number of studies have shown a link between CO_2 emissions and global warming, while other studies have shown no link at all," the answer to this question should be "yes." Though the defendant's statement does not explicitly contradict the BTS, it does so implicitly. The BTS gives the impression that CO_2 emissions almost certainly cause global warming; the defendant's statement gives the impression that the science is unsettled and CO_2 emissions may or may not cause global warming. The defendant's hypothetical statement may very well be factually correct—it is undoubtedly true that "a number of studies have shown a link between CO_2 emissions and global warming, while other studies have shown no link at all"—yet, because this statement communicates a different level of certainty than the BTS, it should, under the proposed standard, be false for the purposes of a fraud claim.[153]

Fraud law recognizes many technically true statements as false under the law.[154] This nuance is particularly important in the realm of scientific knowledge fraud, where defendants routinely make statements that are (or arguably are) technically true but also mislead the public.[155] The touchstone inquiry here is whether or not the defendant's statement gives the reader an accurate understanding of the

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153 *See generally* Grove Holding Corp. v. First Wis. Nat. Bank of Sheboygan, 12 F. Supp. 2d 885, 890 (E.D. Wis. 1998) (referencing an earlier decision and order on a summary judgment motion, the court quoted itself as stating that "[a] representation can be technically accurate, yet still misleading" for purposes of negligent and intentional misrepresentation claims); KEETON ET AL., *supra* note 40 ("[M]isrepresentation may be found in statements which are literally true, but which create a false impression in the mind of the hearer . . . .").

154 *See Grove Holding Corp.*, 12 F. Supp. 2d at 890.

155 For instance, suppose someone were to claim that "no scientist on earth could tell you with one hundred percent certainty that the earth is warming, let alone that we humans are causing it." This statement is technically true, because climate science—indeed, *all* the sciences—does not work on certainties but on probabilities. *See* Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 590 (1993) ("Of course, it would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty; arguably, there are no certainties in science.").

scientific knowledge held by the scientific community (as stated in the BTS).

Additionally, by turning the public's attention to the wrong set of data, a company's statement can also mislead the public. For instance, Exxon's CEO once insisted that the science on climate change was uncertain and, as support for this idea, told his audience that "[w]e also have to keep in mind that most of the greenhouse effect comes from natural sources, especially water vapor."[156] This statement is both irrelevant (stating a fact unrelated to anthropogenic climate change) and misleading (giving the impression that climate change is naturally occurring to unsophisticated nonscientists). It is also a logical fallacy at least two times over: it qualifies as both a big lie and a red herring.[157] Yes, there is a large amount of natural greenhouse gases in the atmosphere. Without them, Earth's average surface temperature would be about negative fifteen degrees Celsius (or five degrees Fahrenheit).[158] Exxon's president made this statement, however, to give the impression the science on global warming was suspect, or even a sham; he was misinforming rather than informing. Even assuming the other assertions contained in the statement were factual—which they were not—the statement serves only to mislead. Such a statement could also be grounds for a "yes" answer to this question.

> Finally, the court should also be on the lookout for cautionary terms and phrases used frequently by those trying to raise scientific doubt. These terms include might, may, maybe, could, belief, believe, we believe, scientists believe, some believe, conjecture, opinion, judgment, view, viewpoint, possible, possibly, speculate, speculative, uncertain, unsettled, theory, theorize, theoretical, hypothesis, hypothesize, hypothetical, surmise, guess, suppose, suspect, although, while, albeit, even though, notwithstanding, sincere attempt to determine, unanswered questions, jump to the conclusion, variables, variability, difficult to determine, gaps in the data, missing data, more study needed, more proof needed, we will look into it, we are looking into it, we are investigating, studies are ongoing, this is a complex issue, we are trying to clear up misunderstandings, until it can be proved or disproved, until it is

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156 Lee R. Raymond, Chairman & Chief Exec. Officer, Exxon Corp., Energy—Key to Growth and a Better Environment for Asia-Pacific Nations 9 (Oct. 13, 1997), http://www.climatefiles.com/exxonmobil/1997-exxon-lee-raymond-speech-at-world-petroleum-congress/.

157 *See id.*

158 *See Carbon in the Atmosphere*, EARTHLABS, http://serc.carleton.edu/eslabs/carbon/3a.html (last visited Feb. 6, 2019).

> determined conclusively, remains an open question, our goal is the truth, and other similar or related terms or phrases.[159]

By using these terms and phrases, corporate, political, and religious groups simultaneously appear to embrace objective science and to raise doubt about the scientific fact at issue. The presence of such terms should tip the scale in favor of a "yes" answer to Question Five.

Question Six: Is there any inconsistency in regard to the confidence in the fact at issue?

Doubt is the centerpiece of scientific knowledge fraud. The corporate groups that aim to mislead the public about dangers posed by their products nearly always seek to sow doubt about the underlying science. And although this question overlaps somewhat with Questions Three, Four, and Five, it nevertheless should be addressed separately.[160] By doing so, it forces the trier of fact to zero in on how each statement presents the scientific community's confidence level.

Consider the following example: assume a BTS on toxicity of lead in the human body says, "There is no safe threshold level of lead in the body, and any amount, no matter how trace, is considered toxic and dangerous to human health." Now consider that the defendant's statement repeated the BTS, but preceded it with caveat language, such as "some scientists believe . . . ." Such caveat language would require a "yes" answer to this question. Adding "some scientists believe" to the statement raises doubt about how confident scientists are regarding the dangers of lead poisoning. As a result, a reader of the BTS would come away with a materially different impression than a reader of the defendant's statement, which is precisely what falsity hinges on.[161]

Question Seven: Does the defendant's statement question, criticize, discredit, or belittle the scientific community, the scientific community's opinion, or individuals or organizations within the scientific community?

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159 Henricksen, *supra* note 15, at 350.

160 As such, in considering this question, courts should keep an eye out for cautionary terms and phrases, such as those discussed above in Question Five.

161 United States v. Colton, 231 F.3d 890, 898 (4th Cir. 2000) ("[C]ommon-law fraud includes acts taken to conceal, create a false impression, mislead, or otherwise deceive in order to 'prevent[] the other [party] from acquiring material information.'" (quoting RESTATEMENT (SECOND) OF TORTS § 550 (AM. LAW INST.1977))); *see also* KEETON ET AL., *supra* note 40, at 737 ("Any words or acts which create a false impression covering up the truth, or which remove an opportunity that might otherwise have led to the discovery of a material fact . . . are classed as misrepresentation, no less than a verbal assurance that the fact is not true.").

One of the most effective ways to mislead the public about science is to attack the scientists themselves. This has been done by the tobacco industry,[162] the fossil fuel industry,[163] the asbestos industry,[164] and many others who have misrepresented the science behind their dangerous products.[165] For instance, the fossil fuel industry and those working on behalf of its interests frequently allege that climate scientists who concur with the scientific community's consensus on climate change (climate change is real and humans are causing it) do so to secure grant funding,[166] further their careers,[167] or stay within the pack, thereby representing a sheep mentality among scientists.[168] Industries have also tried to question, criticize, discredit, or belittle scientists by attempting to show that scientists are either baffled by their own data or do not know if what they are saying is actually true.[169]

Attacks on the integrity, morals, or competency of an opponent has proven as effective, if not more effective, than other kinds of persuasion techniques.[170] Scientific knowledge fraud defendants also attempt to do so to avoid directly contradicting the scientific community's opinion. The effect on the audience is nevertheless the same. By criticizing the scientists, companies cast doubt about the authorities

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162 *See, e.g.*, ORESKES & CONWAY, *supra* note 4; Henderson, Jr. & Twerski, *supra* note 4.

163 *See, e.g.*, ORESKES & CONWAY, *supra* note 4, at 1–9; Penn, *supra* note 3.

164 *See* BRODEUR, *supra* note 4; Brickman, *supra* note 4; Gelinas, *supra* note 4.

165 These include, for instance, pesticides, *see* McCabe, *supra* note 4; Freudenburg et al., *supra* note 4, leaded gas, *see* Nriagu, *supra* note 4; Kitman, *supra* note 4, and fracking-produced oil and gas, *see* van de Biezenbos, *supra* note 4; Peeples, *supra* note 4.

166 *See, e.g.*, Henry Payne, *Global Warming: Follow the Money*, NAT'L REV. (Feb. 25, 2015, 9:00 AM), http://www.nationalreview.com/article/414359/global-warming-follow-money-henry-payne (publishing in the politically active conservative magazine, the National Review, which made a number of false and unsubstantiated assertions, including that "[i]n truth, the overwhelming majority of climate-research funding comes from the federal government and left-wing foundations. And while the energy industry funds both sides of the climate debate, the government/foundation monies go only toward research that advances the warming regulatory agenda. With a clear public-policy outcome in mind, the government/foundation gravy train is a much greater threat to scientific integrity.").

167 *Id.*

168 *See* John Timmer, *If Climate Scientists Are in It for the Money, They're Doing It Wrong*, ARS TECHNICA (May 30, 2016, 9:10 AM), https://arstechnica.com/science/2016/05/if-climate-scientists-push-the-consensus-its-not-for-the-money/.

169 *See, e.g.*, Bob Ellis, *Some Scientists "Baffled" by Lack of Global Warming*, DAKOTA VOICE (Nov. 19, 2009), http://www.dakotavoice.com/2009/11/some-scientists-baffled-by-lack-of-global-warming; Timmer, *supra* note 168.

170 *See, e.g.*, Richard R. Lau & Ivy Brown Rovner, *Negative Campaigning*, 12 ANN. REV. POL. SCI. 285, 295 (2009) (noting that recent U.S. presidential elections strongly support the fact that negative campaigning works, and adding that this "mantra among political practitioners . . . has reverberated throughout the scholarly literature as well").

behind the valid scientific knowledge, giving the audience (often, the public at large) a flawed perception on the matter. Accordingly, if the defendant's statement questions, criticizes, discredits, or belittles individuals or organizations within the scientific community—no matter how gently or subtly—the court should answer "yes" to this question.

Question Eight: Does the defendant's statement overstate, misstate, or misrepresent a controversy in any way that may exist with regard to the fact at issue?

Overstating, misstating, or misrepresenting a controversy is a very common practice among companies aiming to mislead the public about science.[171] For example, the fossil fuel industry (and its allies) have repeatedly represented that there are sides to the debate, which casts doubt on whether humans are causing global warming. In truth, however, at least ninety-seven percent of climate scientists agree that humans cause global warming, primarily through CO_2 emissions.[172] In fact, a recent study clarified that not a single scientist within the three percent who disagreed actually represents valid, objective scientific interests.[173] In that study, researchers attempted to replicate the results of the three percent, which is a common way to test scientific studies.[174] One of those researchers noted that "[e]very single one of those analyses had an error—in their assumptions, methodology, or analysis—that, when corrected, brought their results into line with the scientific consensus."[175] Accordingly, in order to be truthful, companies who represent that there are two sides to a scientific debate must clarify that the overwhelming majority—perhaps ninety-seven percent—land on one side of this "debate." And this debate has been settled for at least twenty years.[176]

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171 *See, e.g.*, ORESKES & CONWAY, *supra* note 4.

172 John Cook et al., *Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature*, ENVTL. RES. LETTERS, Apr.–June 2013, at 1, 2, http://iopscience.iop.org/article/10.1088/1748-9326/8/2/024024/pdf.

173 *See generally* Rasmus E. Benestad et al., *Learning from Mistakes in Climate Research*, 126 THEORETICAL & APPLIED CLIMATOLOGY 699 (2016); Katherine Ellen Foley, *Those 3% of Scientific Papers That Deny Climate Change? A Review Found Them All Flawed*, QUARTZ (Sept. 5, 2017), https://qz.com/1069298/the-3-of-scientific-papers-that-deny-climate-change-are-all-flawed.

174 *See* Foley, *supra* note 173.

175 *Id.* (quoting Katharine Hayhoe, FACEBOOK (Sept. 4, 2017), https://www.facebook.com/katharine.hayhoe/posts/1915202578704620).

176 *See, e.g.*, Weiss, *supra* note 132; O'Grady, *supra* note 131.

While some companies falsely purport scientists are debating an issue, other companies simply invent a controversy when there is no valid scientific controversy at all. For instance, scientific evidence establishes that Earth is about 4.5 billion years old,[177] and widespread scientific consensus supports this estimate.[178] Yet, some groups still reject this view in favor of the so-called "Young Earth theory," which holds that Earth was created just a few thousand years ago.[179] Similarly, although Earth is certainly round, in recent years, a number of groups have theorized that Earth is flat.[180] In each of these cases, although a tiny fringe group holds a conflicting view on the scientific knowledge, the scientific community is not conflicted on that knowledge.[181] Any company who makes a statement referencing something as objectively false as the Young Earth theory or the Flat Earth theory should clearly state that neither one is a scientific theory at all, but rather a nonevidence-based idea held by a small number of individuals who reject the evidence. Because such an idea has no serious scientific evidentiary support, any statement about such a theory that omits this caveat would be highly misleading.

Accordingly, if the defendant's statement overstates, misstates, misrepresents, or invents in any way a controversy that may or may not exist with regard to the fact at issue, the court should answer this question "yes."

In summary, courts should answer the following eight questions in regard to each allegedly false statement:

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177 *See, e.g.*, *Age of the Earth*, U.S. GEOLOGICAL SURV., https://web.archive.org/web/20051223072700/http://pubs.usgs.gov/gip/geotime/age.html (last updated Oct. 9, 1997); G. Brent Dalrymple, *The Age of the Earth in the Twentieth Century: A Problem (Mostly) Solved*, 190 GEOLOGICAL SOC'Y LONDON 205 (2001).

178 *See Age of the Earth*, *supra* note 177.

179 *See, e.g.*, WHY INTELLIGENT DESIGN FAILS: A SCIENTIFIC CRITIQUE OF THE NEW CREATIONISM 1–2 (Matt Young & Taner Edis eds., 2004).

180 *See, e.g.*, Cassandra Santiago & A.J. Willingham, *Dear Doubters, B.o.B Wants to Prove the Earth Is Flat Once and for All*, CNN, https://www.cnn.com/2017/09/25/us/b-o-b-flat-earth-gofundme-trnd/index.html (updated Sept. 26, 2017, 9:40 PM) (discussing rapper B.o.B's plan to launch satellites into space to prove Earth is flat); Mark Shanahan, *Kyrie Irving Talks Flat Earth Yet Again*, BOSTON GLOBE (Feb. 16, 2018), https://www.bostonglobe.com/lifestyle/names/2018/02/16/kyrie-irving-talks-flat-earth-yet-again/wfCbvn76Z23tjQ3uX0ssXL/story.html.

181 *What Controversy: Is a Controversy Misrepresented or Blown Out of Proportion?*, U.C.: UNDERSTANDING SCI., http://undsci.berkeley.edu/article/0_0_0/sciencetoolkit_06 (last visited Feb. 6, 2019).

(1) At the time of the representation, does the defendant have an economic, political, ideological, or religious motive to make a statement inconsistent with the opinion of the scientific community?
(2) Is the evidentiary support, if any, underlying the defendant's representation biased?
(3) Does the defendant's statement misstate or misconstrue the scientific authority it purports to rely on?
(4) Does the defendant's statement contain any words or phrases that make its statement mean something different than the baseline truth statement?
(5) Does the defendant's statement, taken as a whole, present the fact at issue in a manner inconsistent with the baseline truth statement?
(6) Is there any inconsistency in regard to the confidence in the fact at issue?
(7) Does the defendant's statement question, criticize, discredit, or belittle the scientific community, the scientific community's opinion, or individuals or organizations within the scientific community?
(8) Does the defendant's statement overstate, misstate, or misrepresent in any way a controversy that may exist with regard to the fact at issue?

These eight questions are meant to supplement, not supplant, the court's analysis of whether the defendant's statement was false. Under this framework, the answer with regard to ExxonMobil's 2000 statement that "scientists remain unable to confirm" that humans are causing global warming[182] is clearly "yes" to at least seven of the eight questions. As a fossil fuel company, ExxonMobil clearly has an economic motive to counter the scientific knowledge that its product is causing global warming. Therefore, ExxonMobil's statement satisfies the first question. Even though ExxonMobil cites to two scientific authorities, a National Research Council report and a Sargasso Sea Temperature chart, to support its statement, it is unclear whether either of these authorities are given as direct support for the statement at issue. Accordingly, the second question, regarding evidentiary support, is inconclusive. However, the third question should be answered "yes"

[182] ExxonMobil Advertorial, *supra* note 62.

because ExxonMobil misrepresented the two authorities it cited.[183] ExxonMobil's statement uses a word or phrase ("unable to confirm") describing the fact at issue (the scientific certainty on global warming) that makes the statement mean something different from the BTS, satisfying the fourth question. Further, ExxonMobil's statement, taken as a whole, presents the fact at issue in a manner inconsistent with the BTS. The BTS makes clear that CO_2 emissions are likely causing global warming, while ExxonMobil's statement makes this proposition appear uncertain or even unlikely. This satisfied the fifth question.

The confidence level in the fact at issue as portrayed by ExxonMobil's statement ("scientists are unable to confirm") is patently inconsistent with the confidence level of the BTS ("CO_2 *is* accumulating in Earth's atmosphere *as a result of human activities*" and "increases in CO_2 concentrations *are virtually certain* to be due to fossil fuel emissions"), satisfying the sixth question. The seventh question is likewise satisfied because it calls into question scientists' ability to establish the fact at issue. This is a close call, however, and could conceivably come out the other way since the slight against the scientific community is rather subtle in this statement. The eighth question is easily met because ExxonMobil's statement portrays the question of human-caused global warming as unestablished or in

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183 ExxonMobil's reliance on the National Research Council's report is disingenuous. That report confirmed the IPCC's assessment that global warming is happening and that humans are causing it while acknowledging that some uncertainties remain, as is common in science. ExxonMobil, on the other hand, cherry-picked two conclusions addressed in the report and presented those conclusions as support for the notion that scientists were still uncertain about whether warming was even happening. *See Leading Climate Scientists Advise White House on Global Warming*, NAT'L ACADS. OF SCI., ENGINEERING, & MED. (June 6, 2001), http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10139; NAT'L RES. COUNCIL, *supra* note 117.

The second authority ExxonMobil relies on, the chart on page 95 with the heading "Sargasso Sea Temperature," is even more misleading. ExxonMobil purports the chart shows declining global temperatures. However, the underlying data does not pertain to global temperatures at all. Dr. Lloyd D. Keigwin, who created the chart, was so angry ExxonMobil misrepresented his work that he wrote a letter stating that "no responsible scientist" would use that chart to represent global temperatures, and he added, "I believe ExxonMobil has been misleading in its use of the Sargasso Sea data. There's really no way those results bear on the question of human-induced climate warming . . . . [T]he sad thing is that a company with the resources of ExxonMobil is exploiting the data for political purposes . . . ." Letter from Lloyd D. Keigwin, Senior Scientist, Woods Hole Oceanographic Inst., to Peter Altman, Nat. Coordinator, Campaign ExxonMobil (Dec. 11, 2000), http://web.archive.org/web/20040621170714/http://www.campaignexxonmobil.org/pdf/KeigwinLetter.pdf.; *see also* Cindy Baxter, *ExxonMobil, Funder of Climate Change Deniers*, HUFFPOST (Dec. 1, 2015, 9:25 AM), https://www.huffingtonpost.com/cindy-baxter/exxonmobil-funder-of-clim_b_ 8684320.html (updated Dec. 1, 2016).

controversy, while the truth of the matter at the time the statement was made was that there was a vast consensus on the question, and any contrarian views represented only a tiny minority of scientists, many of whom were tied to the fossil fuel industry.[184]

The framework set out in this Part is meant to guide courts in determining whether a defendant's statement misrepresented knowledge held by the scientific community at the time the statement was made. If it did, it should fulfill the falsity element of a fraud claim under the proposed fraud-falsity standard.

CONCLUSION

For far too long, industries like Big Tobacco, Big Oil, and Big Pharma have gotten away with misleading the public about the dangers posed by their products. Misrepresentations of scientific knowledge are on the rise, not only in private industry but in the public sector as well. Our own government has, under the current administration, taken a sharp anti-science turn, giving a green light to many industries to further mislead the public about the products they mine, manufacture, and sell.

Implementing the fraud-falsity standard discussed in this Article should help level the playing field by giving plaintiffs a firmer legal ground upon which to bring fraud actions against those who lie about the science behind their products. There are, however, other hurdles faced by plaintiffs in fraud cases concerning scientific knowledge. Imagine a homeowner whose house is damaged by sea level rise bringing a fraud claim against a fossil fuel company for causing the harm. The falsity element would certainly be of great concern. But so would the elements of intent, reliance, reasonableness of the reliance, and causation.

Accordingly, although those harmed by misrepresentations pertaining to the link between products and the harm they cause should be able to bring a fraud action, there remain several significant barriers to doing so. The falsity element, however, need not be one of them. Courts should not throw up their arms, as Justice Scalia did, and say, "We're not scientists." That excuse only allows corporate, political, and religious groups to continue lying to the public without recourse. Profiting through deception is precisely what the law of misrepresentation was put in place to punish. Unless courts are able to apply the elements in cases where the public is misled with regard to scientific

184 *See, e.g.*, Weiss, *supra* note 132; O'Grady, *supra* note 131.

knowledge, those spreading the lies will continue to not only get away with it but profit hand over fist from it.