

SCIENTIFIC KNOWLEDGE FRAUD

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ABSTRACT

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 them. Individuals harmed by these misrepresentations should be able to sue for fraud. Plaintiffs in fraud cases of this kind, however—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. Answering these questions should help make it possible for those harmed by scientific knowledge fraud to obtain relief.

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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 SEC are investigating Exxon Mobil Corp.,¹ the world’s largest oil company,² for misleading the public about climate change over the past four decades.³ ExxonMobil’s alleged actions closely resemble schemes carried out by the tobacco, asbestos, pesticide, leaded gasoline, and fracking industries.⁴ The scheme is always the same. There is a product that is both profitable and destructive,

¹ In 1998, the Exxon Corporation and Mobil Oil Corporation signed a \$73.7 billion merger agreement, forming a new company called Exxon Mobil Corp., the third largest company in the world. Allen R. Myerson & Agis Salpukas, Exxon and Mobil Announce \$80 Billion Deal to Create World’s Largest Company, N.Y. Times (Dec. 3, 1998), http://www.nytimes.com/learning/teachers/featured_articles/19981203thursday.html?mcubz=0. This article will refer to the company post-merger as “ExxonMobil,” and premerger as “Exxon.”

² See Lauren Gensler, *The World’s Largest Oil and Gas Companies 2016: Exxon is Still King*, Forbes (May 26, 2016), <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), <http://www.latimes.com/business/la-fi-exxon-global-warming-20160120-story.html>; John Schwartz, Exxon Mobil Fraud Inquiry Said to 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., James A. Henderson, Jr. & Aaron D. Twerski, Reaching Equilibrium in Tobacco Litigation, 62 S.C. L. REV. 67, 70-75 (2010) (tobacco); Oreskes & Conway, MERCHANTS OF DOUBT, 14, 24, 33 (tobacco); Lester Brickman, On the Theory Class’s Theories of Asbestos Litigation: The Disconnect Between Scholarship and Reality, 31 PEPP. L. REV. 33 (2003) (asbestos); Paul Brodeur, Outrageous Misconduct (1985) (asbestos); Elise Gelin, Asbestos Fraud Should Lead to Fairness: Why Congress Should Enact the Fairness in Asbestos Injury Resolution Act, 69 MD. L. REV. 162 (2003) (asbestos); Martha McCabe, Pesticide Law Enforcement: A View from the States, 4 J. ENVTL. L. & LITIG. 35, 51 (1989) (pesticides); William R. Freudenburg, et al., *Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt*, Sociological Inquiry, Vol. 78, No. 1 (Feb. 2008), at pp. 11-16 (pesticides); Jerome O. Nriagu, *Clair Patterson and Robert Kehoe’s Paradigm of “Show Me the Data” on Environmental Lead Poisoning*, ENVIRONMENTAL RESEARCH, SECTION A (1998), at pp. 71-77 (leaded gas); Jamie Lincoln Kitman, *The Secret History of Lead*, The Nation (March 20, 2000), at <https://www.thenation.com/article/secret-history-lead/> (leaded gas); Kristen van de Biezenbos, Where Oil Is King, 85 Fordham L. Rev. 1631, 1633-38 (2017) (fracking).

and the companies selling it tell the public the science linking that product to the harm it causes is unsettled when, in fact, the science is well-established, if not overwhelming.⁵ Typically, these companies are 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 plaintiffs in fraud cases of this kind, where the alleged misrepresentation pertains to scientific knowledge, face obstacles to proving

⁵ Recently, other such schemes have come to light. For instance, the sugar industry paid Harvard-affiliated researchers to publish papers downplaying the link between sugar and heart disease and obesity, directing blame instead to saturated fat. (<http://jamanetwork.com/journals/jamainternalmedicine/article-abstract/2548255>.) The industry's misinformation campaign shaped fifty years of health policy in the United States. (<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. (<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 the companies funded a “campaign of fraud and deception” by misleading doctors and consumers about opioids’ addictiveness and adverse health effects. (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=.d7265fe9beb5.) Similar lawsuits have been filed in Mississippi and Ohio. Jerry Mitchell, Mississippi sets tone as opioid drugmakers face rising tide of lawsuits, *The Clarion Ledger* (June 12, 2017), <http://www.clarionledger.com/story/news/2017/06/11/mississippi-sets-tone-opioid-drugmakers-face-rising-tide-lawsuits/346518001/> (Mississippi); Eftthimios Parasidis, A look inside Ohio’s lawsuit against opioid manufacturers, *Salon* (July 7, 2017), http://www.salon.com/2017/07/07/a-look-inside-ohios-lawsuit-against-opioid-manufacturers_partner/ (Ohio).

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., *West v. JPMorgan Chase Bank, N.A.*, 154 Cal. Rptr. 3d 285, 295 (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); *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); CAL. CORP. CODE § 25401 (West 2016) (California securities fraud); FLA. STAT. § 517.301 (2016) (Florida securities fraud); N.Y. GEN. BUS. LAW §§ 352, 353 (McKinney 2016) (New York securities fraud); TEX. REV. CIV. STAT. ANN. § 581-33 (West 2016) (Texas securities fraud); 18 U.S.C.A. § 1341 (federal mail fraud); 18 U.S.C.A. § 1343 (federal wire fraud); SEC Rule 10b-5, 17 C.F.R. § 240.10b-5 (2017) (federal securities fraud).

falsity, a required fraud element, that typical fraud plaintiffs do not.⁷ This is because science, by its very nature, can and often is misleadingly characterized as uncertain.⁸ It is easy to raise scientific doubt. There are a number of reasons for this. These include, for instance, the fact scientific knowledge cannot generally be labeled categorically “true” or “false.”⁹ Moreover, there are numerous widely held prejudices and misconceptions about science that are easy to exploit.¹⁰ Corporate, political, and religious

⁷ Fraud requires as one of its elements 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*, Jeremy Shearmur & Geoffrey Stokes, eds. (Cambridge University Press 2016), at p. 120. 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, underdetermined. For a more in-depth exploration of underdetermination in scientific knowledge theory, see Kyle Stanford, Edward N. Zalta, ed., *Underdetermination of Scientific Theory*, *The Stanford Encyclopedia of Philosophy* (Winter 2000), at <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 Thomas S. Kuhn, *The Essential Tension: Selected Studies in Scientific Tradition and Change* 240-65 (1977); see also 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 community about scientific evidence); Steph 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*, 5 *J. Phys. Tchr. Educ. Online* 1, 3-4 (Autumn 2009) (noting that because science deals with truths we cannot know subjectively for ourselves, such as the fact the Earth is round or that it spins on its axis, “[i]t appears that knowledge is to some extent a *justified belief*”) (italics in original); see also 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 (Misconceptions about science)*, University of California (May 23, 2018), <http://undsci.berkeley.edu/teaching/misconceptions.php> (listing more than two dozen misconceptions the public holds about what science is and how it works); DAVID GOODSTEIN, *HOW SCIENCE WORKS, REFERENCE MANUAL ON SCIENTIFIC*

entities have, for decades, exploited these prejudices and misconceptions to spread misleading pseudoscientific messages that further their agenda.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 it was happening and CO₂ emissions were the cause.¹²

Most scientists would agree 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 that mean they were false? There are many, including a growing number of states attorneys general and civil plaintiffs, that argue the answer is “yes.”¹⁴ But the answer under the law is far from clear. Indeed, proving a science-is-unsettled statement to be *legally* false is prohibitively difficult under current laws. Defendants can, in most cases, show that a statement asserting scientific uncertainty, like those made by ExxonMobil pertaining to human-induced global warming, were not technically false even though they were

EVIDENCE (3d ed. 2011), <https://www.nap.edu/read/13163/chapter/4> (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, Killing Us Sweetly: How to Take Industry Out of the FDA, 6 J. FOOD L. & POL’Y 31, 46-68 (2010)), trans-fats (see Ross Williams, 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 Supran & Oreskes, Assessing ExxonMobil’s climate change communications (1977–2014), Environ. Res. Lett. 12 (2017), available at <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); Unsettled Science, New York Times (advertorial published by ExxonMobil in the New York Times which purports that the science of climate change is “unsettled”); IPCC assessment report 2001 (finding, among other things, “There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities”).

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>.

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

calculated to mislead.¹⁵ Accordingly, although ExxonMobil's statements were calculated to mislead, and in fact did mislead, the fact they pertained to scientific knowledge—as opposed to, say, financial statements—means they were likely not “false” for the purposes of fraud. Well-funded corporate defendants in such cases, like Big Oil, Big Tobacco, Big Sugar, and others, get away with making misleading statements and paying to spread a misleading message because the falsity element in fraud is ill-equipped to address deceptions pertaining to scientific knowledge. Accordingly, the scale is tipped heavily in favor of well-funded corporate defendants in such 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 The standard, stated simply, is:

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.

Before any court can adopt and apply this standard, however, three key questions must be addressed. (1) What constitutes a scientific

¹⁵ Wes 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 Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295 (2017). Fraud, however, is only one avenue of holding those who mislead the public about the science behind their products liable. 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 Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295 (2017).

¹⁸ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 342 (2017). Due to the nature of group knowledge, and group scientific knowledge in particular, an alternative wording of the statement might be to add the following highlighted words to it: 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.

knowledge fraud case? (2) How should courts determine what knowledge the scientific community held at a given time—i.e., 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 under nuisance law,¹⁹ but very few have done so with regard to fraud, none of whom addressed falsity.²⁰ This article aims to fill that gap in the scholarship. It also, more broadly, attempts to contribute to the scholarship aimed at addressing how easy it is to mislead the public about science and get away with it.²¹ Courts,

¹⁹ See Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 300 n. 22 (2017) (citing several law journal articles exploring the topic of climate change liability under nuisance law).

²⁰ See, e.g., Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 302 (2017); John C. Coffee, Jr., *On Thin Ice: Climate Change, Exxon, NYAG and the Martin Act*, N.Y. L.J. (Nov. 19, 2015); Jennifer Klein, *Potential Liability of Governments for Failure to Prepare for Climate Change*, Colum. L. Sch.: Sabin Ctr. for Climate Change L., Aug. 2015, at 1, 15-23, <http://wordpress.ei.columbia.edu/climate-change-law/files/2016/06/Klein-2015-08-Liability-US-Gov-Failure-to-PrepClimate-Change.pdf> (describing how governments may be held liable for fraud for failing to prepare for climate change); 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); *CLIMATE CHANGE REGULATION THROUGH LITIGATION: NEW YORK’S INVESTIGATION OF EXXONMOBIL UNDER THE MARTIN ACT*, 2/27/2017 Geo. Envtl. L. Rev. Online 1 (2017).

²¹ See, e.g., James Parker-Flynn, *The Fraudulent Misrepresentation of Climate Science*, 43 Envtl. L. Rep. News & Analysis 11098, 11099 (2013) (positing that “the United States should adopt a narrowly tailored civil cause of action for the fraudulent misrepresentation of climate science”); Elizabeth Dubats, *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); See James R. Dillon, *Expertise on Trial*, 19 Colum. Sci. & Tech. L. Rev. 247, 295-305 (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 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, 260-61 (2000) (proposing “an expert tribunal to decide between competing expert generalisations” put forth by the parties).

Congress, and scholars have proposed solutions to this dilemma in a number of contexts. For instance, the federal courts twice set forth guidelines to ensure that only expert witness testimony based on valid science is admissible in court, first in *Frye*²² and then in *Daubert*,²³ 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 this issue 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 to which the standard should apply. Part II addresses how a court should

²² *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

²³ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993).

²⁴ 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*, 119 S.Ct. 1167 (1999), encapsulates the current evidentiary standard. See also *County of Fresno v. Superior Court*, 92 Cal.App.3d 133, 138 (Cal. 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, to determine admissibility of scientific expert witness evidence, “the district court must determine whether there exists any objective, verifiable evidence that the testimony is based on scientifically valid principles.”) (internal quotation marks omitted).

²⁵ See, e.g., James Parker-Flynn, *The Fraudulent Misrepresentation of Climate Science*, 43 *Envtl. L. Rep. News & Analysis* 11098, 11099 (2013) (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”); Elizabeth Dubats, *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).

²⁶ See James R. Dillon, *Expertise on Trial*, 19 *Colum. Sci. & Tech. L. Rev.* 247, 295–305 (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 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, 260–61 (2000) (proposing “an expert tribunal to decide between competing expert generalisations” put forth by the parties).

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 within which courts could more effectively and accurately compare that baseline truth with the defendant's statement to determine falsity.

Courts will benefit immediately from the guidance and clarity of the proposed standard. To date, at least nine lawsuits have been filed that allege misrepresentations of climate change science against ExxonMobil and other fossil fuel companies.²⁷ More are sure to come. In addition, other

²⁷ See *Boulder County v. Suncor Energy (U.S.A.), Inc.*, Boulder District Court, Case No. 2018CV030349 (filed April 17, 2018) (bringing claims for nuisance, trespass, and violations of consumer protection laws against Suncor and ExxonMobil); *City of New York v. BP P.L.C. et al.*, No. 18 cv 182 (S.D.N.Y. filed Jan. 9, 2018) (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); *People of the State of California v. BP P.L.C. et al.*, San Francisco Superior Court Case No. CGC 17-561370 (San Francisco County Superior Court, filed Sept. 19, 2017) (alleging public nuisance and seeking an abatement fund to provide for infrastructure in San Francisco necessary for the People to adapt to global warming impacts such as sea level rise); *People of the State of California v. BP P.L.C. et al.*, Alameda County Superior Court Case No. RG17875889 (filed Sept. 19, 2017) (alleging public nuisance and seeking to shift the costs of abating sea level rise harm back onto the companies); *Native Village of Kivalina v. Exxon et al.*, No. CV 08 1138 SBA (N.D. Cal. filed Feb. 26, 2008) (action to recover damages from global warming caused by defendant's actions); *Ramirez v. Exxon Mobil Corporation*, 16-cv-03111 – N.D. Texas (filed Nov. 7, 2016) (class action alleging federal securities fraud claims under §§10(b) and 20(a) of the Securities Exchange Act of 1934 and SEC Rule 10b-5 promulgated thereunder) (case closed 6/6/2017); *Attia v. Exxon Mobil Corporation*, 16-cv-03484 – S.D. Texas (amended complaint filed Feb. 7, 2017) (class action alleging claims under Section 502 of the Employee Retirement Income Security Act, 29 U.S.C. § 1132) (case closed 4/30/17); *Exxon Mobil Corporation v. Schneiderman*, Case No. 17-CV-2301 (VEC) (SN), S.D.N.Y. (transferred from N.D. Texas, Case No. 16-cv-00469 – N.D. Texas on March 30, 2017) (action for declaratory relief) (case closed 3/29/17); *New York v. PriceWaterhouseCoopers LLP*, Case No. 451962/16, Supreme Court of New York, County of New York: IAS Part 61 (New York Attorney General subpoenas compelling ExxonMobil to produce documents pertaining to climate change); *Exxon Mobil Corporation vs. Office of Attorney General*, Case No. 1684CV01888, Massachusetts Superior Court, County of Suffolk (action filed by ExxonMobil in response to subpoenas issued by Massachusetts Attorney General); see also Verified Petition for Pre-Suit Depositions, filed by Exxon Mobil Corporation, Cause No. 096-297111-18, District Court of Tarrant County, Texas, Jan. 8, 2018. Other parties have filed non-fraud-based claims against ExxonMobil for its role in climate change and sea level rise. See, e.g., *County of Marin v. Chevron Corp.*, CIV 1702586 – Cal. Superior Court, Marin County (filed July 17, 2017) (alleging nuisance, failure to warn, negligence, and trespass claims); *County of San Mateo v. Chevron Corp.*, 17 CIV 03222 – Cal. Superior Court, San Mateo County (filed July 17, 2017) (alleging nuisance, failure to warn, negligence, and trespass claims); *City of Imperial Beach v. Chevron Corp.*, C17-01227 – Cal. Superior Court,

misrepresentations of scientific knowledge have come to light in recent years,²⁸ spawning litigation against defendants in other industries.²⁹ Courts will be required to determine whether these corporate defendants made one or more false representations to the public, to shareholders, to government regulators, or to policymakers when they misstated 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, in recent months, dismantled environmental regulations, gutted the EPA, scrubbed politically inconvenient scientific data from government websites, and defunded scientific research and institutions. Climate change denial and other anti-science initiatives, laws, and policies are being implemented at an alarming rate.³⁰ By misleading the public on science, those in power increase their wealth and influence at the expense of the health, prosperity,

Contra Costa County (filed July 17, 2017) (alleging nuisance, failure to warn, negligence, and trespass claims). 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.

²⁹ For instance, opioid manufacturers have been charged by state law enforcement agencies in Missouri, Mississippi, and Ohio. See 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=.d7265fe9beb5 (discussing the Missouri attorney general's lawsuit against opioid manufacturers); Therese Apel, *Mississippi Attorney General Joins Nationwide Effort to Push Opioid Alternatives*, THE 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); and Richard Perez-Pena, *Ohio Sues Drug Makers, Saying they Aided Opioid Epidemic*, THE NY 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).

³⁰ One example of this is Florida House Bill 989, which was signed into law by Governor Rick Scott on June 26, 2017. It allows any county resident to file a complaint about instructional materials in the county's public schools, and if a hearing officer deems the challenge justified, he or she may unilaterally remove those materials from the curriculum. 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 (Jul. 1, 2017), <https://www.forbes.com/sites/marshallshepherd/2017/07/01/two-sad-ironies-in-florida-passing-its-anti-science-law/#7a97fc065089>.

and security of everyone else.³¹ At the same time, society's dependence on science, engineering, and technology is growing more rapidly than ever.³² Accordingly, it is urgent we reaffirm our commitment to objective truth by calling falsehoods "false."

I. DEFINING SCIENTIFIC KNOWLEDGE FRAUD

A. Fraud and Falsity

The elements of common law fraud³³ are: (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;

³¹ 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*, *Financial Times* (Oct. 17, 2017), <https://www.ft.com/content/f350020e-b206-11e7-a398-73d59db9e399> (describing how global warming disproportionately affects lower income nations), and Robert Reich, *Climate and Inequality* (video), *Inequality Media*, <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.").

³² See, e.g., Alan I. Marcus and Amy Sue Bix, *THE FUTURE IS NOW: SCIENCE AND TECHNOLOGY POLICY IN AMERICA SINCE 1950*, 6 *J. High Tech. L.* 1 (2006-2007) (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, 26 (July-August 1998) (noting that "the law itself increasingly needs access to sound science. . . . as 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, *Speech at the National Academy of Sciences*, April 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."), available at <https://obamawhitehouse.archives.gov/blog/2009/04/27/necessity-science>.

³³ Although the proposed standard could apply to a wide range of fraud claims, see *supra* note 6, parts of this article, including this Section I, discuss common law fraud (or intentional misrepresentation or deceit) principles to give guidance on fraud law generally, and on the falsity element specifically.

(7) the hearer's reliance on the representation; (8) the hearer's right to rely on the representation; and (9) the hearer's consequent and proximate injury caused by reliance on the representation.³⁴ All elements must typically be pled with heightened specificity, and proven by clear and convincing evidence.³⁵

To satisfy the falsity element, the second in the list above, a plaintiff must prove the defendant's representation was "false" under the law.³⁶ A false representation consists of any oral or written words, conduct, or combination of words and conduct that create an untrue or misleading

³⁴ The elements of fraud are presented in slightly different forms in different jurisdictions. Some list five elements, for instance, while others list seven, eight, or nine. But all jurisdictions include some version of these core fraud elements. See V. John Ella, *Common Law Fraud Claims: A Critical Tool for Litigators*, Bench & B. Minn., September 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.*, 214 Cal. App. 4th 780, 792, 154 Cal. Rptr. 3d 285, 295 (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."); *Girozentrale v. Tilton*, 149 A.D.3d 152, 162, 48 N.Y.S.3d 98, 105 (N.Y. 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."); *Zaidi v. Shah*, 502 S.W.3d 434, 441 (Tex. App. 2016), review denied (June 9, 2017) (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"); *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") (italics removed).

³⁵ See, e.g., *In re Ogden*, 314 F.3d 1190 (10th Cir. 2002); *Mayberry v. Ememessay, Inc.*, 201 F. Supp. 2d 687, 198 A.L.R. Fed. 793 (W.D. Va. 2002); see also 37 C.J.S. Fraud § 12.

³⁶ *U.S. v. Beebe*, 180 U.S. 343, 21 S. Ct. 371, 45 L. Ed. 563 (1901); *Prestwood v. City of Andalusia*, 709 So. 2d 1173 (Ala. 1997); *Turner v. Milliman*, 392 S.C. 116, 708 S.E.2d 766 (2011); *Hennig v. Ahearn*, 230 Wis. 2d 149, 601 N.W.2d 14 (Ct. App. 1999); *Adams v. Gillig*, 199 N.Y. 314, 92 N.E. 670 (1910); 37 Am. Jur. 2d Fraud and Deceit § 106

impression in the mind of another.³⁷ The person making the representation need not know it is untrue or intend to mislead.³⁸ Knowledge and intent are separate fraud elements. Falsity, by contrast, requires only that the representation be, at the time it is made, objectively untrue or misleading.³⁹

In scientific knowledge fraud cases, falsity is uniquely difficult to prove.⁴⁰ There are a number of reasons why. For one thing, science does not operate on certainties.⁴¹ This makes it easy for a wrongdoer to assert that the science on a particular topic is uncertain or unsettled, giving the impression that “we don’t know” when, in fact, those who know the most, the scientists who study that topic, know enough to warrant action or precautions, if not liability. That is what the tobacco industry did for half of a century. Industry executives and affiliates told the public and policymakers that the science was unclear on the link between smoking and

³⁷ T.A. Pelsue Co. v. Grand Enterprises, 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 impression on the listener or viewer that conflicts with reality”) (internal quotes omitted).

³⁸ See Davis v. Sterne, Agee and 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 (Tex. Civ. App. Houston 1967), writ dismissed, (Oct. 4, 1967).

³⁹ Spreitzer v. Hawkeye State Bank, 779 N.W.2d 726 (Iowa 2009); Mukhopadhyay v. Genesis Corp., 70 A.D.3d 520, 894 N.Y.S.2d 430 (1st Dep’t 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 Service Co. v. Rickert, 996 S.W.2d 464 (Ky. 1999); Knights of Columbus Council 3152 v. KFS BD, Inc., 280 Neb. 904, 791 N.W.2d 317 (2010); American Empire Life Ins. Co. v. Long, 344 S.W.2d 513 (Tex. Civ. App. Eastland 1961), writ refused n.r.e., (June 14, 1961); Farnsworth v. Feller, 256 Or. 56, 471 P.2d 792 (1970); see also 37 Am. Jur. 2d Fraud and Deceit § 107), where the representation is technically accurate, yet still misleading for the purposes of a fraud claim (see Grove Holding Corp. v. First Wisconsin Nat. 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 § 106, at 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 (1912); see also 37 Am. Jur. 2d Fraud and Deceit § 106; 60A N.Y. Jur. 2d Fraud and Deceit § 121).

⁴⁰ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 317-33 (2017)

⁴¹ *Daubert*, 509 U.S. at 590. (“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.”).

cancer.⁴² This statement, and all its permutations, was a lie.⁴³ But it worked. It convinced millions of people there was genuine doubt about the smoking-cancer link when there wasn't, thereby increasing sales and causing millions of deaths and chronic and acute illnesses.⁴⁴ It also worked to evade fraud laws because, although the message misled the public, it was not false under the law.⁴⁵

⁴² 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 attempts by the tobacco industry 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 attempts by the tobacco industry to escape regulation); Robert N. Proctor, *Golden Holocaust: Origins of the Cigarette Catastrophe and the Case for Abolition* (University of California Press 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); Naomi Oreskes and Erik M. Conway, *Merchants of Doubt* (Bloomsbury Press 2010). One 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. U. NEWS SERV. (Apr. 6, 2016), <http://news.stanford.edu/pr/2007/pr-proctor-021407.html>.

⁴³ See National Institute of Health, "Harms of Cigarette Smoking and Health Benefits of Quitting," found at <https://www.cancer.gov/about-cancer/causes-prevention/risk/tobacco/cessation-fact-sheet> ("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 ANDREWS TOBACCO INDUS. LITIG. REP. 2 (2009).

⁴⁴ See U.S. DEP'T OF HEALTH AND HUMAN SERV.: TOBACCO FACTS AND FIGURES, <https://betobaccofree.hhs.gov/about-tobacco/facts-figures/> (last visited Sept. 3, 2017) (noting that "[m]ore 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, *The Book Big Tobacco Doesn't Want You to Read*, MOTHER JONES (Apr. 6, 2016), <http://www.motherjones.com/politics/2012/05/tobacco-book-golden-holocaust-robert-proctor>. Worldwide, the number is even more grim; it is estimated one hundred million people were killed by tobacco in the Twentieth Century, and that as many as one billion are expected to die from tobacco in this century. THE TOBACCO ATLAS: SMOKING'S DEATH TOLL, <http://www.tobaccoatlas.org/topic/smokings-death-toll/> (last visited Sept. 3, 2017).

⁴⁵ See, e.g., *Melancon v. Brown & Williamson Tobacco Corp.*, 621 F.Supp. 567 (W.D. Ky. 1985) (Smoker brought action against tobacco company for alleged injuries caused by cigarette tobacco sold without warning label. Court held the case was frivolous in its face); *Hudson v. R.J. Reynolds Tobacco Co.*, 427 F.2d 541 (5th Cir. 1970) (Action brought

Another reason falsity is difficult to prove in scientific knowledge fraud cases is the great number of misconceptions people have about science, like how the scientific method works, what a “theory” is, and the lack of absolute objectivity and certainty in scientific research results.⁴⁶ There are also many biases that warp people’s interpretations of scientific assertions, like prejudices based on religious, social, political, or other personal convictions, as well as financial conflicts of interest.⁴⁷ Because of these misunderstandings and biases, 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—e.g., the link between smoking and cancer—with certainty, something extraordinarily difficult, if not impossible, to do. Indeed, the burden on plaintiffs in such cases has proven largely insurmountable.⁴⁸ The history of claims against the tobacco,⁴⁹ asbestos,⁵⁰ and other industries⁵¹ demonstrates a striking track record of

against cigarette manufacturer for cancer of larynx and lungs from smoking. Court found for defendant because Plaintiff did not offer proof that defendant could or should have known that smoking could cause cancer.).

⁴⁶ See *supra*, note 10.

⁴⁷ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295 (2017).

⁴⁸ See *infra* notes 49, 50, and 51.

⁴⁹ See James A. Henderson, Jr. & Aaron D. Twerski, *Reaching Equilibrium in Tobacco Litigation*, 62 S.C. L. REV. 67, 70-75 (2010); see also ORESKES & CONWAY, *MERCHANTS OF DOUBT*, 14, 24, 33.

⁵⁰ See, e.g., Lester Brickman, *On the Theory Class’s Theories of Asbestos Litigation: The Disconnect Between Scholarship and Reality*, 31 PEPP. L. REV. 33 (2003) (giving a brief overview of asbestos litigation); Paul Brodeur, *Outrageous Misconduct* (1985); Elise Gelinas, *Asbestos Fraud Should Lead to Fairness: Why Congress Should Enact the Fairness in Asbestos Injury Resolution Act*, 69 MD. L. REV. 162 (2003) (discussing history of asbestos litigation); see also *Bragg v. Owens-Corning Fiberglas Corporation*, 734 A.2d 643 (D.C. 1999) (recounting the history of asbestos use and litigation); *In re Joint Eastern & Southern Districts Asbestos Litigation*, 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 rehearing*, 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).

⁵¹ Regarding the scientific consensus on the tobacco-cancer link, see David G. Owen, *Inherent Product Hazards*, 93 KY. L.J. 377, 392–393 (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 Tobacco Tort Litigation*, 44 STAN. L. REV. 853, 856 (1992); Richard Doll and A. Bradford Hill, *A Study of the Aetiology of Carcinoma of the Lung*, 2 BRIT. MED. J. 1271 (1952), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2022425/pdf/brmedj03472-0009.pdf> (June

injured plaintiffs denied compensation because of the extraordinary difficulty of holding industry defendants liable.

To level the playing field, courts should apply the above-proposed falsity standard in scientific knowledge fraud cases.⁵² The 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, a court must understand first what scientific knowledge is, and second 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 CO₂ emissions and global warming.⁵³ The asbestos industry misled the public about the health hazards of asbestos.⁵⁴ The sugar industry misled the public about the health dangers of sugar.⁵⁵ Again and again the same scheme is repeated: there is a product both profitable and dangerous, and the companies selling it hide the dangers it poses by lying about the science linking the product to the damage it causes. This allows them to continue selling the product. Profits are tied to how well companies in these industries can mislead the public about the science involved.

What these companies and their allies misrepresented—that the evidence establishes CO₂ emissions cause global warming, or that asbestos causes lung cancers, or that sugar causes obesity, diabetes, and heart

9, 2015); Wynder and Everts A. Graham, *Tobacco Smoking as a Possible Etiologic Factor in Bronchiogenic Carcinoma: A Study of Six Hundred and Eighty-Four Proved Cases*, 143 J. AM. MED. ASS'N 329 (1950). Regarding the Reader's Digest article and its effect, see Ray Norr, *Cancer by the Carton*, READER'S DIG., Dec. 1952, at 7-8, available at <https://www.industrydocumentslibrary.ucsf.edu/tobacco/docs/#id=nyyp0092> (last visited Oct. 7, 2017); RICHARD KLUGER, *ASHES TO ASHES* 152 (1996).

⁵² See supra note 18, and corresponding text.

⁵³ Ivan Penn, *California to Investigate Whether Exxon Mobil Lied About Climate-Change Risks*, LA TIMES (Jan. 20, 2016, 3:00 AM), <http://www.latimes.com/business/la-fi-exxon-global-warming-20160120-story.html>.

⁵⁴ See Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 328–29 (2017).

⁵⁵ See Camila Domonoske, *50 Years Ago, Sugar Industry Quietly Paid Scientists to Point Blame At Fat*, NPR (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>.

disease, for instance—was, in each case, a fact drawn from a body of scientific knowledge.⁵⁶ That is, whether CO₂ emissions cause global warming is an epistemic question more than it is a question of fact. *Do* CO₂ emissions cause global warming? 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.

The United States Supreme Court in *Daubert* defined the term in the evidence context when explaining what constitutes admissible “scientific knowledge” testimony from an expert witness.

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.⁵⁷

The Supreme Court made clear there is a bright-line division between valid scientific knowledge, which is adequately supported and derived from scientific methods, on the one hand, and subjective beliefs and unsupported speculation on the other.⁵⁸ The Court laid out four factors for determining whether an assertion qualifies as scientific knowledge. They are incorporated into the definition of “scientific knowledge” provided in Black’s Law Dictionary:

⁵⁶ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 296 n.4 (2017) (noting that, to qualify as “scientific knowledge,” an assertion must be derived by scientific methods and supported by adequate validation, citing *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 590 (1993) and *Scientific Knowledge*, BLACK’S LAW DICTIONARY (10th ed. 2014)).

⁵⁷ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 590 (1993) (internal citations omitted). The Court there noted that the determination entails an “assessment of whether the reasoning or methodology underlying the testimony is scientifically valid.” *Id.* at 593-94.

⁵⁸ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 589–90 (1993).

(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.⁵⁹

No single factor is determinative. Moreover, these four factors have not been applied in enough cases to give a complete picture of the parameters of what comprises scientific knowledge.⁶⁰ It is clear that an assertion such as “Scientists are unable to confirm if humans are causing global warming” or “Fundamental gaps in knowledge leave scientists unable to make reliable predictions about the climate,” both of which were made by ExxonMobil,⁶¹ purported to assert scientific knowledge. 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” in question here 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 702.⁶² Rather, it is, epistemologically-speaking, a matter of group knowledge.⁶³ The question of whether or not ExxonMobil’s assertions above are true

⁵⁹ Scientific Knowledge, BLACK’S LAW DICTIONARY (10th ed. 2014).

⁶⁰ See, e.g., *Allison v. McGhan Medical Corp.*, 184 F.3d 1300 (11th Cir. 1999) (court granted 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); *Quintana v. Acosta*, 316 P.3d 912 (N.M. Ct. App. 2013) (court held that plaintiffs expert witness testimony was admissible because it was not based on scientific knowledge, but from the witnesses own knowledge, training and experience, and was therefore not subject to the *Daubert* factors analysis); *Payne v. Wyeth Pharmaceuticals, Inc.*, No. 2:08cv119, 2008 WL 5586824 *1 (E.D. Va. Nov. 17, 2008) (court added an additional factor to the *Daubert* factors: to consider “whether the expert testimony was prepared solely for purposes of litigation, or whether it flowed naturally from the expert’s research or technical work”).

⁶¹ *Unsettled Science*, New York Times, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, *What Exxon Mobil Didn’t Say About Climate Change*, New York Times (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

⁶² See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); Fed. R. EVID. 702.

⁶³ See, e.g., Kristina Rolin, “Science as Collective Knowledge,” *Cognitive Systems Research* 9: 115–24 (2008) (discussing scientific knowledge as group knowledge).

hinges not on whether they square with a single scientist's knowledge, but whether they square with the knowledge of the scientific community.⁶⁴

Group knowledge is based on “[t]he idea that groups can be treated as collective agents capable of knowledge and beliefs.”⁶⁵ Today, “[m]any epistemologists endorse the claim that collective knowledge sometimes obtains: groups can *have* knowledge.”⁶⁶ Naturally, however, groups 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.”⁶⁷

There is disagreement in the literature on which groups of scientists can be considered to hold group knowledge,⁶⁸ but the idea that scientific knowledge *can* be group knowledge appears widely accepted.⁶⁹ The debate instead hinges on how restrictive the kinds of scientific groups to which collective knowledge can be attributed should be—e.g., scientific research teams versus the entire scientific community.⁷⁰

But this query—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

⁶⁴ See Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 298–99 (2017).

⁶⁵ Baltag, A., R. Boddy and S. Smets, *Group knowledge in interrogative epistemology*, in: Outstanding Contributions to Logic: J. Hintikka, Springer, 2016 p. 1.

⁶⁶ Chris Dragos, *Which Groups Have Scientific Knowledge? Wray vs. Rolin*, 30 Social Epistemology 611, 611 (2016) (italics in original); see also *id.* at note 1 (citing to thirty-four papers supporting the quoted assertion).

⁶⁷ Rachel Boddy, *Epistemic Issues and Group Knowledge*, Msc Thesis, University of Amsterdam (unpublished), date of public defense June 20, 2014, at p. 3, <https://www.illc.uva.nl/Research/Publications/Reports/MoL-2014-03.text.pdf>.

⁶⁸ See, e.g., Chris Dragos, *Which Groups Have Scientific Knowledge? Wray vs. Rolin*, 30 Social Epistemology 611, 611–12 (2016) (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); see also Alexander Bird, *When Is There a Group That Knows? Distributed Cognition, Scientific Knowledge, and the Social Epistemic Subject*, in *ESSAYS IN COLLECTIVE EPISTEMOLOGY* 44–47 (Jennifer Lackey ed. 2015) (addressing the question more broadly, “When is there a ‘group’, ‘collectivity’, or ‘social system’ that knows?”).

⁶⁹ Compare Kristina Rolin, “Science as Collective Knowledge,” *Cognitive Systems Research* 9: 115–24 (2008) and Kristina Rolin, “Group Justification in Science,” *Episteme* 7 (3): 215–31 (2010) with Brad Wray, “Who Has Scientific Knowledge?” *Social Epistemology* 21 (3): 337–47 (2007).

⁷⁰ See *supra* notes 68 and 69, and sources cited therein.

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 Rolin's framework, set forth in a recent series of papers.⁷¹ Building on Professor Michael Williams's analysis of epistemic responsibility,⁷² Rolin articulated that "a scientific community as a whole can be epistemically responsible for some knowledge claims."⁷³ The knowledge underlying the myriad scientific principles behind sweeping assertions pertaining to, for instance, the causes of global warming, need not, under Rolin's framework, be entirely known by any individual scientist.⁷⁴ Rather, it is group knowledge held by the scientific community. The scientific community could thus distribute the duties to defend particular assertions or attacks to those scientists most knowledgeable in the particular area in question.⁷⁵ That designated scientist would be capable of defending against such criticism (or attack) on behalf of the whole community even though she or he would not necessarily possess knowledge of every underlying grounding or assumption.⁷⁶

In the context of a scientific knowledge fraud claim, where to satisfy the falsity element a plaintiff must prove that the representation was false⁷⁷

⁷¹ See Brad Wray, "Who Has Scientific Knowledge?" *Social Epistemology* 21 (3): 337–47 (2007); Kristina Rolin, "Science as Collective Knowledge," *Cognitive Systems Research* 9: 115–24 (2008); Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016), at p. 7.

⁷² See Michael Williams, *Problems of Knowledge: A Critical Introduction to Epistemology* (Oxford University Press, 2001), at 22 ("[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'.") and 22-25 (elaborating on the concept of epistemic responsibility).

⁷³ Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016), at p. 7.

⁷⁴ Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016), at p. 7; Kristina Rolin, "Science as Collective Knowledge," *Cognitive Systems Research* 9: 121 (2008).

⁷⁵ Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016), at p. 7-8; Kristina Rolin, "Science as Collective Knowledge," *Cognitive Systems Research* 9 (2008), at 121-22.

⁷⁶ Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016), at p. 8.

⁷⁷ *U.S. v. Beebe*, 180 U.S. 343, 349, 21 S. Ct. 371, 45 L. Ed. 563 (1901); *Prestwood v. City of Andalusia*, 709 So. 2d 1173, 1175 (Ala. 1997); *Turner v. Milliman*, 392 S.C. 116,

or created an untrue or misleading impression in the mind of another,⁷⁸ the baseline truth upon which the falsity question must be answered necessarily comes from the known science on the particular topic. This knowledge is held by the community rather than any individual.⁷⁹ This is particularly evident in light of the sophisticated and complex nature of the science behind many of the misleading assertions made in recent history.⁸⁰

Accordingly, a scientific knowledge fraud case arises when a defendant is alleged to have misrepresented knowledge held by the scientific community. The misrepresentation could be by statement or omission. But it must pertain to knowledge—or the state of the knowledge—held by the scientific community.

C. The Parameters of Scientific Knowledge Fraud

Did the fraud defendant allegedly lie about scientific knowledge? If yes, the proposed standard should apply. If not, it shouldn't.

If, for instance, a fraud defendant's alleged statement or omission pertained to a fact over which it is clear a body of scientific knowledge exists—say, the link between smoking and cancer, or whether global warming is caused by CO₂ emissions—it would satisfy the inquiry. This would be a textbook scientific knowledge fraud case. A court addressing such a claim should apply the proposed fraud-falsity standard. Other clear-

124, 708 S.E.2d 766, 770 (2011); *Hennig v. Ahearn*, 230 Wis. 2d 149, 173, 601 N.W.2d 14, 25 (Wis. Ct. App. 1999); *Adams v. Gillig*, 199 N.Y. 314, 320, 92 N.E. 670 (1910); 37 AM. JUR. 2d Fraud and Deceit § 106.

⁷⁸ *T.A. Pelsue Co. v. Grand Enters., Inc.*, 782 F. Supp. 1476, 1488 (D. Colo. 1991).

⁷⁹ Kristina Rolin, "Collective Epistemic Responsibility: A Reply to Chris Dragos," *Social Epistemology Review and Reply Collective* 5, no. 11 (2016).

⁸⁰ See, e.g., PHILLIP J. HILTS, *SMOKE SCREEN: THE TRUTH BEHIND THE TOBACCO INDUSTRY COVER UP* (1996) (outlining the history of attempts by the tobacco industry to escape regulation); Lester Brickman, *On the Theory Class's Theories of Asbestos Litigation: The Disconnect Between Scholarship and Reality*, 31 PEPP. L. REV. 33 (2003) (giving a brief overview of asbestos litigation); Ivan Penn, *California to Investigate Whether Exxon Mobil Lied About Climate-Change Risks*, L.A. TIMES (Jan. 20, 2016), <http://www.latimes.com/business/la-fi-exxon-global-warming-20160120-story.html> (discussing how ExxonMobil and its predecessor, Exxon, knew that the fossil fuel industry was causing climate change, yet denied this information to the public); *Complaint, California v. Purdue Pharma L.P.*, Orange County Superior Court, Case No. CGC-13-534108 (filed May 21, 2014) (lawsuit alleging opioid manufacturers knew that opioids were addictive).

cut “yes” cases, based on their underlying facts and not the actual causes of action pled, include:

- (1) an action by the U.S. alleging that cigarette manufacturers and tobacco-related trade organizations violated the Racketeer Influenced and Corrupt Organizations Act by engaging in conspiracy to deceive the American public about the health effects of smoking and environmental tobacco smoke, addictiveness of nicotine, and health benefits from low tar “light” cigarettes⁸¹;
- (2) 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 manufacturers to make it appear that the drug would cause fewer gastrointestinal side-effects than the less costly competitors’ drug alternatives⁸²;
- (3) an action alleging that a tobacco manufacturers, suppliers, and distributors violated Ohio’s consumer protection statutes by “their conduct, including the manipulation of nicotine levels, suppression, subversion and distortion of medical and scientific research, misrepresentations and non-disclosures of material facts” regarding nicotine, and by “falsely and deceptively representing that nicotine is not addictive and that Defendants do not manipulate the levels of nicotine in their cigarettes”⁸³;
- (4) an action alleging the defendant pharmaceutical manufacturers “knew – and had known for years – that opioids were too

⁸¹ *United States v. Philip Morris USA, Inc.*, 449 F. Supp. 2d 1 (D.D.C. 2006), *aff’d in part, vacated in part*, 566 F.3d 1095 (D.C. Cir. 2009), and order clarified, 778 F. Supp. 2d 8 (D.D.C. 2011). 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.”).

⁸² *Alaska Elec. Pension Fund v. Pharmacia Corp.*, 554 F.3d 342, 344-45 (3d Cir. 2009).

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

addictive and too debilitating for long-term use for chronic non-cancer pain...because of the substantial risk of significant side effects and addiction, especially with high-dose use,” yet they “spent millions of dollars funding, assisting, and encouraging doctors and front groups [to] pioneer a new and far broader market for their potent and highly addictive drugs” and “overstated the benefits of using opioids long-term to treat chronic non-cancer pain, promising improvement in patients’ function and quality of life, and dismissed or minimized the serious risks and adverse outcomes of chronic opioid use, including the risk of addiction, overdose, and death”⁸⁴; and

- (5) 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 flipside 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.

⁸⁴ Complaint, *California v. Purdue Pharma L.P.*, Orange County Superior Court, Case No. CGC-13-534108 (filed May 21, 2014), <https://www.law360.com/articles/540839/attachments/0>, at pp. 1-2. The complaint there 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, *Ohio v. Purdue Pharma L.P.*, (Ohio Com. Pleas filed May 31, 2017) <http://www.ohioattorneygeneral.gov/Files/Briefing-Room/News-Releases/Consumer-Protection/2017-05-31-Final-Complaint-with-Sig-Page.aspx>, at p. 2.

⁸⁶ *Bolden v. Potter*, 452 So. 2d 564 (Fla. 1984).

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

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

One such case would be, for instance, a Rule 10b-5 securities fraud⁸⁹ action against ExxonMobil⁹⁰ where shareholders allege the company overstated the number of barrels of oil in the ground (reserves) because it failed to discount the proportion of its reserves it will not be allowed to use due to the additional warming burning that oil would cause.⁹¹ The fraud alleged in that case centers on ExxonMobil failing to account for global warming its own scientists and officers acknowledged for decades.⁹² But the specific alleged representations pertain to barrels of oil reported in its financial statements,⁹³ and, as such, implicate the science of anthropogenic global warming indirectly rather than directly. Whether a case like this involves an alleged misrepresentation of scientific knowledge must be determined by the court. It is likely a question of law for the judge.⁹⁴

Another case difficult to categorize as either scientific knowledge fraud or not would be one brought against a university, its cancer research center, and its researchers, alleging that applications for federal grants for research funding had relied on inaccurate scientific studies and constituted false claims in violation of False Claims Act.⁹⁵ It is unclear whether this would qualify as scientific knowledge fraud because although it involves claims of misrepresenting scientific studies and data, it is not the kind of claim the proposed standard was created to address—cases where a defendant misrepresents scientific knowledge to the public, the government, or policymakers to gain or retain the ability sell a product that harms the public or the environment, such as tobacco, asbestos, sugar, or fossil fuels.⁹⁶

⁸⁹ Securities and Exchange Commission Rule 10b-5, codified at 17 C.F.R. § 240.10b-5.

⁹⁰ See Complaint, *Ramirez v. Exxon Mobil Corp.*, N.D. Tex. Case No. 3:16-cv-3111.

⁹¹ Complaint, *Ramirez v. Exxon Mobil Corp.*, N.D. Tex. Case No. 3:16-cv-3111, at 2-3, 9-10.

⁹² Complaint, *Ramirez v. Exxon Mobil Corp.*, N.D. Tex. Case No. 3:16-cv-3111, at 13-14.

⁹³ Complaint, *Ramirez v. Exxon Mobil Corp.*, N.D. Tex. Case No. 3:16-cv-3111, at 9-10.

⁹⁴ 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 (2004); *Harris v. Toys “R” Us-Penn, Inc.*, 880 A.2d 1270 (2005), appeal denied, 895 A.2d 1262 (2006)); as an interpretation of the pleadings (see, e.g., *Parsons v. United Technologies Corp., Sikorsky Aircraft Div.*, 700 A.2d 655 (1997); *Carnegie v. Carnegie*, 55 S.E.2d 583 (1949); *Wells v. Clayton*, 72 S.E.2d 16 (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 (2006)). See generally 75A Am. Jur. 2d Trial § 599.

⁹⁵ *U.S. ex rel. Milam v. Regents of Univ. of California*, 912 F. Supp. 868 (D. Md. 1995).

⁹⁶ See generally *supra*, INTRODUCTION.

This case, by contrast, appears to involve the misrepresentation of specific studies or data derived therefrom to a narrow audience unrelated to selling goods of any kind.⁹⁷

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

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

If I 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, my 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.⁹⁸

To find out if it is raining, you can, one would imagine, 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

⁹⁷ See U.S. ex rel. Milam v. Regents of Univ. of California, 912 F. Supp. 868, 873 (D. Md. 1995) (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”).

⁹⁸ Spreitzer v. Hawkeye State Bank, 779 N.W.2d 726 (Iowa 2009); Mukhopadhyay v. Genesis Corp., 70 A.D.3d 520, 894 N.Y.S.2d 430 (1st Dep’t 2010); Parker v. Byrne, 996 A.2d 627 (R.I. 2010); see also United States ex rel. Bahnsen v. Boston Scientific Neuromodulation Corp., No. CV 11-1210, 2017 WL 6403864, at *5 (D.N.J. Dec. 15, 2017) (noting the Third Circuit found that in the context of a False Claims Act case, “[a] statement is ‘false’ when it is objectively untrue”); Restatement (Second) of Contracts § 159 (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 Enterprises, Inc., 782 F. Supp. 1476, 1488 (D. Colo. 1991); Wilson v. Neighborhood Restore Hous., 129 A.D.3d 948, 949–50, 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) (“to constitute actionable fraud the representations relied on must be material and must be false at the time they were made”).

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, in fact, wet, but not necessarily raining, per se. 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.

The problem is that without a baseline truth (*it is raining* or *it is not raining*) to compare with the representation (*it is raining*), there is no accurate way to determine whether the representation is true or false. Courts addressing the falsity element of a scientific knowledge fraud claim face, in fact, a worse dilemma than this. Because not only must they grapple with competing sources of purported scientific knowledge, which often contradict one another, but they do so with regard to questions far more complex and difficult than “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”⁹⁹ (referred to hereafter as the ExxonMobil Advertorial). In it, ExxonMobil asserted that “scientists are unable to confirm if humans are causing global warming,” and that “fundamental gaps in knowledge leave scientists unable to make reliable predictions about the climate.”¹⁰⁰ These statements cause myriad problems for any court tasked with determining their truthfulness or falsity. However, before examining these statements to verify or debunk them, a court must first identify the precise fact ExxonMobil was speaking about, and second, come

⁹⁹ Available at Geoffrey Supran and Naomi Oreskes, What Exxon Mobil Didn’t Say About Climate Change, *New York Times* (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

¹⁰⁰ Each of these assertions was actually made by ExxonMobil on March 23, 2000. Unsettled Science, *New York Times*, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, What Exxon Mobil Didn’t Say About Climate Change, *New York Times* (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

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 defendant misrepresents, say, a company's net income in a given year or likelihood of finding a job after a graduating with a specific for-profit degree, determining what the baseline truth will pertain is easy. A court must simply ask *What was that company's net income that year?* or *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. Take the ExxonMobil Advertorial representations ("scientists are unable to confirm if humans are causing global warming," and "fundamental gaps in knowledge leave scientists unable to make reliable predictions about the climate").¹⁰¹ Both assertions pertain not to the underlying scientific fact, whether or not global warming is happening, but to scientists' knowledge of it.¹⁰²

This distinction is important, at least with regard to the fraud-falsity element. It dictates what baseline truth must be uncovered and juxtaposed with the representation to determine its truthfulness or falsity. The baseline truth that corresponds to the ExxonMobil Advertorial statements consists not of whether global warming was happening, per se, but rather of what scientists knew of it at the time the statement was made.¹⁰³ ExxonMobil's representations pertained to (1) scientists' knowledge of whether humans are causing global warming and (2) scientists' ability to make reliable

¹⁰¹ Each of these assertions was actually made by ExxonMobil on March 23, 2000. Unsettled Science, New York Times, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, What Exxon Mobil Didn't Say About Climate Change, New York Times (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change.html>.

¹⁰² 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 Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 312–13 n.99–100 (2017).

¹⁰³ 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 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE: FIFTH ASSESSMENT REPORT: SUMMARY FOR POLICYMAKERS, http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf.

predictions about the climate. Having identified the representation's subject matter, the 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

Courts are ill-equipped to determine scientific truth, something numerous authors have noted.¹⁰⁴ Nevertheless, they must. Subsection II.B.1 below discusses how courts can come up with an accurate baseline truth statement (or "BTS") to apply in scientific knowledge fraud claims. Alternatively, courts could implement a new guideline standard, proposed below, to help make this determination. Such a guideline standard could, as discussed in Subsection II.B.2 below, 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 lay 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 below.

1. Baseline truth under current law

Courts tasked with determining the baseline truth pertaining to a representation of scientific knowledge have a difficult job.¹⁰⁵ Most judges are not scientists.¹⁰⁶ 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 from which to discern the baseline truth is admissible, either because it is valid science under *Daubert* and its progeny¹⁰⁷ or Federal Rule of Evidence 702,¹⁰⁸ or because it represents a generally accepted scientific position under *Frye* and its progeny.¹⁰⁹ Once the court determines which evidence is admissible on

¹⁰⁴ See *supra*, notes 25 & 26, and accompanying text.

¹⁰⁵ See *supra*, notes 8, 9, & 11, and accompanying text.

¹⁰⁶ See Transcript of Oral Argument at 22-23, *Mass. v. Envtl. Prot. Agency*, 549 U.S. 497 (2007) (No. 05-1120) (emphasis added), *infra* note 140 (Justice Scalia noting that because he is not a scientist he does not want to deal with scientific issues).

¹⁰⁷ See *Nease v. Ford Motor Co.* 838 F.3d 219, 228 (4th Cir. 2017) (discussing *Daubert* and its progeny); *General Elec. Co. v. Joiner* 522 U.S. 136, 153-54 (1997); *To Hear or Not to Hear: When are Daubert Hearings Appropriate?*, SF78 ALI-ABA 371 (2001).

¹⁰⁸ See FED. R. EVID. 702; *General Elec. Co. v. Joiner* 522 U.S. 136, 153-54 (1997); *To Hear or Not to Hear: When are Daubert Hearings Appropriate?*, SF78 ALI-ABA 371 (2001).

¹⁰⁹ Under the *Frye* standard, "[t]he proponent of the evidence bears the burden of establishing by a preponderance of the evidence the general acceptance of the underlying

the question of what the scientific community knew at the time of the representation¹¹⁰—the baseline truth—the trier of fact decides what that baseline truth was.¹¹¹

Courts and scholars appear to have given little treatment to the issue of how judges or juries should determine the truthfulness or falsity of an alleged misrepresentation of scientific knowledge.¹¹² However, under the proposed falsity standard, the court must compare the alleged misrepresentation with its corresponding scientific knowledge.¹¹³ When determining what the scientific community knew at a particular moment—i.e., at the time of the defendant’s representation—there are several reasons why the court should come up not only with the baseline truth, but with a baseline truth *statement*.

A written baseline truth statement, or BTS, would allow 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.¹¹⁴ It puts words down on paper that can be read again and again, and pondered. It precludes confusion or differing interpretations.¹¹⁵ It also gives a more tangible statement to compare with the defendant’s representation, as

scientific principles and methodology.” *Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 2003); see also *Frye v. United States*, 293 F. 1013, 1013 (D.C. Cir. 1923).

¹¹⁰ See, e.g., *Wilson v. Neighborhood Restore Hous.*, 129 A.D.3d 948, 949–50, 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) (“to constitute actionable fraud the representations relied on must be material and must be false at the time they were made”)

¹¹¹ 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).

¹¹² A search of cases and scholarship revealed no on-point authorities. —the author.

¹¹³ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 *UMKC L. REV.* 295, 347-48 (2017).

¹¹⁴ Although 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. Am. 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.”). But when words are written down, all can at least agree what the words are. When words are merely spoken, on the other hand, the probability of misunderstanding what those words mean, or even what those words *are*, multiplies, as anyone who has ever played the childhood game telephone would attest. See, e.g., Ingrid Wickelgren, *Speaking Science: Why People Don’t Hear What You Say*, *Scientific American* (Nov. 8, 2012), <https://www.scientificamerican.com/article/bring-science-home-speaking-memory>.

¹¹⁵ See *supra*, note 114.

discussed *infra* in Section III. But although of very high utility, coming up with a baseline truth statement presents enormous challenges. It requires the trier of fact to adopt exact language to ideas and concepts not easily reduced to short or easily-digested words or phrases.¹¹⁶

Nevertheless, courts are not helpless in this inquiry. Turning to one of the particular assertions made by ExxonMobil in its March 23, 2000 *New York Times* advertorial—“scientists are unable to confirm if humans are causing global warming”¹¹⁷—a court hearing a fraud case alleging this to be a misrepresentation must answer the question: *Were scientists unable to confirm if humans were causing global warming on March 23, 2000?*

The court could craft the BTS by adopting it from an existing document.¹¹⁸ Alternatively, it could create a BTS based on the evidence presented to it, most likely through expert witness testimony and documents

¹¹⁶ 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, e.g., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE: FIFTH ASSESSMENT REPORT: SUMMARY FOR POLICYMAKERS, http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf; 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 baseline truth statement on those questions poses a legitimately difficult problem.

¹¹⁷ Unsettled Science, *New York Times*, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, What Exxon Mobil Didn’t Say About Climate Change, *New York Times* (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

¹¹⁸ 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, which are published every six to eight years. See, e.g., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE: FIFTH ASSESSMENT REPORT: SUMMARY FOR POLICYMAKERS, http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf; THOMAS G. FARMER & JOHN COOK, CLIMATE CHANGE SCIENCE: A MODERN SYNTHESIS: VOLUME 1 – THE PHYSICAL CLIMATE (2015). Or the statement could come from a leading private or public organization that brings together scientists in that particular field of science, such as the Geological Society of America, the National Aeronautics and Space Administration, or the National Oceanic and Atmospheric Administration, to give just a few examples. It is worth noting that although climate science offers helpful summaries of the global scientific community addressing climate change—in statements contained in periodic IPCC Assessment Reports, National Academy of Science statements, and others—it is unclear how many other areas of science offer similar cheat sheets for courts.

such as scientific papers, studies, and data.¹¹⁹ Returning again to the ExxonMobil Advertorial hypothetical, one possible (and plausible) BTS a court might adopt would be the language below, comprised of direct quotes and paraphrasing from a report by the National Academy of Sciences' Committee on the Science of Climate Change¹²⁰ and from the IPCC's Third Assessment from 2001,¹²¹ reflecting the climate scientists' view on the topic at about the time of ExxonMobil's statement:

CO₂ 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 CO₂ concentrations are virtually certain to be due to fossil-fuel emissions.

Whether adopting a baseline truth statement from an existing document or documents, or coming up the court's 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.¹²² For that reason it is advisable that courts implement a guideline standard for creating or adopting the BTS in order to make the task easier and less draining on judicial resources.

¹¹⁹ This is what the trier of fact does in every case. It comes up with what happened 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).

¹²⁰ NAT'L ACAD. OF SCIENCES COMM. ON THE SCI. OF CLIMATE CHANGE, *Climate Change Science: An Analysis of Some Key Questions* (National Academy Press 2001), at 1 ("Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise.").

¹²¹ J.J. MCCARTHY ET AL., EDS., *CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY* (Cambridge Univ. Press 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."); IPCC Third Assessment Report (2001), Full Report, available at https://www.ipcc.ch/ipccreports/tar/wg1/pdf/WGI_TAR_full_report.pdf, at 7 ("Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.") and 10 ("There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities." and "The balance of evidence suggests a discernible human influence on global climate." and "[I]t is very likely that the 20th century warming has contributed significantly to the observed sea level rise...") (footnote omitted).

¹²² 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).

2. Baseline truth under a truth-determination guideline

There appears to be no specific guidance in the scholarship or case law for how courts should come up with the BTS with which to compare a scientific knowledge fraud defendant's allegedly false representation.¹²³ There is ample guidance, however, with regard to which scientific expert testimony should be admitted and which should be excluded.¹²⁴ Evidence submitted to the trier of fact will already have passed through the valid-scientific "gate" in an FRE 702 or *Daubert* jurisdiction,¹²⁵ or passed through the *Frye* generally-accepted test in a jurisdiction that applies that standard.¹²⁶ However, the scientific evidence that crosses these hurdles is not all equally valid, or necessarily scientifically valid at all; it should not all be given equal weight.¹²⁷ The guidelines given to the trier of fact for determining the baseline scientific truth, or the BTS, must necessarily be narrower than either of these evidentiary standards for scientific testimony or evidence. The guidelines must further filter out bad or misleading scientific assertions.

First, the trier of fact must ensure the baseline truth reflects the entire scientific community rather than a minority, or even majority,

¹²³ A search of cases and scholarship revealed no on-point authorities. —the author.

¹²⁴ With regard to the *Daubert* standard and Federal Rule of Evidence 702, see *Nease v. Ford Motor Co.* 838 F.3d 219, 228 (4th Cir. 2017) (discussing *Daubert* and its progeny); *General Elec. Co. v. Joiner* 522 U.S. 136, 153-54 (1997); *To Hear or Not to Hear: When are Daubert Hearings Appropriate?*, SF78 ALI-ABA 371 (2001); and FED. R. EVID. 702. With regard to the *Frye* standard, see *Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 2003); and *Frye v. United States*, 293 F. 1013, 1013 (D.C. Cir. 1923).

¹²⁵ See *Nease v. Ford Motor Co.* 838 F.3d 219, 228 (4th Cir. 2017) (discussing *Daubert* and its progeny); *General Elec. Co. v. Joiner* 522 U.S. 136, 153-54 (1997); *To Hear or Not to Hear: When are Daubert Hearings Appropriate?*, SF78 ALI-ABA 371 (2001); FED. R. EVID. 702.

¹²⁶ See *Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 2003); *Frye v. United States*, 293 F. 1013, 1013 (D.C. Cir. 1923).

¹²⁷ See *People v. Brown*, 91 Cal. App. 4th 623, 110 Cal. Rptr. 2d 750 (5th Dist. 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) (noting that " 'flaws 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").

opinion.¹²⁸ There is only one baseline truth. Turning again to ExxonMobil's 2000 statement, "scientists are unable to confirm if humans are causing global warming," the baseline truth about this topic is the knowledge of the whole scientific community. That is not to say there must be a "consensus" or general agreement. Disagreement among scientists is as much a part of scientific knowledge as is a degree of uncertainty.¹²⁹ That disagreement can and should be built into the BTS. Whether the statement says "majority of scientists" or "vast majority of scientists" or "97 percent of scientists," for instance, is a matter of discretion left to the trier of fact.¹³⁰ It, like all components of the BTS, must be objectively true.

Because the baseline truth statement must, in most cases, reflect the scientific community as a whole, the *Frye* standard of "general acceptance" of a scientific idea¹³¹ can be a helpful guide. 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.¹³² 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.¹³³

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, and these words may have different meanings depending on what phenomenon they describe.¹³⁴ Like lawyers, scientists carefully craft the language used in

¹²⁸ 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." See *infra* Introduction; Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 342 (2017).

¹²⁹ 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.").

¹³⁰ 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).

¹³¹ *Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 2003); see also *Frye v. United States*, 293 F. 1013, 1013 (D.C. Cir. 1923).

¹³² *Castillo v. E.I. Du Pont De Nemours & Co., Inc.*, 854 So.2d 1264, 1268 (Fla. 2003).

¹³³ See *supra*, note 128.

¹³⁴ See the IPCC Third Assessment Report (2001), Full Report, available at https://www.ipcc.ch/ipccreports/tar/wg1/pdf/WGI_TAR_full_report.pdf, p. 2 n.7 (noting

studies and reports to convey exactly what knowledge it represents.¹³⁵ 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.

Third, to avoid tainting the BTS, the trier of fact should craft the BTS out of view of (and independent of) the defendant's representation. Exposure to the defendant's representation while crafting the BTS would likely create a tendency, or at least a temptation, to tailor the BTS to conform to or otherwise reflect the defendant's representation.¹³⁶

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.¹³⁷ Other authors, including Judge Learned Hand, have made similar proposals.¹³⁸ Studies of lay (nonexpert) judges' ability to apply the *Daubert* test reliably support the conclusion judges generally cannot apply the test with a level of

that "the 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)," and so on).

¹³⁵ See, e.g., <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).

¹³⁶ 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").

¹³⁷ James R. Dillon, *Expertise on Trial*, 19 *Colum. Sci. & Tech. L. Rev.* 247, 295-305 (2018).

¹³⁸ See, e.g., 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 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, 260-61 (2000) (proposing "an expert tribunal to decide between competing expert generalisations" put forth by the parties).

competence necessary to satisfy intellectual due process.¹³⁹ Judges, in fact, have, on numerous occasions dating back more than a hundred years, recognized their own inability to adequately grasp and decide scientific issues.¹⁴⁰ Dillon suggests a solution to this problem by proposing a “social epistemological solution,” or “SES,” whereby “scientific adjuncts,” not lay judges, would make conclusions of law and fact on issues involving expert witness testimony.¹⁴¹ Dillon acknowledges that the SES “could be implemented in countless ways.”¹⁴² But, for reasons of political viability as well as to preserve the values embedded in the existing institutional structure of American courts, he proposes a method of implementing the

¹³⁹ James R. Dillon, *Expertise on Trial*, 19 Colum. Sci. & Tech. L. Rev. 247, 272 (2018).

¹⁴⁰ See, e.g., *Commonwealth v. Jacoby*, 170 A.3d 1065, 1093 (Pa. 2017) (discussing the trial court judge’s statement, “That’s my understanding. I’m not a scientist. I could be wrong about that.”); *Laboratory Corporation of America Holdings v. Metabolite Laboratories, Inc.*, 2005 WL 3939545 (U.S.), 62-63 (U.S.,2005) (presenting transcript of U.S. District Court proceedings in which the district judge stated, “. . .and I could be wrong; I’m not a scientist, certainly. . .”); *Parke-Davis & Co. v. H.K. Mulford Co.*, 189 F. 95, 115 (C.C.S.D.N.Y. 1911) (Judge Learned Hand) (“I cannot stop without calling attention to the extraordinary condition of the law which makes it possible for a man without any knowledge of even the rudiments of chemistry to pass upon such questions as these. . . . 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.”); see also the oral argument in *Mass. v. Env’tl. Prot. Agency*, 549 U.S. 497 (2007), a case where the United States Supreme Court was asked to decide whether carbon dioxide was a pollutant that could be regulated under the Clean Air Act. *Id.* at 532 (discussing 42 U.S.C. § 7521(a)(i) (2007)). During that hearing, 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.

MR. MILKEY: Respectfully, Your Honor, it is not the stratosphere. It’s the troposphere.

JUSTICE SCALIA: Troposphere, whatever. **I told you before I’m not a scientist.**

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 at 22-23, *Mass. v. Env’tl. Prot. Agency*, 549 U.S. 497 (2007) (No. 05-1120) (emphasis added), as cited to in Itzhak Kornfeld, *A Tribute to Professor Svitlana Kravchenko*, 15 Or. Rev. Int’l L. 1, 3 n.3 (2013).

¹⁴¹ James R. Dillon, *Expertise on Trial*, 19 Colum. Sci. & Tech. L. Rev. 247, 295-305 (2018).

¹⁴² *Id.* at 295-96.

SES that maintains as much of the existing structure as possible while establishing an epistemologically valid solution to the problem of epistemic competence.¹⁴³

Utilizing 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.”¹⁴⁴ 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.¹⁴⁵ Commentators have also noted the urgency now upon us to integrate science into the law¹⁴⁶—not only because science is increasingly important to our health, wealth, and security,¹⁴⁷ but also because it is under attack.¹⁴⁸

¹⁴³ Id.

¹⁴⁴ 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 sub nom. Parke-Davis & Co v. H K Mulford & Co, 196 F. 496 (2d Cir. 1912).

¹⁴⁵ Parke-Davis & Co. v. H.K. Mulford Co., 189 F. 95, 115 (C.C.S.D.N.Y. 1911).

¹⁴⁶ 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.”); Stephen Breyer, *The Interdependence of Science and Law*, 82 JUDICATURE 24, 26 (1998) (noting that “the law itself increasingly needs access to sound science. . . . as 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”).

¹⁴⁷ See, e.g., Alan I. Marcus & Amy Sue Bix, *The Future is Now: Science and Technology Policy in America Since 1950*, 6 J. HIGH TECH. L. 1 (2006-2007) (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”); Barack Obama, Speech at the National Academy of Sciences (April 27, 2009), <https://obamawhitehouse.archives.gov/blog/2009/04/27/necessity-science> (“Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.”).

¹⁴⁸ The reports of how science is being attacked by the new administration are widespread and troubling. See, e.g., Matthew Nisbet, Ending the Crisis of Complacency in Science, AM. SCIENTIST (Dec. 18, 2016), <https://www.americanscientist.org/article/ending-the-crisis-of-complacency-in-science> (“As newly elected president Donald Trump takes office, the scientific community faces

If the SES were implemented and scientific issues were decided by scientific experts,¹⁴⁹ one result, among many others,¹⁵⁰ would be to ensure a more accurate and just determination of the BTS. It would also improve accuracy and efficiency of courts' handling of other components of the fraud-falsity analysis in such cases. For instance, scientific experts would be more able to accurately identify the knowledge of the scientific community on any given scientific topic, compare that baseline truth with the defendant's representation, and determine truthfulness or falsity of the defendant's representation of a scientific fact.

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, March 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. Department of Interior Censors Press Release on USGS Study, UNION OF CONCERNED SCIENTISTS (May 25, 2017), <http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/department-interior-censors-press-release-usgs-study#.WW-9MOmQzIU>. 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 OF CONCERNED SCIENTISTS (May 25, 2017), <http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/climate-change-language-altered-doe-webpages#.WW-96emQzIU>. In March 2017, EPA Administrator 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 OF CONCERNED SCIENTISTS (March 10, 2017), http://www.ucsusa.org/center-science-and-democracy/attacks-on-science/epa-administrator-scott-pruitt-lies-about-causes#.WW-_cOmQzIU; see also WENDY WAGNER & RENA STEINZOR, *RESCUING SCIENCE FROM POLITICS: REGULATION AND THE DISTORTION OF SCIENTIFIC RESEARCH* (Cambridge Univ. Press 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").

¹⁴⁹ James R. Dillon, *Expertise on Trial*, 19 *Colum. Sci. & Tech. L. Rev.* 247, 295-305 (2018). 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 judgement 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.

¹⁵⁰ *Id.* at 299-300.

III. A FRAMEWORK FOR COURTS APPLYING THE PROPOSED STANDARD

To determine falsity, a question of fact for the jury,¹⁵¹ the BTS should be put side by side with the defendant's representation to see if they say the same thing, i.e., whether each gives the reader the same impression.¹⁵² If so, the defendant's representation was true. If not, it 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
<p>CO₂ 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 CO₂ concentrations are virtually certain to be due to fossil-fuel emissions.¹⁵³</p> <p>[IPCC 2001, NAS 2001]</p>	<p>Scientists are unable to confirm whether humans are causing global warming.¹⁵⁴</p> <p>[March 23, 2000]</p>

¹⁵¹ See, e.g., *Martin v. Sixty-Third & Halsted State Sav. Bank*, 299 Ill. App. 123, 127-28; 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).

¹⁵² 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*, 205 N.Y. 251, 98 N.E. 391 (1912); see also 37 Am. Jur. 2d Fraud and Deceit § 106; 60A N.Y. Jur. 2d Fraud and Deceit § 121.

¹⁵³ NAT'L ACAD. OF SCIENCES COMM. ON THE SCI. OF CLIMATE CHANGE, *Climate Change Science: An Analysis of Some Key Questions* (National Academy Press 2001), at 1 ("Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise."); J.J. MCCARTHY ET AL., EDS., *CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY* (Cambridge Univ. Press 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."); IPCC Third Assessment Report (2001), Full Report, available at

Given that the statement in the left-hand column is true—i.e., expresses what the scientific community knew at the time of the defendant’s statement—was the defendant’s statement, in the right-hand column, 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 the face of it, this appears a straightforward analysis. However, because of the particular challenges courts face when deciding scientific knowledge fraud cases,¹⁵⁵ the trier of fact should take a number of other considerations into account that more precisely focus the analysis on the idiosyncratic difficulties inherent in parsing statements pertaining to scientific knowledge. When comparing the two statements, the trier of fact should ask the following eight questions.¹⁵⁶ A “yes” answer to any one of them should, at a minimum, raise red flags. Depending on the facts of the particular case, a “yes” answer might tip the scale irretrievably in favor of finding that the defendant’s statement was false. The first question below is particularly relevant, as it goes to the heart of the problem: corporations motivated to mislead the public about the science behind their products in order to sell more of them and make more money.

https://www.ipcc.ch/ipccreports/tar/wg1/pdf/WGI_TAR_full_report.pdf, at 7 (“Concentrations of atmospheric greenhouse gases and their radiative forcing have continued to increase as a result of human activities.”) and 10 (“There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.” and “The balance of evidence suggests a discernible human influence on global climate.” and “[I]t is very likely that the 20th century warming has contributed significantly to the observed sea level rise...”) (footnote omitted).

¹⁵⁴ *Unsettled Science*, New York Times, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, *What Exxon Mobil Didn’t Say About Climate Change*, New York Times (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

¹⁵⁵ See *supra* footnote 8, and accompanying text.

¹⁵⁶ A discussion of five questions that somewhat resemble the eight questions included here appeared in Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 *UMKC L. REV.* 295, 349-53 (2017). However, I have here further developed, refined, revised, and expanded each question, as well as added three new questions to the list.

1. Did the defendant have, at the time of the representation, an economic, political, ideological, or religious motive to make a statement inconsistent with the opinion of the scientific community?

If the answer to this question is yes, the court should take that into account when addressing each of the remaining questions, two through eight. For instance, if the fact at issue is the link between CO₂ emissions and global warming, a fossil fuel company or any individual or entity closely affiliated with them would benefit, directly or indirectly, from raising doubt about the link between CO₂ emissions and global warming. Such a defendant would be biased. The court should consider this bias when addressing all remaining questions, as well as when answering the overall question of whether the representation was false.

2. Was 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 1 above are present in the evidentiary support, if any, defendant cited or relied on to make its representation. Representations of scientific knowledge are often made without reference to any support at all. But if support is cited, it 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 to make its statement differ from those relied on to create the BTS? As with Question 1 above, if the court answers "yes" to this question, it should consider this bias when addressing the remaining questions.

3. Does the defendant's statement 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 relied upon. This is a common tactic by those seeking to raise scientific doubt. To answer this question, the court must examine the underlying scientific authority. It is not necessarily required that, to be truthful, the defendant quote word-for-word what is stated in the underlying authority. Instead, the inquiry hinges on whether defendant's statement is consistent with, and a reasonable representation of, the underlying authority. If the defendant's statement would lead the listener to believe something different from what is contained in the

underlying authority, it should be considered misleading and this question should be answered yes.

4. Does the defendant's statement contain any words or phrases that make that statement mean something different than the baseline truth statement?

This question is aimed at words in the defendant's statement that conflict with words in the BTS that describe the same thing but mean 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 CO₂ emissions "likely" cause global warming, and the defendant's statement said CO₂ emissions "possibly" cause global warming, these would be inconsistent terms. This inconsistency would merit a "yes" answer to this question.

Again, the bar here is a low one, because this inquiry is strictly limited to truthfulness or falsity, not knowledge, intent, or any other element. The two statements either say the same thing, or they do not. That is the end of the analysis for falsity.

5. 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 give a different overall impression than the BTS. For instance, if the BTS asserted that "scientists are in virtually unanimous agreement that CO₂ emissions cause global warming," while the defendant's statement asserted that "a number of studies have shown a link between CO₂ emissions and global warming, while other studies have shown no link at all," this would be enough to answer "yes" to this question. Though the defendant's statement does not explicitly contradict the baseline truth statement, it does so implicitly. The impression given by the baseline truth statement is one of a much greater than fifty-fifty certainty that CO₂ emissions cause global warming, whereas the defendant's statement gives the impression that the link is an open question, that the science is unsettled or unclear. 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 CO₂ 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.¹⁵⁷

Fraud law recognizes many technically-true statements as false under the law,¹⁵⁸ and this nuance is particularly important in the realm of scientific knowledge fraud, where defendants routinely make statements that are or are arguably technically true while at the same time achieving the goal of misleading the public.¹⁵⁹ The touchstone inquiry here is whether the reader comes away from the defendant's statement with an accurate understanding of the scientific knowledge held by the scientific community (as stated in the BTS).

Another way an overall misleading impression is often achieved with regard to scientific knowledge is by turning the public's attention to the wrong set of data. For instance, Exxon's president once insisted the science on climate change was uncertain and, as support for this idea, told his audience "[w]e also have to keep in mind that most of the greenhouse effect comes from natural sources, especially water vapor."¹⁶⁰ This statement is both irrelevant (stating a fact unrelated to anthropogenic climate change) and misleading (giving the impression to unsophisticated nonscientists that it controverts the prevailing science on climate change). It also a logical fallacy at least two times over—it qualifies as both a big lie¹⁶¹

¹⁵⁷ *Grove Holding Corp. v. First Wis. Nat. Bank of Sheboygan*, 12 F. Supp. 2d 885, 890 (E.D. Wis. 1998) (holding that a representation can be technically accurate, yet still misleading, for purposes of negligent and intentional misrepresentation claims) (A statement can be technically true but nevertheless "false" for the purposes of a fraud claim); W. PAGE KEETON ET AL., *PROSSER & KEETON ON THE LAW OF TORTS* § 106, at 736-37 (5th ed. 1984) ("[M]isrepresentation may be found in statements which are literally true, but create a false impression in the mind of the hearer.").

¹⁵⁸ See *supra*, note 157.

¹⁵⁹ For instance, suppose someone were to claim: "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* of the sciences—do 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.").

¹⁶⁰ Lee R. Raymond, Energy, Remarks to the World Petroleum Congress: Key to growth and a better environment for Asia-Pacific nations (October 13, 1997), in Beijing, China, <http://www.climatefiles.com/exxonmobil/1997-exxon-lee-raymond-speech-at-world-petroleum-congress/>.

¹⁶¹ Master List of Logical Fallacies, University of Texas at El Paso, <http://utminers.utep.edu/omwilliamson/ENGL1311/fallacies.htm>.

and a red herring¹⁶² fallacy. The audience hearing this statement would be less informed, rather than better informed, for hearing it. Yes, there is a large amount of natural greenhouse gasses in the atmosphere. Without them, the Earth's average surface temperature would be about -15 degrees Celsius (or 5 degrees Fahrenheit).¹⁶³ That is not why Exxon's president said it, however. He was making the false assertion that 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 ground for a “yes” answer to this question.

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 determined conclusively, remains an open question, our goal is the truth, and other similar or related terms or phrases.”¹⁶⁴ By using these terms and phrases, corporate, political, and religious groups are able to simultaneously appear to embrace objective science while in reality only raising doubt about the scientific fact at issue. The presence of terms such as these should tip the scale in favor of a “yes” answer to question three.

6. Is there any inconsistency with 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

¹⁶² Id.

¹⁶³ See *Carbon in the Atmosphere*, EARTHLABS, <http://serc.carleton.edu/eslabs/carbon/3a.html> (last visited May 24, 2018).

¹⁶⁴ Wes Henricksen, *Peddling Ignorance: A New Falsity Standard for Scientific Knowledge Fraud Cases*, 86 UMKC L. REV. 295, 350 (2017).

their products nearly always seek to sow doubt about the underlying science. Accordingly, although this question overlaps somewhat with question three, above, it nevertheless should be addressed separately. 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 the truthful scientific knowledge—i.e., the BTS—on toxicity of lead in the human body was that, “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.” If, in a fraud case against a defendant, the defendant's allegedly false statement stated this very same sentence verbatim, but preceded it with caveat language such as “Some scientists believe...,” this would require a “yes” answer to this question. Adding “some scientists believe” to the statement raises doubt about how confident scientists are about the dangers of even trace amounts of lead in the human body. A reader of the baseline truth statement would come away with a materially different impression than a reader of the defendant's statement. This is precisely what falsity hinges on.¹⁶⁵ In considering this question, courts should keep an eye out for cautionary terms and phrases, such as those discussed above in question three.

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?

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,¹⁶⁶ the fossil fuel industry,¹⁶⁷ the asbestos industry,¹⁶⁸ and many

¹⁶⁵ *United States v. Colton*, 231 F.3d 890, 898 (4th Cir. 2000) (“common-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”) (citing Restatement (Second) of Torts § 550 (1977)); see also W. Page Keeton et al., *Prosser and Keeton on Torts* § 106 (5th ed. 1984) (“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.”).

¹⁶⁶ See, e.g., James A. Henderson, Jr. & Aaron D. Twerski, *Reaching Equilibrium in Tobacco Litigation*, 62 S.C. L. REV. 67, 70-75 (2010); Oreskes & Conway, *MERCHANTS OF DOUBT*, 14, 24, 33.

¹⁶⁷ See, e.g., *supra*, note 3; Oreskes & Conway, *MERCHANTS OF DOUBT*, 1-9.

others who have misrepresented the science behind their dangerous products.¹⁶⁹ 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, that climate change is real and we are causing it, do so because it helps them secure grant funding,¹⁷⁰ or it helps them further their careers,¹⁷¹ or it represents a sheep mentality among scientists.¹⁷² Other ways these criticisms have shown up is by attempting to show that scientists are baffled by their own data, or that they cannot decide whether what they are saying is true is actually true.¹⁷³

Attacks on the integrity, morals, or competency of an opponent has proven as effective, if not more effective, than other kinds of persuasion techniques.¹⁷⁴ It is also a way that scientific knowledge fraud defendants

¹⁶⁸ See Lester Brickman, *On the Theory Class's Theories of Asbestos Litigation: The Disconnect Between Scholarship and Reality*, 31 PEPP. L. REV. 33 (2003); Paul Brodeur, *Outrageous Misconduct* (1985); Elise Gelinias, *Asbestos Fraud Should Lead to Fairness: Why Congress Should Enact the Fairness in Asbestos Injury Resolution Act*, 69 MD. L. REV. 162 (2003).

¹⁶⁹ These include, for instance, pesticides (see Martha McCabe, *Pesticide Law Enforcement: A View from the States*, 4 J. ENVT. L. & LITIG. 35, 51 (1989); William R. Freudenburg, et al., *Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt*, *Sociological Inquiry*, Vol. 78, No. 1 (Feb. 2008), at pp. 11-16), leaded gas (see Jerome O. Nriagu, *Clair Patterson and Robert Kehoe's Paradigm of "Show Me the Data" on Environmental Lead Poisoning*, ENVIRONMENTAL RESEARCH, SECTION A (1998), at pp. 71-77; Jamie Lincoln Kitman, *The Secret History of Lead*, *The Nation* (March 20, 2000), at <https://www.thenation.com/article/secret-history-lead>), and fracking-produced oil and gas (see Kristen van de Biezenbos, *Where Oil Is King*, 85 *Fordham L. Rev.* 1631, 1633-38 (2017)).

¹⁷⁰ See, e.g., Henry Payne, *Global Warming: Follow the Money*, NATIONAL REVIEW (Feb. 25, 2015), <http://www.nationalreview.com/article/414359/global-warming-follow-money-henry-payne> (Publishing in the politically-active conservative magazine, the National Review, 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.").

¹⁷¹ *Id.*

¹⁷² See John Timmer, *If climate scientists are in it for the money, they're doing it wrong*, ARSTECHNICA.COM, <https://arstechnica.com/science/2016/05/if-climate-scientists-push-the-consensus-its-not-for-the-money/>.

¹⁷³ 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 172.

¹⁷⁴ See, e.g., Richard R. Lau and Ivy Brown Rovner, *Negative Campaigning*, 12 *Annu. Rev. Polit. Sci.* 285, 295 (2009) (noting that recent U.S. presidential elections strongly

attempt to avoid directly contradicting the science community's opinion. The effect on the audience of the message is the same. It misrepresents the scientific knowledge because it gives the audience (often, the public at large) a flawed perception of the truth of the matter. It raises doubt about the authorities behind the valid scientific knowledge. Accordingly, if the defendant's statement questions, criticizes, discredits, or belittles the scientific community, the scientific community's opinion, or individuals or organizations within the scientific community, no matter how gently or subtly, the court should answer this question "yes."

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?

This is a very common practice among those aiming to mislead the public about science. One particularly prescient example is the myriad representations made in recent years by the fossil fuel industry (and its allies) that whether humans are causing global warming is an "unsettled" question, or that there are "two sides" to it. In truth, at least 97% of climate scientists are in agreement that global warming is caused by humans, primarily through CO₂ emissions.¹⁷⁵

In fact, a recent study actually clarified that not one single scientist in that other 3% actually represents valid, objective scientific interests.¹⁷⁶ Researchers attempted to replicate the results of those 3% of papers, a common way to test scientific studies.¹⁷⁷ The authors of the study found, "Every 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."¹⁷⁸ Accordingly, any mention of the "two sides" of this scientific debate must, to be truthful, be accompanied by a

support the fact that negative campaigning works, and adding that this "mantra among political practitioners...has reverberated throughout the scholarly literature as well").

¹⁷⁵ John Cook, et al., Quantifying the consensus on anthropogenic global warming in the scientific literature, *Environ. Res. Lett.* 8 (2013), at 1.

¹⁷⁶ See generally Rasmus E. Benestad, et al., Learning from mistakes in climate research, 126 *Theoretical and Applied Climatology* 699 (Nov. 2016); see also Katherine Ellen Foley, Those 3% of scientific papers that deny climate change? A review found them all flawed, *Quartz Media* (Sept. 5, 2017), <https://qz.com/1069298/the-3-of-scientific-papers-that-deny-climate-change-are-all-flawed>.

¹⁷⁷ See supra, note 176.

¹⁷⁸ Katherine Ellen Foley, Those 3% of scientific papers that deny climate change? A review found them all flawed, *Quartz Media* (Sept. 5, 2017), <https://qz.com/1069298/the-3-of-scientific-papers-that-deny-climate-change-are-all-flawed>.

clarification that the overwhelming majority, nearly if not literally one hundred percent, of climate scientists are all on one side of this “debate.” In the climate science community, in fact, it is not a debate at all. It is a settled question, and has been for at least twenty years.¹⁷⁹ This same practice has been carried out by a number of other industries, as well.¹⁸⁰

Others have simply invented a controversy where no valid scientific controversy exists at all. For instance, scientific evidence establishes that the Earth is about 4.5 billion years old.¹⁸¹ There is widespread scientific consensus with regard to this estimate.¹⁸² However, there are groups that reject this view in favor of the so-called “young Earth theory,” which holds that the Earth was created just a few thousand years ago.¹⁸³ Similarly, although it is conclusively established that the Earth is round, in recent years a number of flat-Earthers have broadcast the contrarian view that the Earth is flat.¹⁸⁴ In each of these cases, although there is a conflict over scientific knowledge between a tiny fringe group, on the one hand, and valid, objective science on the other, it is not a conflict within the scientific community.¹⁸⁵ Any statement referencing the young Earth idea or the flat-Earth theory should clearly state that neither one is a valid scientific “theory” at all, but rather non-evidence-based ideas held by a small number of individuals that reject the evidence. Neither idea has any serious scientific evidentiary support. Any statement about them that omits this caveat would be highly misleading.

¹⁷⁹ See, e.g., supra, note 120 and 121.

¹⁸⁰ See supra, note 4.

¹⁸¹ See, e.g., *Age of the Earth*, U.S. GEO. SURVEY (1997), <https://web.archive.org/web/20051223072700/http://pubs.usgs.gov/gip/geotime/age.html>; Dalrymple, G. Brent, *The age of the Earth in the twentieth century: a problem (mostly) solved*, GEO. SOC'Y OF LONDON, 190 (1): 205–221 (2001), www.blc.arizona.edu/courses/schaffer/449/Geology/Dalrymple%20Geol%20Time.pdf.

¹⁸² See supra, note 181; U.S. Geological Survey, *Age of the Earth* (Jul. 9, 2007), <https://pubs.usgs.gov/gip/geotime/age.html>; G. Brent Dalrymple, *The Age of the Earth*, Stanford University Press (1991).

¹⁸³ See, e.g., Matt Young and Taner Edis, eds., *Why Intelligent Design Fails: A Scientific Critique of the New Creationism*, Rutgers University Press (2006), at 1-2.

¹⁸⁴ See, e.g., Cassandra Santiago and AJ Willingham, *Dear doubters, B.o.B wants to prove the Earth is flat once and for all*, CNN (Sep. 26, 2017) (discussing rapper B.o.B’s plan to launch satellites into space to prove the Earth is flat); Mark Shanahan, *Kyrie Irving talks flat Earth yet again*, Boston Globe (Feb. 16, 2018) (discussing basketball player Kyrie Irving’s belief in the flat earth theory).

¹⁸⁵ *What controversy: is a controversy misrepresented or blown out of proportion?*, UNDERSTANDING SCIENCE, http://undsci.berkeley.edu/article/0_0_0/sciencetoolkit_06.

Accordingly, if the defendant's statement overstates, misstates, or misrepresents in any way a controversy that may exist with regard to the fact at issue, including simply making such a controversy up, the court should answer this question "yes."

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

1. Did the defendant have, at the time of the representation, an economic, political, ideological, or religious motive to make a statement inconsistent with the opinion of the scientific community?
2. Was 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 that 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 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. Applying this framework to ExxonMobil's 2000 statement, "scientists are unable to

confirm if humans are causing global warming,”¹⁸⁶ it is clear the answer to at least seven of the eight questions should be “yes.” ExxonMobil is a fossil fuel company, clearly possessing a profit motive to counter the scientific knowledge that its product is causing global warming. This satisfies **question one**. ExxonMobil cites to two scientific authorities: a National Research Council report and a Sargasso Sea Temperature chart, but it is unclear whether either of these is given as direct support for the statement at issue. Accordingly, **question two** is inconclusive. However, **question three** should be answered “yes” because the two authorities ExxonMobil does cite it misrepresented.¹⁸⁷ ExxonMobil’s statement uses a word or phrase (“unable to confirm”) describing the fact at issue (the scientific certainty on global warming) that make the statement mean something different from the baseline truth statement, satisfying **question four**. Further, ExxonMobil’s statement, taken as a whole, presents the fact at issue in a manner inconsistent with the baseline truth statement. The baseline truth statement

¹⁸⁶ Unsettled Science, New York Times, March 23, 2000, available at Geoffrey Supran and Naomi Oreskes, What Exxon Mobil Didn’t Say About Climate Change, New York Times (Aug. 22, 2017), <https://www.nytimes.com/2017/08/22/opinion/exxon-climate-change-.html>.

¹⁸⁷ 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 we 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 them as support for the notion that scientists were still uncertain about whether warming was even happening. See The National Academies of Science, Engineering, and Medicine, Leading Climate Scientists Advise White House on Global Warming, <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10139>; see also National Research Council, Climate Change Science: An Analysis of Some Key Questions (National Academies Press 2001).

The second authority ExxonMobil relies on, the chart in the middle of the page with the heading “Sargasso Sea Temperature,” is even more misleading. ExxonMobil purports the chart shows declining global temperatures, but data underlying does not pertain to global temperature at all. Dr. Lloyd D. Keigwin, who created the chart, was so angry ExxonMobil misrepresented his work he wrote them a letter stating, “no responsible scientist” would use that chart to represent global temperatures, and added, “I believe ExxonMobil has been misleading in its use of the Sargasso Sea data...There’s no way those results bear on the question of human induced climate warming...the sad thing is that a company with the resources of ExxonMobil is exploiting the data for political purposes.” See Cindy Baxter, ExxonMobil, Funder of Climate Change Deniers, Huffington Post (Dec. 1, 2015), https://www.huffingtonpost.com/cindy-baxter/exxonmobil-funder-of-clim_b_8684320.html; see also Letter from Dr. Lloyd D. Keigwin, Senior Scientist, Woods Hole Oceanographic Institute, to Peter Altman, National Coordinator, Campaign ExxonMobil, ExxonMobil Corp. (Dec. 11, 2000), available at <http://web.archive.org/web/20040621170714/http://www.campaignexxonmobil.org/pdf/KeigwinLetter.pdf>.

makes clear CO₂ emissions are likely causing global warming, while ExxonMobil's statement makes this proposition appear uncertain or even unlikely. This satisfied **question five**.

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 baseline truth statement ("CO₂ *is* accumulating in Earth's atmosphere *as a result of human activities*" and "increases in CO₂ concentrations *are virtually certain* to be due to fossil-fuel emissions"), satisfying **question six**. **Question seven** 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. **Question eight** is easily met, however, since ExxonMobil's statement portrays the question of human-caused global warming as unestablished or in controversy, while the truth of the matter was that at the time the statement was made there was a vast consensus on the question, and any contrarian views represented only a tiny minority of scientists, many of them tied to the fossil fuel industry.¹⁸⁸

The framework set out in this Section III 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

¹⁸⁸ See *supra* notes 120 and 121.

behind their products. There are, however, other hurdles faced by plaintiffs in such cases. Imagine, for instance, 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 too 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 an action in fraud, there remain several significant barriers to doing so. The falsity element, however, need not be one of them. Courts should not, as Justice Scalia did, throw up their arms 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. But unless courts are able to apply the elements in cases where the public is misled with regard to scientific knowledge, those spreading the lies will continue to, not only get away with it, but profit hand over fist from it.