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CAN YOU HEAR ME LATER AND BELIEVE ME NOW? BEHAVIORAL LAW AND ECONOMICS OF CHRONIC REPEATED AMBIENT ACOUSTIC POLLUTION CAUSING NOISE-INDUCED (HIDDEN) HEARING LOSS

PETER H. HUANG* AND KELLY J. POORE**

ABSTRACT

This Article analyzes the public health issues of *Noise-Induced Hearing Loss* (“NIHL”) and *Noise-Induced Hidden Hearing Loss* (“NIHHL”) due to *Chronic Repeated Ambient Acoustic Pollution* (“CRAAP”). This Article examines the clinical and empirical medical data about NIHL and NIHHL and its normative implications. It applies behavioral law and economics and information economics to advance legal policies to reduce CRAAP. Finally, this Article advocates changing individual and social attitudes about deafness and hearing loss to raise

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** Ms. Poore was a senior at Pittsford Mendon High School when this Article was completed and is currently a freshman at Binghamton University, State University of New York. Thanks to my co-Author for sharing this opportunity, and to my parents for their support and encouragement.

political awareness and social consciousness about NIHL and NIHHL. One way to change our attitudes is by practicing compassion, empathy, and kindness, including Loving-Kindness Mindfulness (“LKM”) meditation.

KEYWORDS

Noise-Induced Hearing Loss, Noise-Induced Hidden Hearing Loss, Chronic Repeated Ambient Acoustic Pollution, Behavioral Law and Economics, Information Economics, Consciousness-Raising Role of Laws, Aspirational Law, Audism, Ableism, Attitudes, Attitude-Changing Role of Laws, Compassion, Empathy, Kindness, Loving-Kindness Mindfulness Meditation

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I. INTRODUCTION

The catchphrase “*can you hear me now*” is part of the American popular cultural vocabulary due to a series of memorable Verizon Wireless television commercials.¹ These television spots ran from 2002 to

¹ Verizon Wireless, *Test Man Launch*, YOUTUBE (Jan. 26, 2009), <https://www.youtube.com/watch?v=OPwPo-IAQ-E> (showing the first Verizon Wireless television commercial that Jesse Peretz directed in 2002).

2011 featuring actor Paul Marcarelli wearing horn-rimmed glasses and uttering the famous question as Verizon's "Test Man" character.² The unnamed "can you hear me now" character "transcended the commercial and became a punchline for political speeches, editorial cartoons and late-night humor."³ Another part of American collective consciousness is a similar catchphrase, "hear me now and believe me later," from a recurring sketch called "Pumping Up with Hans & Franz" on the popular NBC late night television show *Saturday Night Live*.⁴ Comedians Dana Carvey and Kevin Nealon made famous the memorable fictional characters Hans and Franz, who were Austrian body building brothers and supposedly cousins of Arnold Schwarzenegger, the famous Austrian-American actor, filmmaker, former professional bodybuilder, politician, and the 38th Governor of the golden state of California.⁵

This Article's main title, *Can You Hear Me Later and Believe Me Now?* is our playful concatenation of these well-known catchphrases to memorably introduce a serious and timely public health issue: Chronic Repeated Ambient Acoustic Pollution ("CRAAP") causing Noise-Induced Hearing Loss ("NIHL") and Noise-Induced Hidden Hearing Loss ("NIHHL").⁶ Our introduction of the acronym CRAAP is also our modest way of paying homage to Pace University Elisabeth Haub School of Law Professor Jill Gross,⁷ for her creative, empirical research⁸ to solve a real-

² Theresa Howard, "Can You Hear Me Now?" A Hit, USA TODAY (Feb. 22, 2004), http://usatoday30.usatoday.com/money/advertising/adtrack/2004-02-22-track-verizon_xhtm.

³ Marc Jampole, *Is the "Can You Hear Me?" Guy More Famous Than Spencer Tracy or Christopher Marlow?*, OPEEDGE (June 6, 2016), <https://www.jampole.com/blog/is-the-can-you-hear-me-guy-more-famous-than-spencer-tracy-or-christopher-marlow/>. Ironically, these days, the "can you hear me now" guy is a paid spokesperson for Sprint! Edward C. Baig, *Verizon's "Can You Hear Now" Guy Now at Sprint*, USA TODAY (June 5, 2016), <https://www.usatoday.com/story/tech/columnist/baig/2016/06/05/verizons-can-you-hear-me-now-guy-now-sprint/85458446/>.

⁴ See, e.g., State Farm, *All-time Modern Favorite TV Ad Hans und Franz State Farm Commercial*, YOUTUBE (Oct. 5, 2014), https://www.youtube.com/watch?v=qXYLk_qJm0w (presenting Hans & Franz characters in State Farm Insurance television commercial with NFL quarterback Aaron Rodgers).

⁵ *Id.*

⁶ We did not coin the acronyms NIHL and NIHHL, as they already existed in the medical literature. See, e.g., *Noise-Induced Hearing Loss*, NAT'L INST. ON DEAFNESS OTHER COMMUN DISORDERS (last updated May 31, 2019), <https://www.nidcd.nih.gov/health/noise-induced-hearing-loss>; Wei Wei et al., *RNA-seq Profiling and Co-expression Network Analysis of Long Noncoding RNAs and mRNAs Reveal Novel Pathogenesis of Noise-induced Hidden Hearing Loss*, 434 NEUROSCI. 120, 120 (2020).

⁷ Professor Jill Gross, *Faculty*, PACE UNIV. ELISABETH HAUB SCH. L., <https://law.pace.edu/faculty/jill-gross> (last visited Oct. 20, 2020).

world problem that she noticed about small claims arbitration before the Financial Industry Regulatory Authority (“FINRA”) by patiently and repeatedly “lobbying FINRA to reform its arbitration code governing small claims.”⁹ Professor Gross introduced the acronym CRAPP, which stands for “Credibility, Repetition, Actual Evidence, Publish, and Patience,” as an element of her strategy to reform a particular type of Alternative Dispute Resolution (“ADR”).¹⁰ As Gross notes, the CRAPP method “should work not just for ADR reform, but for any proposed change to public policy, the law, or people’s views.”¹¹ Our Article follows in her footsteps to propose ideas about how to change people’s attitudes and behavior. The first part of this Article’s main title, “*Can You Hear Me Later?*,” emphasizes the cumulative, delayed nature of NIHL and NIHHL over years of CRAAP. The second part of this Article’s main title, “*and Believe Me Now?*,” emphasizes the importance of individuals and society—believing the clinical and empirical medical data *now* and taking cost-justified precautions *now*.

Like the movie title, “*Snakes on A Plane*,”¹² our Article’s subtitle, “*Behavioral Law and Economics of Chronic Repeated Ambient Acoustic Pollution Causing Noise-Induced (Hidden) Hearing Loss*,” is descriptively accurate.¹³ More importantly, the subtitle signals this Article’s interdisciplinary approach, drawing on research in (neoclassical, behavioral, and information) economics; (administrative, case-based, and statutory environmental, property, and tort) law; marketing; neuroscience; and (cognitive and social) psychology. The behavioral sciences, especially behavioral economics,¹⁴ are particularly relevant for the public health issues of NIHL and NIHHL because of a temporal mismatch between

⁸ See generally Jill I. Gross & Barbara Black, *When Perception Changes Reality: An Empirical Study of Investors' Views of the Fairness of Securities Arbitration*, 2008 J. DISP. RESOL. 349 (2008) (conducting an empirical analysis of securities ADR participants’ perceptions of the process).

⁹ Jill Gross, *AT&T Mobility and the Future of Small Claims Arbitration*, 41 SW. L. REV. 47, 71-76 (2012).

¹⁰ Jill Gross, *CRAPP: A Strategy for Dispute Resolution Reform*, INDISPUTABLY (July 25, 2019), <http://indisputably.org/2019/07/crapp-a-strategy-for-dispute-resolution-reform/>.

¹¹ *Id.*

¹² *SNAKES ON A PLANE* (Mutual Film Company 2006).

¹³ Unlike that movie title, our subtitle is neither pithy, nor rolls off the tongue.

¹⁴ Jodi Beggs, *Homer Economicus or Homer Sapiens*, in *HOMER ECONOMICUS: THE SIMPSONS AND ECONOMICS* 161 (Joshua Hall ed., 2014) (providing an introduction to behavioral economics utilizing the animated television program *The Simpsons*).

costs and benefits.¹⁵ NIHL and NIHHL caused by CRAAP have significant health and monetary costs in the future.¹⁶ NIHL and NIHHL caused by CRAAP can be mitigated if individuals and society take cost-justified precautions now.

Most of us are familiar with the experience of having trouble hearing ourselves or our companions at some restaurant meals due to the loud ambient din in that restaurant, often in conjunction with loud background music. According to a recent Zagat State of American Dining Report, 25 percent of restaurant patrons feel that noise is the most irritating aspect of eating out.¹⁷ Similar experiences of commonplace hearing difficulties occur when attending such events as rock concerts or monster truck rallies, dancing in nightclubs, frequenting bars, returning rental cars at airports, and riding snowmobiles. Other potential everyday sources of loud ambient noises include airplanes, blenders, bulldozers, helicopters, jackhammers, lawnmowers, leaf blowers, movie theaters, motorcycles, sirens, snow blowers, snowmakers, subways, trains, waiting music during phone calls, and woodworking tools. A recent study by thirteen-year old Nora Keegan¹⁸ found that “many hand dryers operate at levels far louder than their manufacturers claim and at levels that are clearly dangerous to children’s hearing.”¹⁹ As Keegan observes, kids’ “ears are more sensitive to damage from loud sounds than adult ears.”²⁰ These situations illustrate the prevalence and ubiquitous nature of CRAAP.

¹⁵ See, e.g., Tanit Ganz Sanchez et al., *Tinnitus is Associated with Reduced Sound Level Tolerance in Adolescents with Normal Audiograms and Otoacoustic Emissions*, 6 SCI. RPT. 27109 (2016) (finding that risky listening habits in adolescence led to NIHL that worsens hearing later in life); McMaster Univ., *Evidence of hearing damage in teens prompts researchers’ warning*, AM. ASS’N ADVANCEMENT SCI. (June 6, 2016), https://www.eurekalert.org/pub_releases/2016-06/mu-eoh060316.php.

¹⁶ See, e.g., Penny E. Mohr et al., *The Societal Costs of Severe to Profound Hearing Loss in the United States*, 16 INT’L J. TECH. ASSESSMENT HEALTH CARE 1120 (2000) (estimating the social costs to severe and profound hearing loss over an individual’s life).

¹⁷ Zagat Staff, *The State of American Dining in 2016*, ZAGAT (JAN. 26, 2016), <https://www.zagat.com/b/the-state-of-american-dining-in-2016>.

¹⁸ Susan Bannister, *Can Electric Hand Dryers Hurt Your Hearing?* HAVE YOU HEARD?, NAT’L INST. HEALTH (Sept. 10, 2019), https://www.noisyplanet.nidcd.nih.gov/have-you-heard/can-electric-hand-dryers-hurt-yourhearing?utm_source=NIDCD_NPeblast&utm_medium=email&utm_campaign=FallNwsLtrSept19.

¹⁹ Nora Louise Keegan, *Children Who Say Hand Dryers ‘Hurt My Ears’ Are Correct: A Real-World Study Examining the Loudness of Automated Hand Dryers in Public Places*, PEDIATRICS & CHILD HEALTH 1 (June 17, 2019).

²⁰ *Id.* at 3.

Many Americans experience hearing loss. The first national estimates of hearing loss in the U.S. population based on audiometric data and well-characterized representative sample found that approximately 30 million—or 12.7 percent of Americans 12 years or older—had bilateral hearing loss from 2001-2008. This estimate increased to 48.1 million, or 20.3 percent, when also including individuals with unilateral hearing loss.²¹ In other words, in the population of people who are twelve years and older in the United States, about one in eight has bilateral hearing loss, and about one in five has unilateral hearing loss. The prevalence of hearing loss will only increase as our population ages.²²

This Article is organized as follows. Section II relates the genesis of this Article because of its atypical co-authorship that is the result of a collaboration between a high school senior with Deaf parents and a business chair law school professor. We capitalize the word “Deaf” in front of Kelly’s parents because the uncapitalized word “deaf” refers to an individual who does not hear, while the capitalized word “Deaf” refers to an individual who does not hear and is involved in the cultural Deaf community. Section II also details the clinical and empirical medical data about health consequences, distributional inequities, and monetary costs of NIHL and NIHHL due to exposure to CRAAP. The public health issues raised by NIHL and NIHHL, having resulted from years of being exposed to CRAAP, are myriad and vastly underappreciated by most people today. Section III explains the latest behavioral law and economics research about how to achieve legal, political, and social change and applies that research to analyze alternative legal and policy responses to reduce the prevalence of CRAAP causing NIHL and NIHHL. Section III also advocates changing people’s and society’s attitudes towards deafness and hearing loss. We conclude with a call to action to address tomorrow’s public health problems that will materialize when a generation of elderly Americans, who were exposed to rampant, unregulated CRAAP in their youths, experience NIHL and NIHHL. Our sincere hope is that our readers learn to appreciate how impactful NIHL and NIHHL due to CRAAP are to the lives of those affected, their families, their friends, and society-at-large. One way towards a more inclusive society is to foster caring, compassion, empathy, and kindness, including through the practice of Loving-Kindness Mindfulness (“LKM”) meditation.

²¹ Frank R. Lin et al., *Hearing Loss Prevalence in the United States*, 171 ARCHIVES INTERNAL MED. 1851, 1851-52 (2011).

²² *Id.* at 1851.

II. NOISE-INDUCED HEARING LOSS (NIHL) AND NOISE-INDUCED HIDDEN HEARING LOSS (NIHHL)

Retired Los Angeles doctor and noise activist Daniel Fink recently presented a paper, *Disability Rights Aspects of Ambient Noise for People with Auditory Disorders Under the Americans with Disabilities Act*.²³ Fink's paper compellingly argues that loud restaurant ambient noise violates Title III of the Americans with Disabilities Act ("ADA") of 1990: Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities.²⁴ The most frequent concern about restaurants in the Washington, D.C. area is the din of loud ambient noise, as opposed to the bad food, rude, poor or slow service, high prices, small portions, or tipping etiquette.²⁵ *Washington Post* food critic, Tom Sietsema, even provides readers with decibel count information in his restaurant reviews in an attempt to shame restaurants into addressing the ambient noise pollution prevalent in those restaurants.²⁶

Noisy restaurants have unfortunately become the norm, and in fact, the "progressive volume increase caused by the reverberation of sound inside an enclosed space has a name: 'the café effect.'"²⁷ CRAAP causes universal public health issues, which are not limited to the United States. Svante Borjesson, the director general of the Oír es Clave Foundation, an organization that works with people with hearing problems, notes that "Spain is the second loudest country in the world after Japan. . . . Noise

²³ Daniel Fink, *Disability Rights Aspects of Ambient Noise for People with Auditory Disorders Under the Americans with Disabilities Act*, 31 PROC. MEETINGS ACOUSTICS 015001 (Dec. 28, 2017), <https://asa.scitation.org/doi/abs/10.1121/2.0000657>; see also Joyce Cohen, *For Those with Hearing Impairments, Restaurant Noise Isn't Just an Irritation. It's Discrimination*, WASH. POST (June 17, 2019), https://www.washingtonpost.com/lifestyle/food/for-those-with-hearing-impairments-restaurant-noise-isnt-just-an-irritation-its-discrimination/2019/06/14/0223d722-8def-11e9-adf3-f70f78c156e8_storyhtml; Debra Cassens Weiss, *Are Loud Restaurants an ADA Violation for People with Hearing Impairment?* ABA J. (June 19, 2019, 9:18 AM), <http://www.abajournal.com/news/article/are-loud-restaurants-an-ada-violation-for-people-with-hearing-impairment>.

²⁴ 42 U.S.C. §§ 12181–12189 (2018).

²⁵ Tom Sietsema, *No Appetite for Noise*, WASH. POST (Apr. 6, 2008), https://www.washingtonpost.com/wp-dyn/content/article/2008/04/01/AR2008040102210_pf.html.

²⁶ Jeremy Hobson, *Are Restaurants Getting Too Loud?*, WBUR: HERE & NOW (JAN. 24, 2019), <https://www.wbur.org/hereandnow/2019/01/24/restaurants-getting-too-loud>; Tom Sietsema, *Revealing Raucous Restaurants*, WASH. POST (Apr. 6, 2008).

²⁷ Raquel Piñeiro, *Turning Down the Volume in Spain's Noisy Bars and Restaurants*, EL PAIS (Nov. 24, 2015), https://english.elpais.com/elpais/2015/11/19/inenglish/1447942855_367793.html.

and acoustic pollution have an effect on our everyday life and negatively impacts everyone, not just those with hearing problems.”²⁸ Our Article advances the view that CRAAP causes many presently underappreciated future public health problems including NIHL and NIHHL for many currently hearing people. The remainder of this Section discusses the genesis of this Article and analyzes the clinical and empirical medical data about NIHL and NIHHL in terms of its normative implications.

A. ARTICLE GENESIS

This Article results from conversations between the two co-Authors regarding our shared interests about deafness and hearing loss. Kelly is hearing and has a Deaf father and a Deaf mother (with bilateral cochlear implants). Kelly identifies as a former KODA, and a recent CODA. The acronyms KODA and CODA stand for Kids of d/Deaf²⁹ Adults and Children of d/Deaf Adults,³⁰ with the only difference between KODAs and CODAs being their age.³¹ KODAs are hearing children under eighteen years old of d/Deaf parents; CODAs are hearing adult children of d/Deaf parents.

Millie Brother is a CODA who coined the term to refer to hearing offspring of Deaf parent(s).³² In 1983, Brother founded CODA, International, a non-profit organization,³³ based on her graduate school research at Gallaudet University³⁴ (a liberal arts university in Washington,

²⁸ *Id.*

²⁹ Ahmed Khalifa, *What’s the Difference Between Deaf with Capital ‘D’ and deaf with small ‘d’?* HEAR ME OUT! (Dec. 29, 2018), <https://hearmeoutcc.com/capital-d-small-d-deaf/> (explaining the difference between Deaf and deaf in terms of identity and inclusion with the Deaf community).

³⁰ *Children of Deaf Adults, Inc.*, <https://www.coda-international.org/> (last visited Oct. 20, 2020).

³¹ Jamie Berke, *KODA Organization for Kids With Deaf Parents*, VERYWELL HEALTH (Mar. 19, 2018), <https://www.verywellhealth.com/kids-of-deaf-adults-1046743>.

³² Millie Brother, Founder of CODA, *Messages from our Founder and President*, CODA-INT’L, <https://www.coda-international.org/milliebrother> (last visited Oct. 20, 2020).

³³ *Id.*

³⁴ *Mission and Goals*, GALLAUDET UNIV., <https://www.gallaudet.edu/academic-catalog/about-gallaudet/mission-and-goals> (last visited Oct. 20, 2020) (explaining that Gallaudet University “federally chartered in 1864, is a bilingual, diverse, multicultural institution of higher education that ensures the intellectual and professional advancement of deaf and hard of hearing individuals through American Sign Language and English”).

D.C. with a wide range of majors, including Deaf Studies). Deaf U,³⁵ a Netflix documentary series of eight episodes (each about twenty minutes), follows a close-knit group of students coming-of-age at Gallaudet and illustrates the diversity of Gallaudet's students (half of which are BIPOC).³⁶ Inclusive Deaf Studies strive for “a more expansive, nuanced, and interdisciplinary approach that encompasses the many ways deaf people live” and “encompass[es] diverse deaf people—diverse in communication, culture, race, and ethnicity.”³⁷

Kelly attended Camp Mark Seven, the first KODA camp established in 1981, as a camper in the summer of 2018 and a Counselor-In-Training in the summer of 2019. KODA Camp at Camp Mark Seven is a place where KODAs can meet other similarly situated kids from all over the world, providing them with a better sense of belonging that they might not feel in their everyday “hearing world.”³⁸ At Camp Mark Seven, Kelly developed many friendships with her fellow KODA campers and counselors. She has many fond memories of the times that she spent immersed in the culture of the Deaf community. Like most CODAs, she identifies as being a member of two cultures, continually navigating both the Deaf and hearing worlds; comfortable in both, yet not fully part of either. Kelly's CODA experiences provide a third perspective: balancing her Deaf and hearing viewpoints. Kelly's experiences as a teenage camper and counselor of a summer KODA camp have been transformative. Kelly's positive memories from Camp Mark Seven have changed Kelly through connection (to fellow CODAs); inclusion (from being more involved with the Deaf community and enhancing her ability to communicate with Deaf individuals); insight (about being a CODA); and pride (in herself, her parents, and fellow CODAs).³⁹

³⁵ Matt Blitz, *New Netflix Documentary Series 'Deaf U' Stars Gallaudet University Students*, DCIST (July 24, 2020), <https://dcist.com/story/20/07/24/dc-gallaudet-university-deaf-students-netflix-series-show/>.

³⁶ Kristen Lopez, *Netflix's 'Deaf U' Wants to Break Boundaries and Showcase Deaf Culture*, INDIEWIRE (Aug. 4, 2020), <https://www.indiewire.com/2020/08/deaf-u-deaf-culture-on-display-netflix-series-1234577933/>.

³⁷ Jane K. Fernandes & Shirley Shultz Myers, *Inclusive Deaf Studies: Barriers and Pathways*, 15 J. DEAF STUD. & DEAF EDUC. 17, 17 (2009); see also Shirley Shultz Myers & Jane K. Fernandes, *Deaf Studies: A Critique of the Predominant U.S. Theoretical Direction*, 15 J. DEAF STUD. & DEAF EDUC. 30 (2009).

³⁸ *About Camp Mark Seven*, CAMP MARK SEVEN, <http://campmark7.org/> (last visited Oct. 20, 2020).

³⁹ CHIP HEATH & DEAN HEATH, THE POWER OF MOMENTS: WHY CERTAIN EXPERIENCES HAVE EXTRAORDINARY IMPACT (2017).

The other co-Author is a professor and the inaugural DeMuth Chair of business law at the University of Colorado, Boulder.⁴⁰ Peter is hearing and has a different set of bicultural experiences, namely that of being an American Born Chinese (“ABC”). Peter understands Mandarin fluently and speaks a “country, hillbilly” dialect version of Mandarin that his maternal grandma spoke and taught him while co-raising him. Peter has written much elsewhere about his unique experiences as an ABC who began his undergraduate degree at Princeton University at age fourteen and his graduate degree at Harvard University in applied mathematics at age seventeen.⁴¹

Since his early childhood, Peter frequently experiences anxiety, depression, insomnia, and mood swings.⁴² He has been clinically diagnosed with Generalized Anxiety Disorder (“GAD”), Obsessive Compulsive Disorder (“OCD”), and Circadian Rhythm Sleep Disorder, Delayed Sleep Phase Type. Peter has written extensively about how practicing mindfulness helps him to be more emotionally intelligent, achieve sustainable happiness, and manage his GAD and OCD by giving himself a time-out, slowing him down, and effectively calming himself down.⁴³

Peter believes that it is a societal tragedy that many people neither speak the languages of mathematics,⁴⁴ nor feel comfortable with the cultures of mathematics,⁴⁵ including some law students⁴⁶ and lawyers.⁴⁷ Many refuse to learn how to become conversant in the languages of

⁴⁰ Peter H. Huang, *Faculty: Professor and DeMuth Chair of Business Law*, UNIV. COLO., BOULDER L. SCH., <https://lawweb.colorado.edu/profiles/profile.jsp?id=456> (last visited Oct. 20, 2020).

⁴¹ Peter H. Huang, *Tiger Cub Strikes Back: Memoirs of an Ex-Child Prodigy About Legal Education and Parenting*, 1 BRIT. J. AM. LEGAL STUD. 297 (2012).

⁴² KATY PERRY, *Hot n Cold*, on ONE OF THE BOYS (Capitol 2008).

⁴³ Peter H. Huang, *Adventures in Higher Education, Happiness, and Mindfulness*, 7 BRIT. J. AM. LEGAL STUD. 425 (2018); see also TAYLOR SWIFT, *You Need to Calm Down*, on LOVER (Republic Records 2019).

⁴⁴ See, e.g., BEN ORLIN, *MATH WITH BAD DRAWINGS: ILLUMINATING THE IDEAS THAT SHAPE OUR REALITY* (2018); see also Ben Orlin, *Math with Bad Drawings*, <https://mathwithbaddrawings.com/> (last visited Oct. 20, 2020).

⁴⁵ See, e.g., EUGENIA CHENG, *HOW TO BAKE PI: AN EDIBLE EXPLORATION OF THE MATHEMATICS OF MATHEMATICS* (2016); KEVIN HOUSTON, *HOW TO THINK LIKE A MATHEMATICIAN: A COMPANION TO UNDERGRADUATE MATHEMATICS* (2009).

⁴⁶ Arden Rowell & Jessica Bregant, *Numeracy and Legal Decision Making*, 46 ARIZ. ST. L.J. 191 (2014).

⁴⁷ Lisa Milot, *Illuminating Innumeracy*, 63 CASE W. L. REV. 769 (2013).

mathematics,⁴⁸ or become familiar with the cultures of mathematics.⁴⁹ Peter often laments about our societal indifference towards, and perpetual misunderstanding about numeracy, let alone mathematics. All three of the main languages of business,⁵⁰ namely accounting, economics, and finance, require at least numeracy and often mathematical fluency. Peter has written elsewhere about being a part of the cultures of an undergraduate mathematics major, mathematics economics graduate student, economics department faculty, finance department faculty, and law school faculty.⁵¹ Peter is engaged in research applying behavioral economics,⁵² happiness,⁵³ and mindfulness⁵⁴ to study law,⁵⁵ law students,⁵⁶ lawyers,⁵⁷ and society.⁵⁸ Although hearing, Peter appreciates the bicultural duality that is part of being a KODA/CODA. Peter has taken several courses in (and unfortunately forgotten a lot of) American Sign Language (“ASL”). Peter also remembers taking in seventh grade a required academic year-long course titled *General Language*, which included Latin, Spanish, French, German, Russian, and Esperanto (a constructed language introduced by Dr. L. L. Zamenhof to allow “people with different native languages to communicate as equals”).⁵⁹ The *General Language* course was intended to

⁴⁸ See, e.g., JOHN ALLEN PAULOS, *INNUMERACY: MATHEMATICAL ILLITERACY AND ITS CONSEQUENCES* (2001).

⁴⁹ See, e.g., JO BOALER, *MATHEMATICAL MINDSETS: UNLEASHING STUDENTS’ POTENTIAL THROUGH CREATIVE MATH, INSPIRING MESSAGES AND INNOVATIVE TEACHINGS* (2015).

⁵⁰ Corporate Finance Institute™, *The Language of Business – Do You Speak It?* <https://corporatefinanceinstitute.com/resources/knowledge/other/accounting-language-of-business/>.

⁵¹ Huang, *supra* note 41.

⁵² See, e.g., Peter H. Huang, *Achieving American Retirement Prosperity by Changing Americans? Thinking About Retirement*, 22 STAN. J. BUS. L. & FIN. 189 (2017).

⁵³ See, e.g., Rick Swedloff & Peter H. Huang, *Tort Damages and the New Science of Happiness*, 85 IND. L.J. 553 (2010).

⁵⁴ See, e.g., Peter H. Huang, *Can Practicing Mindfulness Improve Lawyer Decision-Making, Ethics, and Leadership?* 55 HOUSTON L. REV. 63 (2017).

⁵⁵ See, e.g., Peter H. Huang, *Emotional Adaptation and Lawsuit Settlements*, 108 COLUM. L. REV. SIDEBAR 50 (2008).

⁵⁶ See, e.g., Peter H. Huang & Corie Rosen Felder, *The Zombie Lawyer Apocalypse*, 42 PEPP. L. REV. 727 (2015).

⁵⁷ See, e.g., Peter H. Huang & Rick Swedloff, *Authentic Happiness and Meaning at Law Firms*, 58 SYRACUSE L. REV. 335 (2008).

⁵⁸ See, e.g., Peter H. Huang, *Boost: Improving Mindfulness, Thinking, and Diversity*, 10 WM. & MARY BUS. L. REV. 139 (2018).

⁵⁹ *About Esperanto*, ESPERANTO-USA, <https://www.esperanto-usa.org/esperanto/en> (last visited Oct. 20, 2020).

provide its students with cultural and linguistic proficiency to permit command and ease of communication.

Peter recently rededicated himself to learning ASL through SignSchool, a free, comprehensive, video-based, and fun online platform including a dictionary and learning games, both searchable by sign, topic, and handshape.⁶⁰ SignSchool can be accessed on desktops or cellphones.⁶¹ SignSchool Also offers learners the option to receive daily emails with a sign of the day from Mondays through Saturdays and every Sunday weekly emails with a review of that week's signs of the day.⁶² There are beginner, intermediate, and advanced resources, including conversational ASL by topic and grammar (and fun fingerspelling games).⁶³ SignSchool utilizes a modular curriculum of video lessons and interactive exercises, aiming to provide hearing individuals with the ASL skills necessary to communicate more effectively with the Deaf community.⁶⁴ The co-founders of SignSchool are a d/Deaf person and two hearing people. When Evan Corden and Jack Hudson first met their Princeton University classmate Colin Lualdi, Colin tapped his ear to indicate he is d/Deaf before continuing to communicate by writing messages on a pad of paper.⁶⁵ Evan, Jack, and Colin teamed up to create SignSchool in March 2014 because they became frustrated with the impersonal nature and inefficiency of communicating via written messages.⁶⁶

The co-Authors believe that miscommunication often results in avoidable conflicts and that genuine communication has the potential to positively and sustainably resolve conflicts. Miscommunication is easy, while genuine communication requires attention, desire, effort, and sometimes the ability to forget. Supreme Court Justice Ruth Bader Ginsburg recounted this advice that she received on her wedding date from her mother-in-law, “[i]n every good marriage, it helps sometimes to be a little deaf.”⁶⁷ Positive psychologist Mihaly Csikszentmihalyi is well-

⁶⁰ *Learn American Sign Language*, SIGNSCHOOL, <http://www.signschool.com/> (last visited Oct. 20, 2020).

⁶¹ *Id.*

⁶² *Id.*

⁶³ *Id.*

⁶⁴ SignSchool, *SignSchool Promotional Video*, YOUTUBE (Aug. 28, 2014), <https://youtu.be/IVSdU46HvG4>.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ Kathleen J. Sullivan, *U.S. Supreme Court Justice Ruth Bader Ginsburg Talks About A Meaningful Life*, STAN. NEWS. (Feb. 6, 2017), <https://news.stanford.edu/2017/02/06/supreme-court-associate-justice-ginsburg-talks-meaningful-life/>.

known for his seminal notion of flow—a mental state of being so completely absorbed that nothing else seems to matter (colloquially expressed as “being in a groove” or “being in the zone”).⁶⁸ In his famous book introducing his concept, *Flow: The Psychology of Optimal Experience*, Csikszentmihalyi stated that “[t]he main function of conversation is not to get things accomplished, but to improve the quality of experience.”⁶⁹ Such a perspective about conversation emphasizes its potential impacts for improving the subjective experience among those involved in conversation. This view of conversation differs from a more traditional, transactional view held by economists and lawyers, which emphasizes how conversation facilitates the communication and exchange of information relevant to decisionmaking.⁷⁰ Csikszentmihalyi’s attitude towards communication underlies the idea that positive communication matters because it can improve our lives by inspiring and supporting our hopes, dreams, and personal and professional relationships.⁷¹

While a Counselor-In-Training at Camp Mark Seven in the summer of 2019, Kelly met and was inspired by ASL performer Matt Maxey,⁷² who is an African American “born with a severely profound hearing loss, and . . . attended the prestigious Gallaudet University in Washington, D.C., where he began to learn sign language in an attempt to balance the struggle of developing his identity as a double minority in terms of ability and race.”⁷³ Maxey’s mom and grandmother realized that Maxey at a very young age could not hear a vacuum cleaner that was on behind Maxey’s back.⁷⁴ A physician diagnosed Maxey’s profound hearing loss and Maxey was outfitted with hearing aids when he was only two years old.⁷⁵ Maxey became interested in music because he could hear music better than speech.⁷⁶ He became a social media sensation after videos that he posted

⁶⁸ MIHALY CSIKSZENTMIHALYI, *FLOW: THE PSYCHOLOGY OF OPTIMAL EXPERIENCE* (2008).

⁶⁹ *Id.* at 129.

⁷⁰ Tali Sharot & Cass R. Sunstein, *How People Decide What They Want to Know*, 4 NATURE HUM. BEHAV. 14 (2020).

⁷¹ JULIEN C. MIRIVEL, *THE ART OF POSITIVE COMMUNICATION: THEORY AND PRACTICE* (2014).

⁷² *Meet Matt Maxey: The Man Bringing Music to the Deaf Community*, DEAFINITELY DOPE <https://www.deafinitelydope.org/> (last visited Oct. 20, 2020).

⁷³ *Matt Maxey*, DEAFintely, DEAFINITELY DOPE, <https://www.deafinitelydope.org/team-member/matt-maxey/> (last visited Oct. 20, 2020).

⁷⁴ Ryan Bergeron, *DEAFintely Dope: Handing Rap Music to the Deaf*, CNN (Aug. 17, 2018, 11:52 AM), <https://www.cnn.com/2018/08/17/health/turning-points-deafinitely-dope-chance-the-rapper-matt-maxey/indexhtml>.

⁷⁵ Maxey, *supra* note 73.

⁷⁶ Bergeron, *supra* note 74.

of himself signing musicians went viral in the deaf and hearing communities.⁷⁷ In 2014, he founded *DEAFinitely Dope*,

an idea based on providing support to those that felt marginalized and ignored by mainstream America. DEAFinitely Dope started as a brand, and slowly blossomed into a movement, attracting the likes of educational institutions nationwide, CNN, ESPN The Undeclared, GQ, Cole Haan, ABC news, Chance The Rapper, MTV Video Music Awards, and countless more! With both hearing and deaf partnerships in play, Matt strives to continue to break barriers and defy the norms with a fresh perspective on interaction, inclusion, accessibility and equality, as awareness continues to grow!⁷⁸

Maxey “is working to unite hearing and deaf communities through music.”⁷⁹ His organization “visits schools, does motivational speaking and even held an ASL music camp.”⁸⁰ Music and dance are engaging, entertaining, powerful, universal, and visceral forms of human communication. For example, the American rapper Logic had a popular hit song with vocals from Canadian and American singer-songwriters Alessia Cara and Khalid, titled *1-800-273-8255*,⁸¹ which is also the phone number of the toll-free, 24/7, confidential hotline, National Suicide Prevention Lifeline: 1-800-273-TALK.⁸² On the release date of the song, April 28, 2017, the National Suicide Prevention Lifeline had its second-highest call volume, with calls up approximately 33 percent from a year before that.⁸³ The National Suicide Prevention Lifeline experienced a 50 percent increase in call volume after Logic performed his song *1-800-273-8255* on August 27, 2017 at the Forum in Inglewood, California during the

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ Maya A. Jones, *ASL Interpreter Matt Maxey Went from Viral Video Sensation to Working with Chance The Rapper*, THE UNDEFEATED (July 4, 2017), <https://theundefeated.com/features/asl-interpreter-matt-maxey-chance-the-rapper/>.

⁸⁰ Bergeron, *supra* note 74.

⁸¹ LOGIC, *1-800-273-8255*, on EVERYBODY (Visionary 2017).

⁸² NATIONAL SUICIDE PREVENTION LIFELINE, <https://suicidepreventionlifeline.org/> (last visited Oct. 20, 2020).

⁸³ Ben Tinker, *Calls to Suicide Prevention Hotline Spike After VMA Performance*, CNN (Aug. 27, 2017, 5:06 PM), <http://www.cnn.com/2017/08/25/health/logic-suicide-hotline-vm-18002738255/indexhtml>.

MTV Video Music Awards.⁸⁴ Recently, the Federal Communications Commission began the formal months-long rulemaking “process of designating 988 as a new, nationwide, 3-digit number for a suicide prevention and mental health crisis hotline.”⁸⁵ Dwight Holton who is the CEO of *Lines for Life*, a suicide prevention nonprofit, said, “[t]he three-digit number is really going to be a breakthrough in terms of reaching people in a crisis.”⁸⁶

Maxey has brought music to many deaf individuals through a visually stimulating style of interpreting musicians’ songs that “is not standard word-for-word typical ASL.”⁸⁷ He has performed sign language performed alongside rap artists including D.R.A.M. and Chance the Rapper.⁸⁸ An article about Maxey concludes: “It brings to mind a profound philosophical question raised by OutKast, ‘What’s cooler than being cool?’ What about being more aware and understanding of others’ life experiences? What’s cooler than that?”⁸⁹

The importance of developing and cultivating our innate abilities to empathize⁹⁰ with our fellow humans is the foundation of the social and political philosophy that togetherness is more powerful and productive than divisiveness. This concept is represented wordlessly and succinctly by just these three mathematical symbols: + > ÷. Kelly and Peter are inspired by Maxey and DEAFinitely Dope’s work to raise awareness and consciousness about deafness and hearing loss and by so doing, to unite deaf and hearing communities⁹¹ “through music and signing.”⁹²

⁸⁴ *Id.*

⁸⁵ *FCC Proposes Designating 988 As National Suicide Prevention & Mental Health Hotline Number*, FCC NEWS (Dec. 12, 2019), <https://docs.fcc.gov/public/attachments/DOC-361337A1.pdf>.

⁸⁶ Joel Shannon, *Suicide prevention hotline to have three-digit number for mental health emergencies: 988*, USA TODAY (last updated Dec. 13, 2019, 11:27 AM), <https://www.usatoday.com/story/news/nation/2019/12/12/988-suicide-prevention-number-fcc-approval/4411812002/>.

⁸⁷ Bergeron, *supra* note 74.

⁸⁸ See, e.g., Ashley Fetters, *Meet the Hands (and the Man) that Brings Chance the Rapper to the Deaf*, GQ (Sept. 19, 2017), <https://www.gq.com/story/chance-the-rapper-sign-language-deafinitely-dope>; Zoe Zorka, *DEAFinitely Dope Brings Hip-Hop to the Deaf Community*, THE SOURCE (Apr. 17, 2019), <https://thesource.com/2019/04/17/deafinitely-dope-brings-hip-hop-to-the-deaf-community/>.

⁸⁹ Bergeron, *supra* note 74. OutKast is an American hip hop duo, made up of the rappers André “André 3000” Benjamin, formerly known as Dré, and Antwan “Big Boi” Patton. See *OutKast*, FACEBOOK, <https://www.facebook.com/outkast/> (last visited Oct. 20, 2020).

⁹⁰ The RSA, *Brené Brown on Empathy*, YOUTUBE (Dec. 10, 2013), <https://www.youtube.com/watch?v=1Evwgu369Jw>.

⁹¹ Bergeron, *supra* note 74.

Grammy-winning artist Chancelor Jonathan Bennett, professionally known as Chance the Rapper, is an American rapper, singer, songwriter, actor and activist, who hired Maxey to serve as a performer for his *Be Encouraged Tour*.⁹³ An entertaining and moving YouTube video shows Matt Maxey and his partner, Kelly Kurdi,⁹⁴ teaching Chance how to sign Chance's deeply personal and moving song, *Blessings (Reprise)* in ASL.⁹⁵ Near the end of this video, Chance says, “[w]ow, all right, can I just say, they should definitely be teaching ASL in American public schools.”⁹⁶ We agree, and certainly believe that if a population has a significant proportion of deaf people, then local public schools should—at the very least—offer, if not perhaps mandate, ASL as a language course on par with similar courses.

Another empowering and heartening video,⁹⁷ which went viral with millions of views, depicts nine-year-old, deaf Savannah Dahan's interpretation in ASL of Carrie Underwood's uplifting song, *The Champion*.⁹⁸ Carrie reached out on Twitter to meet Savannah and posted a backstage performance with Savannah on Carrie's Instagram page.⁹⁹ Savannah can hear at a moderate level when using hearing aids and hopes to “‘show the world how beautiful ASL is’ and, because of her love of marine animals, to spread awareness of conservation.”¹⁰⁰

Both of the co-Authors are keenly aware of the tensions which often arise from belonging to and navigating two cultures. These four examples illustrate the diversity and power of cultural and social norms. The first example is due to Northwestern Pritzker School of Law Harris H. Agnew

⁹² Carl Lamarre, *Watch Chance the Rapper Learn 'Blessings (Reprise)' in Sign Language*, BILLBOARD (Sept. 8, 2017), <https://www.billboard.com/articles/columns/hip-hop/7957765/chance-the-rapper-sign-language-blessings-reprise>.

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ DEAFinitely Dope, *DEAFinitely Dope Teaching Chance The Rapper How to Sign Blessings (Reprise) ASL*, YOUTUBE (Sept. 22, 2017), <https://www.youtube.com/watch?v=2oZcZNQnyhk>.

⁹⁶ *Id.*

⁹⁷ Savvy ASL, “*The Champion*” by Carrie Underwood ft. Ludacris (ASL Cover), YOUTUBE (Mar. 4, 2019), <https://www.youtube.com/watch?v=IXf7I7iwJJI>.

⁹⁸ CARRIE UNDERWOOD FEATURING LUDACRIS, *The Champion*, on CRY PRETTY (Capitol Nashville 2018).

⁹⁹ Amy Haneline, *Carrie Underwood Upstaged by Girl's Emotional Sign Language, and It's the Best Ever*, USA TODAY (last updated Oct. 7, 2019), <https://www.usatoday.com/story/life/parenting/2019/10/07/carrie-underwood-meets-deaf-girl-sign-language-song-interpretation-viral/3896231002/>.

¹⁰⁰ *Id.*

Visiting Professor of Dispute Resolution Len Riskin.¹⁰¹ Riskin relates a couple of amusing examples of what he calls the Rule of Threes, under which, “[a]ny offer worth making—or any refusal meant sincerely—must be extended three times, unless it is accepted first.”¹⁰² His examples include: offering to pick up the joint check at breakfast when the other party insists on splitting it; offering relatives and friends “a little something to eat,” despite their alleged excuses for not eating; and “fighting” with friends and relatives over who pays a restaurant bill. Although such rituals also exist in many cultures, such as the Chinese culture, they are not universal among all human cultures.

The second example is the central story of the insightful, poignant, and uplifting film, *The Farewell*,¹⁰³ in which a family lies to their matriarch in China about her impending death from stage IV lung cancer and instead hastily schedules an extravagant shotgun wedding of the matriarch’s grandson as an excuse to bring together far-flung family members one final time before the matriarch passes.¹⁰⁴ Keeping “information from cancer patients is a common practice in many Asian countries, including China, Japan, and Singapore, and in some Western countries, such as Spain, Greece, and Italy.”¹⁰⁵ Withholding a person’s health information, however, seems fundamentally wrong to some Americans whose society and culture values personal autonomy, rugged individualism, self-determination, and self-reliance. Human denial about death may be a self-defense or survival mechanism.¹⁰⁶ Discomfort about, superstitions concerning, and even thinking about death can result in problematic individual and social behavior, such as forgoing estate planning or failing to save and invest for retirement.¹⁰⁷

¹⁰¹ Leonard L. Riskin, *Harris H. Agnew Visiting Professor of Dispute Resolution*, NW. PRITZKER SCH. L.,

<http://www.law.northwestern.edu/faculty/profiles/LeonardRiskin/> (last visited Oct. 20, 2020).

¹⁰² Leonard L. Riskin, *Obey the Rule: Just Say No, No, No*, CHI. TRIB., June 26, 1992, at 19.

¹⁰³ THE FAREWELL (Big Beach 2019).

¹⁰⁴ Patrick Ryan, *Would You Lie to Your Loved One About Dying? Awkwafina’s ‘The Farewell’ Raises Complex Questions*, USA TODAY (Sept. 16, 2019, 2:42 PM), <https://www.usatoday.com/story/entertainment/movies/2019/09/16/the-farewell-dilemma-would-you-tell-loved-one-theyre-dying/2115192001/>.

¹⁰⁵ Yi Hu Ni & Terje Alraek, *What Circumstances Lead to Non-Disclosure of Cancer-Related Information in China? A Qualitative Study*, 25 SUPPORT CARE CANCER 811, 811 (2017).

¹⁰⁶ Lawrence R. Samuel, *The Psychology of Death*, PSYCHOLOGY TODAY (Mar. 8, 2019), <https://www.psychologytoday.com/us/blog/psychology-yesterday/201903/the-psychology-death>.

¹⁰⁷ Huang, *supra* note 52.

The third example is the story told in these lyrics of the Camila Cabello song,¹⁰⁸ *Cry for Me*,¹⁰⁹ about social norms of wishing happiness to an ex-romantic partner upon breaking up:

Yeah, and you look so happy walking down the street,
 don't you babe
 Did you forget, you said that in this lifetime you could
 never get over me
 Are you over me? (Uh)

When I said, "I hope you're happy" didn't mean it
 Never thought you'd be so good at moving on
 When I'm lying wide awake you're probably sleeping
 And maybe what I'm thinking is wrong

I want you to cry for me, cry for me
 Say you'd d-d-die for me, die for me
 And if you can't then maybe lie for me, lie for me
 'Cause you hold me when I'm dreaming
 And it's time you know the feeling
 So cry for me.¹¹⁰

The last example is a story about Mark, one of Peter's colleagues and another chaired business law professor who was also a Fulbright scholar and visiting professor of law at Hokkaido University in Sapporo, Japan. Mark asked one of his Japanese host academics if the academic had ever visited New York City. The Japanese professor did not want to say no because that might sound impolite (if not confrontational) so the Japanese host answered, "I don't think so."

One of Kelly's aunts, who is also a friend of Peter's, introduced us co-Authors. We eventually realized that we share a common interest about deafness and hearing loss. We continued our conversations, and as they evolved, we began thinking about how to mitigate the public health burdens, costs, and impacts of NIHL and NIHHL due to exposure to CRAAP. This Article results from combining our individual respective perspectives about mitigating NIHL and NIHHL due to exposure to CRAAP. Kelly, a former KODA and recent CODA, has first-hand experience and knowledge about deafness and hearing loss. Peter, a

¹⁰⁸ Camila Cabello, *Camila Cabello: Cry for Me (Live on SNL)*, YOUTUBE (Oct. 13, 2019), https://www.youtube.com/watch?v=Syzcvdm1hq4&ab_channel=CamilaCabelloVEVO.

¹⁰⁹ CAMILA CABELLO, *Cry for Me*, on ROMANCE (Epic Records, Syco Music 2019).

¹¹⁰ *Id.*

business law professor with research interests in applying behavioral economics to legal policy analysis, has expertise in helping individuals achieve higher subjective well-being by improving their decisionmaking.

Our Article's title reflects two temporal aspects of NIHL and NIHHL due to exposure to CRAAP. First, NIHL and NIHHL are typically cumulative, delayed, incremental, and nonlinear in their progression.¹¹¹ Second, mitigating interventions require that people believe in clinical and empirical medical data and take individually and socially costly precautions *now*. This pair of temporal challenges is especially problematic for most people who too heavily discount abstract, vague future benefits compared to concrete, salient present costs. Impatience,¹¹² myopia,¹¹³ hyperbolic time discounting,¹¹⁴ (as opposed to exponential time discounting),¹¹⁵ and time-inconsistent preferences,¹¹⁶ are all too common human tendencies which behavioral economists have documented and studied.¹¹⁷

B. CLINICAL AND EMPIRICAL MEDICAL DATA AND NORMATIVE IMPLICATIONS

¹¹¹ See, e.g., Ravi Samy, *Noise Exposure Can Lead to Hearing Loss Years Later*, CINCINNATI.COM (Aug. 1, 2016), <https://www.cincinnati.com/story/sponsor-story/uc-health/2016/08/01/uc-health-hearing-noise-decibels-tinnitus/87605724/>.

¹¹² See, e.g., Ernst Fehr, *The Economics of Impatience*, 41 NATURE 269 (2002).

¹¹³ See JONATHAN BARON, THINKING AND DECIDING 470-80 (3d ed. 2000) (providing an overview about myopia and discounting); R. H. Strotz, *Myopia and Inconsistency in Dynamic Utility Maximization*, 23 REV. ECON. STUD. 165 (1955).

¹¹⁴ About hyperbolic discounting, see, e.g., GEORGE AINSLIE, BREAKDOWN OF WILL (2001) (describing and depicting hyperbolic discounting in Figure 2B); David Laibson, *Golden Eggs and Hyperbolic Discounting*, 112 Q. J. ECON. 443 (1997) (modeling preference reversals using a quasi-hyperbolic discount function); see also Daniel Read, *Is Time-Discounting Hyperbolic or Subadditive?* 23 J. RISK & UNCERTAINTY 5 (2001); Ariel Rubinstein, "Economics and Psychology?" *The Case of Hyperbolic Discounting*, 44 INT'L ECON. REV. 1207 (2003).

¹¹⁵ Paul A. Samuelson, *A Note on the Measurement of Utility*, 4 REV. ECON. STUD. 155, 156 (1937) (introducing the canonical assumption that the rate of discounting future utilities is constant, and in so doing, excluding the possibilities of people having preferences that exhibit intertemporal inconsistencies).

¹¹⁶ See, e.g., Shane Frederick et al., *Time Discounting and Time Preference: A Critical Review*, 40 J. ECON. LITERATURE 351 (2002); George Loewenstein, *The Fall and Rise of Psychological Explanations in the Economics of Intertemporal Choice*, in CHOICE OVER TIME (George Loewenstein & Jon Elster eds., 1992).

¹¹⁷ See, e.g., Keith Marzilli Ericson & David Laibson, *Intertemporal Choice*, in 2 HANDBOOK OF BEHAVIORAL ECONOMICS—FOUNDATIONS AND APPLICATIONS 111 (B. Douglas Bernheim et al. eds., 2019).

We first review some basic physics about sound. Sound is a form of energy that travels in waves and is measured in terms of its frequency.¹¹⁸ It is reported in hertz (Hz), which measures the number of sound vibrations per second, and amplitude, which measures sound forcefulness or intensity using the decibel (dB) scale.¹¹⁹ Decibels are measured on a logarithmic, as opposed to linear, scale of loudness.¹²⁰ Similarly, physicist and seismologist Charles F. Richter developed a logarithmic scale, the well-known Richter scale, which measures the magnitude of energy that an earthquake releases.¹²¹ The logarithmic nature of the decibel scale means that each increase of 10 dB on the decibel scale equals a 100-fold increase in sound pressure level (“SPL”).¹²² Almost silence is expressed as 0 dB, 10 dB is 10 times louder than close to silence, and 20 dB is 100 times as loud as near silence.¹²³ Examples of the decibel levels of some common sounds include the following: everyday conversation is 60 dB; heavy city traffic is 85 dB; a lawn mower is 90 dB; an MP3 player at its maximum volume is 105 dB; concerts and sirens are 120 dB; sporting events are 105 to 130 dB varying by the stadium; and firearms are 150 dB.¹²⁴ Everybody can experience NIHL.¹²⁵ Louder sounds damage hearing more quickly.¹²⁶ Repeated or prolonged (meaning more than 8 hours a day of exposure to noise that is louder than 85 dB) can cause permanent NIHL.¹²⁷

We next review some human biology and neuroscience about NIHL and NIHHL. We note in passing that research about human hearing loss includes occupational studies of workers (somewhat) voluntarily exposed to noise,¹²⁸ and non-occupational studies of non-workers (somewhat) involuntarily exposed to noise.¹²⁹ Standard neoclassical economics would

¹¹⁸ Debbie Clason, *What Is A Decibel?*, HEALTHY HEARING (June 28, 2018), <https://www.healthyhearing.com/report/52514-What-is-a-decibel>.

¹¹⁹ *Id.*

¹²⁰ *Id.*

¹²¹ Charles F. Richter, *An Instrumental Earthquake Magnitude Scale*, 25 BULL. SEISMOLOGICAL SOC'Y AM. 1, 5 (1935).

¹²² *Id.*

¹²³ *Id.*

¹²⁴ *Id.*

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ Richter, *supra* note 121, at 5.

¹²⁸ Rickie Davis, *Long-Term Noise Exposures: A Brief Review*, 349 HEARING RES. 31, 31-32 (2017).

¹²⁹ Yulia Carroll & John Eichwald, *CDC Research on Non-Occupational NIHL*, HEARING J., 40, 40 (2017).

use residential price differences for houses near airports¹³⁰ and so-called compensating wage differentials for airport runway employees¹³¹ to approximate people's preferences about money versus voluntary exposure to noise pollution. It is unclear whether the (in)voluntariness of NIHL and NIHHL make a difference medically, though it is clear that it makes a difference ethically, legally, morally, and socially. Alternatively, contingent valuation offers another methodology to estimate people's valuation of being exposed to CRAAP.¹³² The National Institute on Deafness and other Communication Disorders ("NIDCD") and the National Institutes of Health ("NIH") created a one-page fact sheet succinctly explaining how hearing in humans "depends on a series of complex steps that change sound waves in the air into electrical signals," with a picture depicting key parts of the human ear involved in hearing.¹³³ The NIDCD and NIH also produced an entertaining, informative, and brief (two-minute and twenty-six seconds) animated video that "illustrates how sounds travel from the ear to the brain, where they are interpreted and understood."¹³⁴

A principal mechanism of NIHL is to damage cochlear hair cells and associated synaptopathy.¹³⁵ Leading triggers of hearing loss in individuals include aging, trauma, and exposure to loud noises (or much more rarely, drugs that are toxic to the ear, specifically the cochlea or auditory nerve and sometimes the vestibular system). Drugs that are toxic to the ear are known as ototoxic drugs, and include some familiar antibiotics, such as streptomycin and furosemide, and some well-known nonsteroidal anti-inflammatory drugs, such as aspirin, ibuprofen, and naproxen, all of which

¹³⁰ See, e.g., Molly Espey & Hilary Lopez, *The Impact of Airport Noise and Proximity on Residential Property Values*, 31 GROWTH & CHANGE 408, 409-10 (2000).

¹³¹ Robert S. Smith, *Compensating Wage Differentials and Public Policy: A Review*, 32 INDUS. & LAB. REV. 339, 340-41 (1979).

¹³² See, e.g., David G. McLean & Bill Mundy, *The Addition of Contingent Valuation and Conjoint Analysis to the Required Body of Knowledge for the Estimation of Environmental Damage to Real Estate*, 1 J. REAL EST. PRAC. & EDUC. 1, 4-10 (1998).

¹³³ *Noise-Induced Hearing Loss*, NAT'L INST. ON DEAFNESS OTHER COMM'C'N DISORDERS (last updated May 31, 2019), <https://www.nidcd.nih.gov/health/noise-induced-hearing-loss>; *How Do We Hear?*, NAT'L INST. ON DEAFNESS OTHER COMM'C'N DISORDERS (Jan. 3, 2018), <https://www.nidcd.nih.gov/health/how-do-we-hear>.

¹³⁴ *Journey of Sound to the Brain Video*, *Noise-Induced Hearing Loss*, NAT'L INST. ON DEAFNESS OTHER COMM'C'N DISORDERS (Nov. 21, 2018), <https://www.nidcd.nih.gov/health/journey-of-sound-video>.

¹³⁵ Arwa Kurabi et al., *Cellular Mechanisms of Noise-Induced Hearing Loss*, 349 HEARING RES. 129, 129-130 (2017).

“often damage sensory hair cells, reflected as elevated thresholds on the clinical audiogram.”¹³⁶ Recent research suggests that

a more insidious, but likely more common, process is taking place that permanently interrupts synaptic communication between sensory inner hair cells and subsets of cochlear nerve fibers. The silencing of affected neurons alters auditory information processing, whether accompanied by threshold elevations or not, and is a likely contributor to a variety of perceptual abnormalities, including speech-in-noise difficulties, tinnitus and hyperacusis.¹³⁷

Tinnitus is a persistent buzzing or ringing that some individuals hear, and hyperacusis is an increased sensitivity to such unpleasant sounds as babies crying or loud sirens.¹³⁸ The problem that sometimes referred to as “hidden hearing loss” since it is not detected by standard hearing tests, “and sufferers are often told their hearing is normal. But the distress they feel struggling to discern what others are saying in crowded restaurants and business meetings is real.”¹³⁹ There is accumulating evidence that

the causes of problems processing speech amid noise are different than the causes of problems hearing sound. Scientists believe exposure to loud noises can erode the brain’s ability to listen selectively and decode words, without causing traditional hearing damage. Difficulty understanding speech amid noise can set in long before traditional hearing loss.¹⁴⁰

Traditional research finds that adult hearing loss is “associated with damage to the tiny hair cells that line the inner ear and transfer sound signals to nerve fibers that lead to the brain. Aging, trauma and noise exposure can all cause those hair cells to deteriorate.”¹⁴¹ Recent research finds “the synapses connecting the hair cells to nerve fibers are even more

¹³⁶ M. Charles Liberman & Sharon G. Kujawa, *Cochlear Synaptopathy in Acquired Sensorineural Hearing Loss: Manifestations and Mechanisms*, 349 *HEARING LOSS* 138, 138 (2017).

¹³⁷ *Id.*

¹³⁸ Melinda Beck, *Can’t Hear in Noisy Places? It’s a Real Medical Condition*, WALL ST. J. (Sept. 26, 2016, 1:07 PM), <https://www.wsj.com/articles/cant-hear-in-noisy-places-its-a-real-medical-condition-1474909624>.

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

vulnerable and suffer permanent damage long before the hair cells deteriorate, bringing about the difficulties in selective listening.”¹⁴²

In other words, “hair cells are not the most vulnerable elements in the inner ear; rather, it is the synapses between hair cells and cochlear nerve terminals that degenerate first in the aging or noise-exposed ear.”¹⁴³ Such primary neural degeneration does not affect hearing thresholds, but probably contributes to problems understanding speech in difficult listening environments and may be important in the generation of tinnitus or hyperacusis. A study examining cochlear synaptopathy in humans recruited college students studying music who were repeatedly exposed to loud sounds four to six hours daily in comparison with college students who were studying quieter subjects.¹⁴⁴ The study found that all students were equally proficient at understanding words in quiet environments and tested normally on standard hearing tests.¹⁴⁵ Students studying music tested significantly poorer at word recognition in noise or with time compression and reverberation, and exhibited heightened sound reactions consistent with hyperacusis.¹⁴⁶ This research suggests that such neural damage known as cochlear synaptopathy, or “the noise-induced loss of cochlear nerve synapses[,] leads to deficits in hearing abilities in difficult listening situations, despite the presence of normal thresholds at standard audiometric frequencies.” One of the researchers of the study, Dr. Liberman, analogized

sound signals arriving at the brain to a high-resolution photo, with nerve connections like thousands of pixels creating a clear picture. If some of those nerve connections die, the brain gets a lower-resolution image and may lose the ability to distinguish where sounds are coming from and who is speaking.¹⁴⁷

Cochlear synaptopathy may help explain tinnitus and hyperacusis because if fewer signals reach the brain from auditory nerve fibers, the brain may respond by producing buzzing to fill the vacuum or increase the internal volume, thus causing already loud sounds to become

¹⁴² *Id.*

¹⁴³ M. Charles Liberman et al., *Toward a Differential Diagnosis of Hidden Hearing Loss in Humans*, 11 PLOS ONE 1,1 (2016).

¹⁴⁴ *Id.* at 3.

¹⁴⁵ *Id.* at 5-6.

¹⁴⁶ *Id.* at 1.

¹⁴⁷ *Id.*

intolerable.¹⁴⁸ Noise-induced cochlear synaptopathy, in other words, NIHL is currently a very active research area.¹⁴⁹

An expert in auditory processing disorders, Salus University Professor James W. Hall III,¹⁵⁰ believes the “jury is still out as to how hidden hearing loss manifests in humans and how we might diagnose it We don’t have enough information yet for it to be part of routine diagnosis of hearing problems.”¹⁵¹ Anne Oyler,¹⁵² former associate director for audiology at the American Speech-Language-Hearing Association, has cautioned that wearing hearing aids will not return a wearer’s hearing back to before hearing difficulties or loss, and that the primary complaint among those who wear hearing aids is that they have trouble hearing in noise—and that is not likely to change.¹⁵³ Moreover, according to hearing-aid companies, it often takes individuals on average seven years after suspecting a hearing issue to seek treatment, despite newer hearing-aid models having directional microphones and technology dampening background noise.¹⁵⁴ Dr. Sarah Sydlowski,¹⁵⁵ an audiologist, Audiology Director of a Hearing Implant Program, and board member of the American Academy of Audiology,¹⁵⁶ urges people to get diagnosed and seek treatment as soon as they suspect hearing issues instead of feigning their way through conversations, because “it can be extremely taxing to go through a busy workday and be constantly struggling to understand.”¹⁵⁷

Many veterans experience NIHL and NIHL. In fact, “[a]ccording to the U.S. Department of Veterans Affairs, tinnitus is the most common

¹⁴⁸ *Id.*

¹⁴⁹ Hengchao Chen et al., *Noise-Induced Cochlear Synaptopathy and Signal Processing Disorders* 407 *NEUROSCI. REV.* 41 (2019); Megan Kobel et al., *Noise-Induced Cochlear Synaptopathy: Past Findings and Future Studies*, 349 *HEARING RES.* 148 (2017).

¹⁵⁰ James W. Hall, III, *Professor, Osborne College of Audiology, SALUS UNIV.* <https://www.salus.edu/About/Faculty-Directory/Faculty-Pages/Hall-III,-James.aspx> (last visited Oct. 20, 2020).

¹⁵¹ Beck, *supra* note 138.

¹⁵² *Humans of ASHA: Anne Oyler*, *AM. SPEECH-LANGUAGE-HEARING ASS’N*, <https://www.asha.org/Humans/Anne-Oyler/> (last visited Oct. 20, 2020).

¹⁵³ Anne Oyler, *CEO Update*, *AM. SPEECH-LANGUAGE-HEARING ASS’N* (June 2018); Melinda Beck, *Can’t Hear in Noisy Places? It’s a Real Medical Condition*, *WALL ST. J.* (Sept. 26, 2016), <https://www.wsj.com/articles/cant-hear-in-noisy-places-its-a-real-medical-condition-1474909624>.

¹⁵⁴ Beck, *supra* note 138.

¹⁵⁵ Sarah Sydlowski, *Au.D., Ph.D., CLEVELAND CLINIC*, <https://my.clevelandclinic.org/staff/14769-sarah-sydlowski> (last visited Oct. 20, 2020).

¹⁵⁶ *AMERICAN ACADEMY OF AUDIOLOGY*, <https://www.audiology.org/> (last visited Oct. 20, 2020).

¹⁵⁷ Beck, *supra* note 138.

disability experienced by veterans with over 2.7 million receiving benefits for it.”¹⁵⁸ Unsurprisingly and unfortunately, veterans often were and are still exposed to extreme CRAAP during training and combat from close proximity to explosions and “loud noise caused by small arms, heavy artillery and rockets.”¹⁵⁹ Dr. J. Thomas Roland, Jr. of N.Y.U. Langone Health, co-director of the Cochlear Implant Center, leads the largest cochlear implant translational research team in the United States,¹⁶⁰ and “explained that sound enters not only through the ear canal but also through something know[sic] as bone conduction.”¹⁶¹ Roland noted that American “military personnel are exposed to extreme levels of noise.”¹⁶² Roland pointed out “[w]hen sound strikes the bone of our skull, the bone moves with the sound Even if you completely block the ear, sound above a certain level can still get to the inner ear through bone conduction, still be very damaging.”¹⁶³ Roland observed “that any earplug—even perfectly designed ones—cannot prevent bone conduction of loud sound through the skull to the inner ear.”¹⁶⁴ For example, a federal judge “transferred numerous lawsuits from U.S. military veterans who claimed 3M’s Combat-Arms Earplugs were the cause of their hearing damage and deafness to a Florida federal court.”¹⁶⁵ The “lawsuits seek compensatory and punitive damages, plus attorney’s fees, costs of suit, lawful interest and all other claims available by law” and “counts of strict liability, failure to warn, negligence and fraudulent misrepresentation.”¹⁶⁶

Of the approximately 50,000 calls to New York City’s 311 non-emergency phone number,¹⁶⁷ the number one municipal complaint is about

¹⁵⁸ *Veterans Claim Defective 3M Earplugs Caused Hearing Loss, Ringing in Ears: “It is Torture,”* CBS NEWS (Mar. 12, 2019, 7:40 AM), <https://www.cbsnews.com/news/military-veterans-claim-defective-3m-earplugs-caused-hearing-loss/>.

¹⁵⁹ *Id.*

¹⁶⁰ J. Thomas Roland Jr., NYU LANGONE HEALTH, <https://nyulangone.org/doctors/1962445411/j-thomas-roland-jr> (last visited Oct. 20, 2020).

¹⁶¹ CBS NEWS, *supra* note 158.

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *In re 3M Combat Arms Earplug Prods. Liab. Litig.*, 366 F. Supp. 3d 1368, 1370 (J.P.M.L. 2019) (ruling that 643 lawsuits, including several proposed class actions, alleging defects in 3M Co.’s combat earplugs caused hearing loss in hundreds of members of the U.S. military are to be consolidated in federal court in Florida).

¹⁶⁶ *Id.*

¹⁶⁷ *City of New York*, NYC311, <https://portal.311.nyc.gov/> (last visited Oct. 20, 2020).

noise.¹⁶⁸ Loud restaurant noise damages the hearing of diners and waitstaff,¹⁶⁹ encourages quicker diner turnover, and is correlated with “unhealthy food choices and excessive alcohol consumption.”¹⁷⁰ In this way, loud ambient restaurant noise can increase a restaurant’s profits at the expense of a restaurant’s patrons and employees.¹⁷¹ There is a fascinating path-dependent history about how restaurant acoustics and soundscapes (analogous to landscapes) have become worse in terms of the volume of background din.¹⁷² It is also possible that a restaurant’s noisy soundscape or sonic environment can drive potential diners away and reduce profits.¹⁷³ Factors that influence the soundscape of a restaurant are its background music, design, furniture, machinery, and operations.¹⁷⁴

An exploratory, large-scale noise two-year survey of sound levels at 2,376 New York City restaurants and bars utilized crowd-sourced measurements from SoundPrint, a free, novel, real-time digital sound level meter iPhone app,¹⁷⁵ and found that:¹⁷⁶

- (1) a significant number of venues have high sound levels that are not conducive to conversation and may be endangering the health of patrons and employees;

¹⁶⁸ Mindy Fetterman, *Seeking A Quiet Place In A Nation Of Noise*, STATELINE, THE PEW CHARITABLE TRUSTS (Apr. 16, 2018), <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/04/16/seeking-a-quiet-place-in-a-nation-of-noise>; Brian Taylor, *Noise is the New Secondhand Smoke*, HEARING HEALTH MATTERS (Apr. 19, 2018), <https://hearinghealthmatters.org/hearingnewswatch/2018/noise-pollution-new-secondhand-smoke/>.

¹⁶⁹ Deirdre R. Green & T. Renée Anthony, *Occupational Noise Exposure of Employees at Locally-Owned Restaurants in a College Town*, 12 J. OCCUP. ENV'TL HYGIENE 489 (2015).

¹⁷⁰ Kate Wagner, *How Restaurants Got So Loud*, THE ATLANTIC (Nov. 27, 2018), <https://www.theatlantic.com/technology/archive/2018/11/how-restaurants-got-so-loud/576715/>.

¹⁷¹ *Id.*

¹⁷² *Id.*

¹⁷³ *Audio Branding: 4 Neglected Factors That Make Your Restaurant Too Noisy (Leading to Revenue Loss!)*, EXPRESS MELODY (June 30, 2016), <http://www.expressmelody.com/Audio-Branding.php?id=5>.

¹⁷⁴ *Id.*

¹⁷⁵ SOUNDPRINT, <https://www.soundprint.co/> (last visited Oct. 20, 2020); see also Julia Belluz, *Restaurants Are Too Freaking Loud. This App Helps You Shame Them*, VOX (APR. 22, 2019, 1:59 PM), <https://www.vox.com/science-and-health/2018/4/26/17275406/restaurant-noise-app>; Patricia Marx, *Yelp for Noise*, THE NEW YORKER (Sept. 24, 2018), <https://www.newyorker.com/magazine/2018/10/01/yelp-for-noise>.

¹⁷⁶ Gregory S. Farber & Lily M. Wang, *Analyses of Crowd-Sourced Sound Levels, Logged from More Than 2250 Restaurants and Bars in New York City*, 142 J. ACOUSTICAL SOC. AM. 2593 (2017); Gregory Scott, *An Exploratory Survey of Sound Levels in New York City Restaurants and Bar*, 6 OPEN SOURCE J. SOC. SCI. 64 (2018).

(2) reported sound levels by the venue managers on their online public business pages generally underestimated actual sound levels; and

(3) average sound levels in restaurants and bars are correlated by neighborhood and type of cuisine.¹⁷⁷

A recent study found socioeconomic and ethnic inequities in London transport-related noise at residences from different sources.¹⁷⁸ Another study documented racial, ethnic, and socioeconomic inequalities in noise pollution in the contiguous United States, finding evidence of higher noise exposures in census block groups that are characterized by lower socioeconomic status and comprised of greater proportions of African Americans, Asian Americans, Hispanic Americans, and Native Americans; these associations were stronger in racially segregated communities.¹⁷⁹

The U.S. Department of Transportation's Bureau of Transportation Statistics released a *National Transportation Noise Map*.¹⁸⁰ Road traffic is the most prevalent source of environmental noise.¹⁸¹ The noise map found that "more than 97 percent of the U.S. population has the potential to be exposed to noise from aviation and Interstate highways at levels below 50 decibels or roughly comparable to the noise level of a humming refrigerator."¹⁸² Additionally, "[l]ess than one-tenth of a percent of the population could potentially experience noise levels of 80 decibels or more, equivalent to the noise level of a garbage disposal."¹⁸³ This noise map was a collaboration between Colorado State University and the National Park Service and incorporated 1.5 million hours of acoustical

¹⁷⁷ Gregory S. Farber & Lily M. Wang, *Analyses of Crowd-Sourced Sound Levels of Restaurants and Bars in New York City*, 31 PROC. MEETINGS ACOUSTICS 040003 (2017).

¹⁷⁸ Cathryn Tonne et al., *Socioeconomic and Ethnic Inequalities in Exposure to Air and Noise Pollution in London*, 115 ENV'T INT'L 170 (2018).

¹⁷⁹ Joan A. Casey et al., *Race/Ethnicity, Socioeconomic Status, Residential Segregation, and Spatial Variation in Noise Exposure in the Contiguous United States*, ENV'TL HEALTH PERPS. 077017-1 (2017).

¹⁸⁰ Bureau Transp. Stats., *National Transportation Noise Map*, U.S. DEP'T TRANSP., <https://www.bts.gov/newsroom/national-transportation-noise-map> (last visited Oct. 20, 2020).

¹⁸¹ Anna Hansell et al., *Cardiovascular Health Effects of Road Traffic Noise*, in ENVIRONMENTAL IMPACTS OF ROAD VEHICLES PAST, PRESENT AND FUTURE CARDIOVASCULAR HEALTH EFFECTS OF ROAD TRAFFIC NOISE 107 (R. M. Harrison & R. E. Hester eds., 2017).

¹⁸² Bureau Transp. Stats., *supra* note 180.

¹⁸³ *Id.*

data collected over 15 years at 492 sites.¹⁸⁴ Another study showed that “air and noise pollution in underserved communities were impacted by passing train and truck traffic related to industrial activities.”¹⁸⁵

A Centers for Disease Control and Prevention (“CDC”) Vital Signs Morbidity and Mortality Weekly Report¹⁸⁶ “found about one in four U.S. adults who say their hearing is good or excellent actually have hearing damage”¹⁸⁷ and “much of this damage is from loud sounds encountered during everyday activities at home and in the community.”¹⁸⁸ The CDC research “analyzed more than 3,500 hearing tests conducted on adult participants in the 2012 National Health and Nutrition Examination Survey.”¹⁸⁹

With support from the NIDCD and the NIH, this research “found that 20 percent of people who reported no job-related noise exposure had hearing damage in a pattern usually caused by noise. This damage—shown by a distinctive drop in the ability to hear high-pitched sounds—appeared as early as age 20.”¹⁹⁰ In other words, hearing can be damaged by attending loud concerts or using a leaf blower just as much as working in a very noisy job. CDC Acting Director Dr. Anne Schuchat stated that, “40 million Americans show some hearing damage from loud noise, with nearly 21 million reporting no exposure to loud noise at work.”¹⁹¹

Other key findings of the report include these:

- About 53 percent of adults with noise-induced hearing damage reported no job exposure to loud sounds. This damage—shown by a distinctive drop in the ability to hear high-pitched sounds—appeared as early as age 20.

¹⁸⁴ Nate Seltenrich, *Inequality of Noise Exposures: A Portrait of the United States*, 125 ENV'TL HEALTH PERPS. 094003-1 (2017).

¹⁸⁵ Inkyu Han et al., *Impact of Transient Truck and Train Traffic on Ambient Air and Noise Levels in Underserved Communities*, 63 TRANSPORTATION RES. PART D 706 (2018).

¹⁸⁶ Yulia I. Carroll et al., *Vital Signs: Noise-Induced Hearing Loss Among Adults—United States 2011-2012*, 6 MORBIDITY & MORTALITY WEEKLY REP. 139 (2017), <https://www.cdc.gov/mmwr/volumes/66/wr/pdfs/mm6605e3.pdf>.

¹⁸⁷ *New Vital Signs Study Finds Noise-Related Hearing Loss Not Limited to Work Exposure*, CDC (Feb. 10, 2017), <https://www.cdc.gov/media/releases/2017/p0207-hearing-loss.html>.

¹⁸⁸ *Id.*

¹⁸⁹ *Id.*

¹⁹⁰ *Id.*

¹⁹¹ *Id.*

- Almost 1 in 4 adults ages 20 to 69 who reported good to excellent hearing already have some hearing loss.
- Almost 1 in 5 adults who reported no job exposure to noise showed hearing damage indicative of noise exposure.
- The presence of hearing loss increased with age, from about 1 in 5 (19 percent) among young adults ages 20 to 29 to more than 1 in 4 (27 percent) among adults ages 50 to 59.
- Hearing loss is more common among men and people over the age of 40 years.¹⁹²

Anne Schuchat also stated that “[n]oise is damaging hearing before anyone notices or diagnoses Because of that, the start of hearing loss is underrecognized.”¹⁹³ The report explains that “[h]earing damage results from a combination of volume and the length of the exposure. One minute of hearing a 120-decibel siren can damage hearing, the CDC said. So can two hours of exposure to a 90-decibel leaf blower.”¹⁹⁴

The NIDCD has a webpage¹⁹⁵ that explains the causes and consequences of NIHL and how “hearing damage of this sort is likely to be cumulative and permanent, since repeated exposure to loud noises lastingly damages the *stereocilia*, or sensor hairs, inside the ear on which hearing depends.”¹⁹⁶ Another insightful NIDCD webpage¹⁹⁷ that provides further information about NIHL is part of the federal public information campaign, *It’s A Noisy Planet. Protect Their Hearing®*, “designed to increase awareness among parents of children ages 8 to 12 about the causes and prevention of noise-induced hearing loss.”¹⁹⁸ The co-Authors believe that the federal government and private individuals and

¹⁹² *Id.*

¹⁹³ ‘A Quarter of Adults Have Hearing Loss’—And External Noise Is Causing It: CDC QUIET CLEAN D.C. (Feb. 8, 2017), <http://www.quietcleandc.com/qcdc-in-the-news/2017/2/8/a-quarter-of-adults-have-hearing-loss>.

¹⁹⁴ *Id.*

¹⁹⁵ *Noise-Induced Hearing Loss*, NAT’L INST. ON DEAFNESS OTHER COMM’N DISORDERS, (May 31, 2019) <https://www.nidcd.nih.gov/health/noise-induced-hearing-loss>.

¹⁹⁶ Quiet Clean, *supra* note 193.

¹⁹⁷ *What Is Noise-Induced Hearing Loss?*, NAT’L INST. ON DEAFNESS OTHER COMM’N DISORDERS (June 3, 2019) <https://www.noisyplanet.nidcd.nih.gov/parents/what-is-noise-induced-hearing-loss>.

¹⁹⁸ *It’s A Noisy Planet. Protect Their Hearing®*, NAT’L INST. ON DEAFNESS OTHER COMM’N DISORDERS (last visited Oct. 20, 2020), <https://www.noisyplanet.nidcd.nih.gov/parents/what-is-noise-induced-hearing-loss>

organizations can and should publicize, or link to, this well-designed, informative webpage.

One recent review of experimental and observational studies documents “that noise exposure leads to annoyance, disturbs sleep and causes daytime sleepiness, affects patient outcomes and staff performance in hospitals, increases the occurrence of hypertension and cardiovascular disease, and impairs cognitive performance in schoolchildren.”¹⁹⁹ A later study found a “positive association between residential transportation noise and diabetes, adding to the growing body of evidence that noise pollution exposure may be independently linked to metabolic health and should be considered when developing public health interventions.”²⁰⁰

Another more recent review of epidemiological, experiential, observational, and translational studies found that noise was “associated with annoyance, stress, sleep disturbance, and impaired cognitive performance,”²⁰¹ noting that “environmental noise is associated with an increased incidence of arterial hypertension, myocardial infarction, heart failure, and stroke.”²⁰² The review presented evidence “that transportation noise per se contributes to the development of cardiovascular risk of coronary artery disease, arterial hypertension, stroke, and heart failure.”²⁰³ The review pointed out “that especially nighttime noise increases levels of stress hormones and vascular oxidative stress, which may lead to endothelial dysfunction and arterial hypertension.”²⁰⁴ Furthermore, the review cited novel studies that found “aircraft noise to be associated with oxidative stress–induced vascular damage, mediated by activation of the NADPH oxidase, uncoupling of endothelial nitric oxide synthase, and vascular infiltration with inflammatory cells.”²⁰⁵ NADPH oxidase (Nicotinamide Adenine Dinucleotide PHosphate oxidase) is a membrane-bound enzyme complex that produces reactive oxygen species which play

¹⁹⁹ Mathias Basner et al., *Auditory and Non-Auditory Effects of Noise on Health*, 383 LANCET 1325, 1325 (2014).

²⁰⁰ Charlotte Clark et al., *Association of Long-Term Exposure to Transportation Noise and Traffic-Related Air Pollution with the Incidence of Diabetes: A Prospective Cohort Study*, 125 ENVTL. HEALTH PERSP. 087025–1, 087025–1 (2017).

²⁰¹ Thomas Münzel et al., *Environmental Noise and the Cardiovascular System*, 71 J. AM. CARDIOLOGY 668, 688 (2018).

²⁰² *Id.*

²⁰³ *Id.* at 696.

²⁰⁴ *Id.*

²⁰⁵ *Id.*

important roles in immunity, cell growth, and cell signaling.²⁰⁶ The review noted that already there is a “growing body of evidence finds that noise is associated with oxidative stress, vascular dysfunction, autonomic imbalance, and metabolic abnormalities, potentiating not only the adverse impact of cardiovascular risk factors, such as arterial hypertension and diabetes, but also contributing to the progression of atherosclerosis and increased susceptibility to cardiovascular events.”²⁰⁷ The review concludes by advocating future researchers to study

the magnitude and time course of response to coexposure of noise and air pollution; synergistic effects of both exposures on surrogate measures, such as blood pressure and metabolic risk; duration of effect/time course of reversal; impact of low-grade background noise exposure on air pollution exposure effects and vice versa; impact of noise on the circadian rhythm; and finally the effects on lifestyle (e.g., diet, stress, and exercise).²⁰⁸

Another study of 7,321 individuals from the Helsinki capital region in Finland “assessed the associations of annoyance and road-traffic noise with sleep disorders, anxiety and depression,”²⁰⁹ and found “suggestive associations between high levels of road-traffic noise and psychotropic medication use. Noise sensitivity was associated with psychotropic medication use.”²¹⁰ A different study of the Shenzhen metropolitan region of China demonstrated that urban morphology significantly affects regional environmental noise (“RN”) and traffic noise (“TN”), finding that while building composition and configuration significantly impacts RN, only building configuration correlates with TN.²¹¹ While irregular shapes and scattered distributions of buildings mitigated RN, connected and contiguous buildings along road sides mitigated TN.²¹² Vegetation configuration and composition correlate with RN and TN, and

²⁰⁶ Arvind Panday et al., *NADPH Oxidases: An Overview from Structure to Innate Immunity-Associated Pathologies*, 12 CELLULAR & MOLECULAR IMMUNOLOGY 5 (2013).

²⁰⁷ Münzel et al., *supra* note 201, at 696.

²⁰⁸ *Id.* at 696.

²⁰⁹ Enembe O. Okokon et al., *Traffic Noise, Noise Annoyance and Psychotropic Medication Use*, 119 ENVTL. INT’L 287, 287 (2018).

²¹⁰ *Id.*

²¹¹ Xiaopeng Han et al., *Analysis of the Relationships Between Environmental Noise and Urban Morphology*, 233 ENVTL. POLLUTION 755, 762 (2018).

²¹² *Id.* at 762.

aggregated, high-percentage, and less-fragmented vegetation ameliorates RN and TN.²¹³

One study, from five years ago,²¹⁴ “found significant association between hearing impairment and moderate to severe depression,”²¹⁵ with depression rates higher for women than men and depression found in women over age seventy and not in men.²¹⁶ A veteran personal-health columnist for the *New York Times*, Jane E. Brody, reported on two recent large studies that “demonstrated a clear association between untreated hearing loss and an increased risk of dementia, depression, accidental falls, and even stroke. In a significant number of people, the studies indicate, uncorrected hearing loss itself appears to be the cause of the associated health problem.”²¹⁷ In a study involving 154,414 adults aged fifty years and older with health insurance claims,²¹⁸ “researchers at Johns Hopkins found that untreated hearing loss increased the risk of developing dementia by 50 percent and depression by 40 percent in just five years when compared to those without hearing loss.”²¹⁹ Another study analyzing this large data set²²⁰

linked untreated hearing loss to more and longer hospitalizations and readmissions and more visits to an emergency room. Within 10 years, untreated hearing loss accounted for 3.2 percent of all cases of dementia, 3.57 percent of people significantly injured in a fall, and 6.88 percent of those seeking treatment for depression. The

²¹³ *Id.* at 762.

²¹⁴ Chuan-Ming Li et al., *Hearing Impairment Associated With Depression in US Adults, National Health and Nutrition Examination Survey 2005-2010*, 140 J. AM. MED. ASS’N: OTOLARYNGOLOGY HEAD NECK SURGERY 293 (2014).

²¹⁵ Lisa Pacler, *The Complex Link Between Depression and Hearing Loss*, HEALTHY HEARING (July 27, 2017), <https://www.healthyhearing.com/report/52437-The-complex-link-between-depression-and-hearing-loss>.

²¹⁶ Marie Benz, *Interview with Chuan-Ming Li, Depression and Hearing Impairment in Adults*, MEDICALRESEARCH, https://medicalresearch.com/mental-health-research/depression/depression_and_hearing_loss_in_adults/4071/.

²¹⁷ Jane E. Brody, *Hearing Loss Threatens Mind, Life and Limb*, N.Y. TIMES (Dec. 31, 2018) <https://www.nytimes.com/2018/12/31/well/live/hearing-loss-threatens-mind-life-and-limb.html>.

²¹⁸ Jennifer A. Deal et al., *Incident Hearing Loss and Comorbidity: A Longitudinal Administrative Claims Study*, 145 J. AM. MED. ASS’N: OTOLARYNGOLOGY HEAD NECK SURGERY 36 (2019).

²¹⁹ Brody, *supra* note 217.

²²⁰ Nicholas S. Reed et al., *Trends in Health Care Costs and Utilization Associated with Untreated Hearing Loss Over 10 Years*, 145 J. AM. MED. ASS’N: OTOLARYNGOLOGY HEAD NECK SURGERY 27 (2019).

percentages may seem small, but given how common these conditions are, they affect a very large number of individuals, resulting in great personal, financial and societal costs.²²¹

Dr. Frank R. Lin,²²² who is a co-author of the above two studies and is the director of the Cochlear Center for Hearing and Public Health at the Johns Hopkins Bloomberg School of Public Health,²²³ states that approximately “85 percent of those with hearing loss are untreated”²²⁴ and with “older adults alone, this increased health care costs by 46 percent over a period of 10 years, compared with costs incurred by those without hearing loss.”²²⁵ Lin also laments that “people tend to wait much too long to get their hearing tested and treated with hearing aids, and the longer they wait, the harder it is to treat hearing loss.”²²⁶ Lin points out eyesight is easier to fix than hearing loss and while it takes one to two months for our brains to adjust to hearing aids, wearing eyeglasses permits immediate clear(er) vision.²²⁷ Lin also notes the earlier hearing loss is diagnosed and treated, the easier it is for our brains to adapt.²²⁸ The law that enacted Medicare specifically excludes coverage for hearing aids because back in 1965, hearing loss was not seen to be a common medical issue and hearing aids were not particularly effective.²²⁹ Today, over 38.2 million Americans who are aged twelve or older have some hearing loss.²³⁰ Aging exacerbates hearing loss and makes it more widespread in the population.²³¹ Data from the National Health and Nutrition Examination Survey between 2001 and 2010 found that over half of Americans who are in their seventies, and more than 80 percent of Americans who are in their eighties, have mild to

²²¹ Brody, *supra* note 217.

²²² Frank Lin, *Faculty Website*, JOHNS HOPKINS MEDICINE, <https://www.hopkinsmedicine.org/profiles/results/directory/profile/8389751/frank-lin> (last visited Oct. 20, 2020) (stating that Dr. Lin is a professor of otolaryngology, medicine, mental health, and epidemiology).

²²³ JOHNS HOPKINS COCHLEAR CENTER FOR HEARING AND PUBLIC HEALTH, <https://www.jhucochlearcenter.org/> (last visited Oct. 20, 2020).

²²⁴ Brody, *supra* note 217.

²²⁵ *Id.*

²²⁶ *Id.*

²²⁷ *Id.*

²²⁸ *Id.*

²²⁹ *Id.*

²³⁰ Jane E. Brody, *Hearing Loss Threatens Mind, Life and Limb*, N.Y. TIMES (Dec. 31, 2018) <https://www.nytimes.com/2018/12/31/well/live/hearing-loss-threatens-mind-life-and-limb.html>.

²³¹ *Id.*

moderate hearing loss or worse.²³² Hearing aids can cost thousands of dollars and require multiple visits for proper fitting and adjustments for which many people have neither the money, time, patience, nor realistic expectations about the outcome.²³³

Dr. Jennifer A. Deal, an epidemiologist, gerontologist, and co-author of both studies, states that although “hearing loss itself is not very expensive, the effect of hearing loss on everything else is expensive.”²³⁴ Deal explains that hearing loss is not so much an issue of volume loss as it is an issue of sound quality because “parts of words drop out and speech sounds like mumbling. A garbled message is sent to the brain that it has to work harder to decode.”²³⁵ Noisy auditory messages are more difficult for our brains to decode and remember.²³⁶ Such increased load on cognitive processing can lead to social isolation, loneliness, stress, deprivation of cognitively engaging stimuli, and loss of brain function.²³⁷ Because humans utilize their ears to position themselves in space, hearing loss can lead to balance problems and increased falls as people are more likely to be disoriented and startled by another person or object that seems to come out of nowhere.²³⁸

Medical research demonstrates that positive emotional connections play important roles in our physical health and overall well-being.²³⁹ As Dr. Kelli Harding, Columbia University Irving Medical Center assistant clinical professor of psychiatry, said in an interview:

loneliness is as significant a health risk as well-established factors, such as smoking 15 cigarettes a day, heavy alcohol use, even high blood pressure and obesity Once we’re empowered with that knowledge that loneliness is not good for our health, we can actually start

²³² *Id.*

²³³ *Id.*

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ Jane E. Brody, *Hearing Loss Threatens Mind, Life and Limb*, N.Y. TIMES (Dec. 31, 2018) <https://www.nytimes.com/2018/12/31/well/live/hearing-loss-threatens-mind-life-and-limb.html>.

²³⁷ *Id.*

²³⁸ *Id.*

²³⁹ KELLI HARDING, *THE RABBIT EFFECT: LIVE LONGER, HAPPIER, AND HEALTHIER WITH THE GROUNDBREAKING SCIENCE OF KINDNESS* (2019).

doing things within our circle of influence to make things better for other people.²⁴⁰

Studies have found only *correlations* linking deafness and hearing loss to the adverse medical outcomes of above-average emergency room (“ER”) visits, hospitalizations, depression, dementia, and higher medical bills.²⁴¹ It is crucial to emphasize that these studies did *not* find that deafness and hearing loss caused any of the above adverse medical outcomes.²⁴² Stockton University creative writing professor, novelist, translator, and writer Sara Nović, cogently offers alternative explanations for the observed correlations and states emphatically that

presenting these issues as inextricable from being deaf or hard-of-hearing is a gross misunderstanding of both deafness and of the American healthcare system. Conflating correlation with causality fuels shame and worry, and fails to address the roots of the problems, inevitably leading patients and healthcare providers away from the most effective solutions. As an example, deafness and conditions like depression and dementia can be linked, but the assumption that it’s caused by deafness is misleading at best. Imagine an elderly person who has grown up hearing and now finds herself confused in conversation with family and friends. She can probably hear speech but not understand it — things are unclear, especially if there’s background noise like in a restaurant. This is frustrating for both her and her friends, who constantly have to repeat themselves. As a result, the person begins to withdraw from social engagements. She feels isolated and depressed, and less human interaction means less mental exercise. This scenario could certainly speed up the onset of dementia. But there are also many Deaf people who don’t have this experience at all, giving us insight into what actually allows Deaf people to thrive. The American Deaf community—those of us who use ASL and identify culturally with Deafness—is an

²⁴⁰ Kelli Harding, *Why Kindness Is the Key to Improved Well-Being*, KNOWLEDGE@WHARTON (Sept. 26, 2019), https://knowledge.wharton.upenn.edu/article/science-kindness-harding-book/?utm_source=kw_newsletter&utm_medium=email&utm_campaign=2019-09-26.

²⁴¹ Deal et al., *supra* note 218, at 36; Reed et al., *supra* note 220, at 27.

²⁴² Sara Nović, *Deafness Isn’t A ‘Threat’ to Health. Ableism Is*, HEALTHLINE (June 28, 2019), <https://www.healthline.com/health/ableism-health-risk-for-deaf-community-1>.

extremely socially-oriented group These strong interpersonal ties help us navigate the threat of depression and anxiety caused by isolation from our non-signing family.²⁴³

When ambient noise levels increase, speakers have an involuntary tendency, that is known as the Lombard effect or Lombard reflex, to increase their vocal effort, loudness, sound intensity, and vowel duration.²⁴⁴ A study found “the minimum level of noise in a restaurant that starts the Lombard effect, and how it relates to the perceived communication disturbance and the willingness to spend time and money for a meal.”²⁴⁵ Developing NIHL and NIHL can frustrate existing friendships and make it more difficult to forge new ones. People who are not born deaf can become deaf from ear infections associated with viruses.²⁴⁶ Regardless of the reason, people who are born deaf differ from those who lose their hearing after birth differ because the latter are likely to experience an “endowment effect” about hearing.²⁴⁷ Additionally, those who become deaf after birth experience adjustment and transition costs while adapting to losing their hearing.²⁴⁸ This distinction is important as the rise of people using earbuds as opposed to headphones may also contribute to NIHL and NIHL due to differences in how sound is transmitted by earbuds versus headphones.²⁴⁹

Nović cites two studies finding that individuals who are fluent in a signed language have quicker peripheral vision reaction times²⁵⁰ and

²⁴³ *Id.*

²⁴⁴ Harlan Lane & Bernard Tranel, *The Lombard Sign and the Role of Hearing in Speech*, 14 J. SPEECH & HEARING RES. 677 (1971); Etienne Lombard, *Le Signe de l'élévation de la Voix*, 37 ANN. MALADIES DE OREILLE LARYNX 101 (1911).

²⁴⁵ Pasquale Bottalico, *Lombard Effect, Ambient Noise, and Willingness to Spend Time and Money in a Restaurant*, 144 J. ACOUSTIC SOC. AM. EXPRESS LETTERS EL209, EL209 (2018).

²⁴⁶ Sonya Bauer, *Deafness Due to Ear Infection*, STEADYHEALTH (May 27, 2013), <https://ic.steadyhealth.com/deafness-due-to-ear-infection>; *Sudden Deafness*, NAT'L INST. ON DEAFNESS OTHER COMM'C'N DISORDERS (last updated Sept. 14, 2018), <https://www.nidcd.nih.gov/health/sudden-deafness>.

²⁴⁷ See, e.g., Tomer Hochma, *Endowment Effect – The Complete Guide to The Trigger That Influences Your Customers' Minds*, HUMANHOW, <http://humanhow.com/endowment-effect/>.

²⁴⁸ See, e.g., NOEL HOLSTON, *LIFE AFTER DEAF: MY MISADVENTURES IN HEARING LOSS AND RECOVERY* (2019).

²⁴⁹ See, e.g., Jemal R. Brinson, *What's That? How Earbuds Can Wreck Your Hearing (Especially for Young People)*, CHI. TRIB. (Mar. 8, 2016), <https://www.chicagotribune.com/news/ct-earphones-could-be-hurting-your-ears-20160229-htmlstory.html>.

²⁵⁰ Charlotte J. Codina et al., *Peripheral Visual Reaction Time Is Faster in Deaf Adults and British Sign Language Interpreters than in Hearing Adults*, 8 FRONTIERS PSYCHOL. 50 (2017).

speedier directional movement discrimination.²⁵¹ Additionally, Nović notes that often d/Deaf “people are bilingual—in ASL and English, for example.”²⁵² She cites research,²⁵³ demonstrating “the cognitive benefits of bilingualism, including protection against Alzheimer’s-related dementia.”²⁵⁴ Nović points out how existing social institutions cause healthcare and medical technology such as hearing aids to be unavailable to many d/Deaf individuals.²⁵⁵

Although a recent undergraduate honor’s thesis found that exposure to deaf-related labels (such as deaf, hard-of-hearing, or hearing impaired versus no label) in a vignette likely did not influence implicit attitudes about deafness,²⁵⁶ the co-Authors of this Article know of anecdotal evidence where some overextended physicians become frustrated by the time and energy required to provide d/Deaf patients with ASL interpreters, live-captioners, or personal frequency (FM) systems.²⁵⁷

Similarly, some employers may avoid hiring d/Deaf employees because of a false—yet persistent—belief that d/Deaf employees work slower or are more error-prone than hearing employees. Ironically, the very legal duties and protections the ADA impose may cause hearing employers, physicians, and others who interact with d/Deaf people to avoid such interactions because of perceived, and also actual, higher costs in terms of money and time in comparison to interacting with hearing people.

²⁵¹ Nadine Hauthal et al., *Visual Movement Perception in Deaf and Hearing Individuals* 9 ADV. IN COGNITIVE PSYCHOL. 53 (2013).

²⁵² Nović, *supra* note 242.

²⁵³ Edmarie Guzmán-Vélez & Daniel Tranel, *Does Bilingualism Contribute to Cognitive Reserve? Cognitive and Neural Perspectives*, 29 NEUROPSYCHOL. 139 (2015); Blanca Klimova et al., *Bilingualism as a Strategy to Delay the Onset of Alzheimer’s Disease*, 12 CLIN. INTERVENTIONS IN AGING 1731 (2017); Daniela Perani et al., *The Impact of Bilingualism on Brains Reserve and Metabolic Connectivity in Alzheimer’s Dementia*, 114 PROC. NAT’L ACAD. SCI. 1690 (2017); Maurits Van den Noort et al., *A Systematic Review on the Possible Relationship Between Bilingualism, Cognitive Decline, and the Onset of Dementia*, 9 BEHAV. SCI. 81 (2019).

²⁵⁴ Nović, *supra* note 242.

²⁵⁵ *Id.*

²⁵⁶ Sarah Lundquist, *The Effect of Labels Related to Hearing Loss on Implicit Attitudes toward Deafness*, WESTERN OREGON UNIVERSITY HONORS SENIOR THESES/PROJECTS 132 (June 1, 2017),

https://digitalcommons.wou.edu/honors_theses/132/?utm_source=digitalcommons.wou.edu%2Fhonors_theses%2F132&utm_medium=PDF&utm_campaign=PDFCoverPages.

²⁵⁷ Personal frequency (FM) systems are where speakers use microphones and listeners wear wireless Bluetooth receivers and the systems act as a miniature radio stations that operating on special FCC-assigned frequencies.

It does not and should not matter to d/Deaf people if hearing people have no animus towards d/Deaf people if they find accommodating the quality of deafness to be an “annoyance” or a “hassle” and so choose to minimize interactions with d/Deaf people, be they customers, employees, patients, or students. An analogous statement is non-Asian people thinking they like Peter, just not his quality of Asian-ness, or a not-overweight people thinking they like Peter, just not his quality of being pear-shaped.

Unfortunately, there are likely implicit biases²⁵⁸ and explicit biases²⁵⁹ towards d/Deaf people. If implicit bias towards d/Deaf people is just a form of habitual behavior without conscious animus, then perhaps that bad habit can be broken. A number of research studies demonstrate that participating in habit-breaking interventions can dramatically reduce implicit gender and racial bias, with that reductions lasting for months.²⁶⁰ Unchecked implicit bias towards d/Deaf people may cause pervasive employment discrimination towards d/Deaf people, which implies that many d/Deaf individuals have no, or inferior, employer-subsidized health insurance coverage.²⁶¹ Even superior health insurance coverage may not fully, or partially, cover the high cost of hearing aids.²⁶² The result is that d/Deaf individuals who acquire hearing aids have to pay thousands of dollars out-of-pocket and therefore face increased healthcare costs.²⁶³

The finding that d/Deaf people have above-average ER visits is understandable and not surprising in comparison to any marginalized subpopulation.²⁶⁴ American healthcare inequities due to class, gender, race, and ability are well-documented,²⁶⁵ while there are “significant challenges in communication with health providers and gaps in global health knowledge for deaf people including those with even higher risk of

²⁵⁸ See, e.g., TEDx Talks, *Immaculate Perception: Jerry Kang at TEDxSanDiego* 2013, YOUTUBE (Jan. 28, 2014), <https://www.youtube.com/watch?v=9VGbwNI6Ssk&app=desktop>.

²⁵⁹ Lydia Callis, *Deaf Discrimination: The Fight for Equality Continues*, HUFFPOST (July 17, 2015, 10:05 AM), https://www.huffpost.com/entry/deaf-discrimination-the-f_b_7790204.

²⁶⁰ Molly Carnes et al., *Effect of an Intervention to Break the Gender Bias Habit for Faculty at One Institution: A Cluster Randomized, Controlled Trial*, 90 ACAD. MED.: J. ASSOC. AM. MED. C. 221 (2015); Patricia G. Devine et al., *A Gender Bias Habit-Breaking Intervention Led to Increased Hiring of Female Faculty in STEM Departments*, 73 J. EXPERIMENTAL SOC. PSYCHOL. 211 (2017); Patricia G. Devine et al., *Long-Term Reduction in Implicit Race Bias: A Prejudice Habit-Breaking Intervention*, 48 J. EXPERIMENTAL SOC. PSYCHOL. 1267 (2012).

²⁶¹ *Id.*

²⁶² *Id.*

²⁶³ *Id.*

²⁶⁴ *Id.*

²⁶⁵ Gloria L. Krahn et al., *Persons With Disabilities as an Unrecognized Health Disparity Population*, 105 AM. J. PUB. HEALTH S2 (2015).

marginalization.”²⁶⁶ Multiple physician implicit biases are also well-documented.²⁶⁷ It should not be surprising that deaf people, particularly individuals who live in the intersection of multiple identities, find healthcare at every level to be inaccessible.²⁶⁸

If an individual’s hearing loss is undiagnosed or goes untreated, or if a healthcare provider fails to effectively communicate with a d/Deaf individual, then, unsurprisingly, there will be confusion, panic, and misdiagnoses. Even though federal law, under Title III of the ADA²⁶⁹ and Section 504 of the Rehabilitation Act of 1973 (“RA”),²⁷⁰ requires that hospitals provide appropriate auxiliary aids to hearing-impaired patients if needed for effective communication, hospitals notoriously do not provide ASL interpreters.²⁷¹ Hard-of-Hearing (“HoH”) patients who know of their hearing loss and some elderly deaf patients might be unsure about how to advocate for an ASL interpreter, live-captioner, or personal FM system.

Culturally Deaf individuals seeking healthcare often end up having to discuss their being deaf or defending their Deaf cultural identity instead of the reason for their medical visit, whether it be to a primary care physician, specialist, or even a dentist.²⁷² An unfortunate result of these communication problems is that d/Deaf and HoH individuals have greater mistrust of medical professionals.²⁷³ Financial considerations about and higher distrust of healthcare providers result in d/Deaf and HoH people

²⁶⁶ Alexa Kuenburg et al., *Health Care Access Among Deaf People*, 21 J. DEAF STUD. & DEAF EDUC. 1, 1 (2016).

²⁶⁷ Down Boatright et al., *Racial Disparities in Medical Student Membership in the Alpha Omega Alpha Honor Society*, 177 J. AM. MED. ASS’N: INTERNAL MED. 659 (2017); Julie R. Boiko et al., *Representation of Women Among Academic Grand Rounds Speakers*, 177 J. AM. MED. ASS’N: INTERNAL MED. 722 (2017); Arjun Dayal et al., *Comparison of Male vs Female Resident Milestone Evaluations by Faculty During Emergency Medicine Residency Training*, 177 J. AM. MED. ASS’N: INTERNAL MED. 651 (2017); Bruce Y. Lee, *Three New Studies Suggest Gender And Racial Bias In Medical Training*, FORBES (Mar. 12, 2017, 12:17 PM), <https://www.forbes.com/sites/brucelee/2017/03/12/three-new-studies-suggest-gender-and-racial-bias-in-medical-training/-321d58571930>; DAYNA BOWEN MATTHEW, *JUST MEDICINE: A CURE FOR RACIAL INEQUALITY IN AMERICAN HEALTH CARE* (2015); Dayna Bowen Matthew, *Toward a Structural Theory of Implicit Racial and Ethnic Bias in Health Care*, 25 HEALTH MATRIX 61 (2015).

²⁶⁸ Nović, *supra* note 242.

²⁶⁹ 42 U.S.C. §§ 12181–12189 (2018).

²⁷⁰ 29 U.S.C. § 794 (2018).

²⁷¹ Leila Miller, *‘I was Panicked’: Deaf Patients Struggle to Get Interpreters in Medical Emergencies*, STAT (May 22, 2017), <https://www.statnews.com/2017/05/22/deaf-patients-interpreters/>.

²⁷² Nović, *supra* note 242.

²⁷³ Kuenburg et al., *supra* note 266.

going to ERs only after life-threatening symptoms present and enduring multiple hospital visits because they are not understood, nor listened to, by physicians.²⁷⁴

Nović believes “that’s the root of the problem really: an unwillingness to center the experiences and voices of d/Deaf people.”²⁷⁵ As Nović eloquently says, “while isolation for all people, deaf or hearing, can lead to depression and dementia in the elderly, it’s not a problem inherently worsened by deafness. Rather, it’s exacerbated by a system that isolates d/Deaf people. That’s why ensuring our community can stay connected and communicate is so important.”²⁷⁶ For good reasons, Nović advocates that instead of telling

those with hearing loss that they’re doomed to a life of loneliness and mental atrophy, we should be encouraging them to reach out to the Deaf community, and teaching hearing communities to prioritize accessibility. For the late-deafened, this means providing hearing screenings and assistive technology like hearing aids, and facilitating communication with closed captions and community ASL classes. If society stopped isolating elderly deaf and hard-of-hearing people, they’d be less isolated. Maybe we can start by redefining what it means to be “fine,” and considering that the systems abled people have created—not deafness itself—are at the root of these issues. The problem isn’t that we d/Deaf people can’t hear. It’s that doctors and communities don’t listen to us. Real education—for everyone—about the discriminatory nature of our institutions, and about what it means to be d/Deaf, is our best chance at lasting solutions.²⁷⁷

We agree with Nović and believe that KODAs and CODAs can and should play a critical role in bridging and unifying the d/Deaf and hearing communities and cultures. We also believe that d/Deaf and hearing people should practice compassionate curiosity, inclusiveness, and kindness towards each other. After all, many hearing people are destined to become late-deafened through aging and NIHL and NIHHL. Hearing societal attitudes towards the d/Deaf can and should be more inclusive and kinder.

²⁷⁴ Nović, *supra* note 242.

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.*

Additionally, the kindness that we give and receive provides us medical benefits.²⁷⁸ As Dr. Kelli Harding, MD, MPH said in an interview: “There’s this really exciting science of epigenetics and telomere research that shows that loving actions actually change our physiology . . . being kind is a practice, and it’s hard. . . . What’s encouraging is that we can all become more aware of our biases and try to be kinder.”²⁷⁹

There are now kindness initiatives and organizations, nationally and internationally. A recent domestic example is the University of California, Los Angeles (“UCLA”) “announced a global first: it would use a \$20 million alumnus donation to start the UCLA Bedari Kindness Institute, an interdisciplinary effort aimed at researching ways in which showing kindness benefits both individuals and society.”²⁸⁰ Spreading healing and cultivating kindness to oneself and others is “why Jennifer and Matthew Harris wanted to start the Bedari Kindness Institute, named after the first syllable of the names of their three children: Beckett, Dakota and Riley.”²⁸¹ An international example is the World Kindness Movement,²⁸² which is a global, non-profit organization that was “crystallised at a conference in Tokyo on 20th September 1997”²⁸³ and is dedicated “to inspire individuals towards greater kindness by connecting nations to create a kinder world.”²⁸⁴

III. CHRONIC REPEATED AMBIENT ACOUSTIC POLLUTION (“CRAAP”)

Because CRAAP is what economists term a negative externality,²⁸⁵ there is a well-developed, voluminous law and economics literature about

²⁷⁸ Harding, *supra* note 239.

²⁷⁹ *Id.*

²⁸⁰ Marco della Cava, *Kindness Fever Strikes LA, from Homeless Singer Emily Zamourka to a New UCLA Institute*, USA TODAY (Oct. 6, 2019, 3:48 PM), <https://www.usatoday.com/story/news/nation/2019/10/04/homeless-singer-emily-zamourka-flooded-kindness-ucla-takes-note/3864699002/>.

²⁸¹ Teresa Watanabe, *New UCLA Institute Will Study—and Spread—Kindness*, L.A. TIMES (Sept. 25, 2019, 5:00 AM), <https://www.latimes.com/california/story/2019-09-24/ucla-bedari-kindness-institute-launch>.

²⁸² WORLD KINDNESS MOVEMENT, <https://www.theworldkindnessmovement.org/> (last visited Oct. 20, 2020).

²⁸³ *Id.*

²⁸⁴ *Id.*

²⁸⁵ Justin Ross, *Will You Stop That Infernal Racket!?! in HOMER ECONOMICUS: THE SIMPSONS AND ECONOMICS* 81 (Joshua Hall ed., 2014) (providing an introduction to negative externalities utilizing examples from the well-known animated television program *The Simpsons*).

how to reduce CRAAP through various forms of policy responses, including taxation; assigning and allowing trading of alienable, well-defined property rights; mandating informational disclosures; and nudging people. The rest of this Section discusses what neoclassical, informational, and behavioral law and economics have to contribute about how to achieve legal, political, and social change and applies that research to reducing NIHL and NIHHL due to CRAAP. It also advocates that the law and economics literature incorporate and mathematically analyze the social psychology notion of attitudes and explains how law can play a role in changing people's and society's attitudes.

A. NEOCLASSICAL, INFORMATIONAL, AND BEHAVIORAL ECONOMICS

A neoclassical welfare-economics approach due to economist Arthur C. Pigou²⁸⁶ is to view negative externalities as the result of divergences between private and social (marginal) costs.²⁸⁷ The Pigouvian solution to negative externalities is to have the government impose taxes on activities that generate negative externalities.²⁸⁸ This is the idea underlying carbon taxes that are often discussed in the context of a policy response to global climate change. The analogue in the context of CRAAP would be to impose NIHL and NIHHL taxes to incentivize acoustic polluters to reduce their generation of CRAAP. Taxing activities that generate CRAAP is an attractive idea.²⁸⁹ However, implementation issues arise, including how to determine the optimal tax level and the economic incidence of such taxes—*i.e.*, whether CRAAP-generating corporations are able to pass forward such taxes to consumers or pass backward such taxes to employees or suppliers. There is also the usual inefficiency of any tax, including CRAAP taxes, distorting consumer choices at the margin.

A different neoclassical law and economics approach often associated with the University of Chicago is what is known as the Coasian bargaining approach or solution to negative externalities. Ronald H. Coase was the Clifton R. Musser Professor Emeritus of Economics at the

²⁸⁶ The History of Economic Thought, *Arthur Cecil Pigou, 1877–1959 Profile*, <https://www.hetwebsite.net/het/profiles/pigou.htm>.

²⁸⁷ ARTHUR PIGOU, *THE ECONOMICS OF WELFARE* (1920).

²⁸⁸ See, e.g., FRANK, *MICROECONOMICS AND BEHAVIOR*, 555–56 (9th ed. 2014) (providing intermediate microeconomics textbook examples of noise taxes).

²⁸⁹ See, e.g., B. DOUGLAS BERNHEIM & MICHAEL D. WHINSTON, *MICROECONOMICS* 722–35 (2d ed. 2014) (providing intermediate microeconomics textbook examples of noise abatement limits, noise taxes, liability rules, Pigouvian noise taxes, policy errors, and hybrid policies).

University of Chicago Law School from 1964 until his death.²⁹⁰ Coase received the 1991 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel, for Coase's "discovery and clarification of the significance of transaction costs and property rights for the institutional structure and functioning of the economy."²⁹¹

In his famous article, *The Problem of Social Cost*,²⁹² and another of his articles, *The Federal Communications Commission*,²⁹³ Coase discusses the landmark nuisance case of *Sturges v. Bridgman*.²⁹⁴ In this case,²⁹⁵ for over thirty years, Bridgman had made sweets for sale in his kitchen, which housed machinery in the form of two mortars that were very noisy during their operation. Bridgman's kitchen wall bordered the garden of a physician Sturges' property. Sturges decided to build a consultation room in a small shed on the boundary of both properties. Loud noises from Bridgman's kitchen disrupted Sturges' ability to use his medical practice's consultation room. Coase stated what has since become known as the Coase theorem with these words: "With costless market transactions, the decision of the courts concerning liability for damage would be without effect on the allocation of resources."²⁹⁶ Coase's pivotal contributions to the problem of social cost include observing the reciprocal nature of negative externalities and stating that society's objective should be "to avoid the more serious harm."²⁹⁷

Joseph Farrell, a modern information economic theorist, pointedly observes that what has received much attention in the law and economics literature is that Coase concludes "people can negotiate their way to efficiency."²⁹⁸ What has received much less attention is that Coase came to that conclusion only under a counterfactual and strong assumption of a world of zero transactions costs. Farrell notes "the popular simple view of the Coase theorem is a tautology: that if bargaining and negotiation are perfect (that is, produce perfect outcomes) then the outcomes are perfect.

²⁹⁰ About Ronald Coase, THE RONALD COASE INST., <https://www.coase.org/aboutronaldcoasehtm> (last visited Oct. 20, 2020).

²⁹¹ Ronald H. Coase Facts, NOBEL PRIZE, <https://www.nobelprize.org/prizes/economic-sciences/1991/coase/facts/> (last visited Oct. 20, 2020).

²⁹² Ronald Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 8-10 (1960).

²⁹³ Ronald Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1, 26 n.53 (1959).

²⁹⁴ *Sturges v. Bridgman*, 11 Ch. D. 852 (1879).

²⁹⁵ See, e.g., FRANK, *supra* note 288, at 535-40 (providing intermediate microeconomics textbook examples of Coasian bargaining over noise).

²⁹⁶ Coase, *supra* note 292, at 10.

²⁹⁷ Coase, *supra* note 293, at 26.

²⁹⁸ Joseph Farrell, *Information and the Coase Theorem*, J. ECON. PERSP., Fall 1987, at 113, 113.

Actually, negotiation is far from perfect, even in the simplest situations.”²⁹⁹ Farrell shares parenthetically: “I once tried to bribe some noisy neighbors to be quiet, and the response was a puzzled and angry rebuff.”³⁰⁰ Farrell emphasizes that negotiation “is especially imperfect in the hardest problems—those with private information—where we are most in need of good systems for resolving conflict.”³⁰¹

Modern CRAAP causes difficult problems concerning private information about current and future NIHL and NIHHL levels, which vary across people at any given time and also are rife with uncertainty over time. The significant number of parties involved, among other factors, would render negotiations unwieldy—successful, let alone, Pareto efficient, negotiated outcomes would be unrealistic. Thus, private bargaining over the problem of CRAAP is not a solution with even as few parties as two individuals, and certainly not for societies writ large.

For example, a long-running neighborhood dispute in the village of Saint-Pierre-d’Oléron, on the Isle of Oléron, France over the early morning crowing of a rooster (one of France’s national symbols) named Maurice led to a recent court battle,³⁰² in which neighbors accuse Maurice of noise pollution.³⁰³ This case is “a classic dispute, with noise problems and city dwellers who do not understand,”³⁰⁴ and exemplifies “deeper issues in contemporary society”³⁰⁵ including “that we no longer tolerate each other.”³⁰⁶ A lawyer specializing in animal law told CNN “these kind of issues are common.”³⁰⁷ A civil court in Rochefort, Charente Maritime ruled in favor of Maurice’s owner, Corinne Fesseau, and ordered the complaining neighbors “to pay €1,000 (about \$1,100) in damages.”³⁰⁸

²⁹⁹ *Id.* at 125.

³⁰⁰ *Id.*

³⁰¹ *Id.*

³⁰² Jack Guy & Antoine Crouin, *Maurice the Rooster in the Dock in Divisive French Trial*, CNN (July 4, 2019, 1:49 PM), <https://www.cnn.com/2019/07/04/europe/france-cockerel-trial-scli-intl/indexhtml>.

³⁰³ Thanks to University of Colorado law school fall 2019 Torts I student, Ms. Abbie L. Swanson, for informing us about such a fascinating and intriguing case. She “stands with Maurice!” (Email dated Sept. 16, 2019, at 10:51 AM on file with the first author).

³⁰⁴ Guy & Crouin, *supra* note 302.

³⁰⁵ *Id.*

³⁰⁶ *Id.*

³⁰⁷ *Id.*

³⁰⁸ Emily Dixon et al., *French Rooster Owner is Cock-A-Hoop After Winning Noise Battle*, CNN (Sept. 5, 2019), https://edition.cnn.com/travel/article/france-maurice-rooster-free-scli-intl/indexhtml?utm_content=2019-09-09T06%3A31%3A06&utm_medium=social&utm_term=video&utm_source=twCNN.

This case became the subject of international headlines “and came to symbolize the polarization between rural and urban France—particularly because the neighbors who objected to his crowing are city dwellers and only visit Saint-Pierre-d’Oléron a few times a year, according to Fesseau.”³⁰⁹

If private negotiations are unlikely to solve the problems of CRAAP, then how about mandating disclosures of the dangers of NIHL and NIHHL? Such an informational-based policy is a regulatory favorite because of its light touch. As the famous Chinese philosopher and founder of Taoism, Lao-Tzu stated, “Govern big countries like you cook little fish.”³¹⁰ What is the meaning of this cryptic advice? “Presumably, this means that you mostly leave them alone. Little fish are delicate, and if you keep flipping them or fussing with them they fall apart One needs to be mindful of the law of unintended consequences in governing and in instituting economic policy.”³¹¹ The information economics philosophy underlying mandated disclosure is that once people have information, people will act in their own best self-interests. This is a particularly decision-theoretic, rationalist view of how people act, which might be descriptively accurate, especially of many economists and lawyers.

Unfortunately, because most people certainly today are inundated with too much information to effectively process, people’s attention is a scarce resource to be economized. As the 1978 recipient of the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel,³¹² polymath Herbert Simon famously said, “[w]hat information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention, and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.”³¹³ In other words, the target audiences of disclosure may not pay attention to such disclosures and thus may not act on information disclosures. Behavioral economists Russell Golman, David Hagmann, and George Loewenstein review a growing theoretical and

³⁰⁹ *Id.*

³¹⁰ LAO-TZU, TAO TE CHING, sec. 60.

³¹¹ William Irwin, *Minimal State Taoism*, 38 REASON PAPERS 65, 71 (2016).

³¹² NobelPrize.org, *Herbert Simon, Summary*, The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1978, <https://www.nobelprize.org/prizes/economic-sciences/1978/summary/> (last visited Oct. 20, 2020).

³¹³ Herbert Simon, *Designing Organizations for an Information-Rich World*, in COMPUTERS, COMMUNICATION, AND THE PUBLIC INTEREST, 37, 40 (Martin Greenberger eds., 1971).

experimental literature about information avoidance.³¹⁴ Golman and Loewenstein propose a theory about how people may have preferences over acquiring or avoiding information.³¹⁵

Michael Barsa,³¹⁶ an environmental law scholar and early observer of the limits of information economics, proposes a consciousness-raising role for mandated disclosures,³¹⁷ which differs from its alleged information-provision role for consumers. Barsa's clever alternative is that mandatory disclosures can raise corporate awareness and would change corporate behavior pro-socially in order to avoid having to make the mandated disclosures. The idea is to harness competitive market economic forces and unleash the profit motive to avoid anti-social corporate behavior requiring disclosure. Barsa's proposal uses corporate self-interest to mitigate CRAAP. The genius of Barsa's perspective is that while individuals may have preferences to avoid information, corporations, which are groups of people, have incentives to acquire information that is relevant to profits. In fact, multiple groups of people within corporations have the same incentives to acquire profit-relevant information, such as the marketing division, office of general counsel, and public relations department.

Frank Partnoy, noted author, and Adrian A. Kragen, University of California, Berkeley Law School professor,³¹⁸ succinctly wrote: "Corporations kill people."³¹⁹ We simply would add that corporations also can often deafen people. Mandatory disclosures about corporations' CRAAP causing NIHL and NIHHL work as a form of transparency that changes the behavior of the would-be-discloser to avoid being compelled to disclose such acoustic "bad behavior." This is precisely the type of role for mandatory disclosure that Supreme Court Justice Louis Brandeis had in mind when he famously said: "Publicity is justly commended as a

³¹⁴ Russell Golman, David Hagmann, & George Loewenstein, *Information Avoidance*, 55 J. ECON. LIT. 96 (2017).

³¹⁵ Russell Golman & George Loewenstein, *Information Gaps: A Theory of Preferences Regarding the Presence and Absence of Information*, 5 DECISION 143 (2018).

³¹⁶ Michael R. Barsa, *Professor of Practice, Co-Director of the Environmental Law Concentration*, NW. PRITZKER SCH. L., <http://www.law.northwestern.edu/faculty/profiles/MichaelBarsa/> (last visited Oct. 20, 2020).

³¹⁷ Michael Barsa, *California's Proposition 65 and the Limits of Information Economics*, 49 STAN. L. REV. 1223 (1997).

³¹⁸ *Frank Partnoy, Adrian A. Kragen Professor of Law*, UNIV. CAL., BERKELEY L., <https://www.law.berkeley.edu/our-faculty/faculty-profiles/frank-partnoy/> (last visited Oct. 20, 2020).

³¹⁹ Frank Partnoy, *Corporations and Human Life*, 40 SEATTLE U. L. REV. 399, 399 (2017).

remedy for social and industrial diseases. Sunlight is said to be the best of disinfectants; electric light the most efficient policeman.”³²⁰

Barsa’s notion of the consciousness-raising role of law goes beyond the law’s role in establishing and enforcing rules, and is also related to, yet differs from an expressive role of laws.³²¹ Raising consciousness about something means drawing (more) attention to something, while a law’s expressive role is about conveying a social meaning that alters or sustains community or social norms. Although Barsa originally suggested his idea in 1997, his notion of law raising consciousness is even more apropos in an age of posts and tweets rapidly spreading ideas and memes online.

Especially in today’s digital world of social media and viral videos, mandatory NIHL and NIHHL disclosures may incentivize corporations to reduce—if not eliminate—their CRAAP. It is good business and advantageous optics to be a corporation that does not generate CRAAP or cause NIHL and NIHHL. Many of today’s most popular companies are so-called firms of endearment.³²² For example, *Apple* offers accessible technology.³²³ People can browse and share reviews about businesses on the website *deaffriendly.com*. “Sign language restaurants, such as *Signs*, *Mozzeria*, and *Deafined*, are gaining popularity by offering patrons a ‘Deaf dining experience,’ complete with deaf/HoH waitstaff.”³²⁴ A Burger King in Oklahoma City fired an employee who refused to provide drive-through service to a deaf mother, Rachel Hollis, with her two kids in her car.³²⁵ Less than a month later, a Jack in the Box in Campbell, California fired an employee who refused to provide drive-through service to another deaf mother, ReVae Arnaud-Jensen, a single mother with one of her three sons in her car, and mocked her for her deafness by pantomiming ASL and laughing.³²⁶

³²⁰ Louis D. Brandeis, *What Publicity Can Do*, HARPER’S WEEKLY, Dec. 13, 1913, at 10.

³²¹ RICHARD MCADAMS, *THE EXPRESSIVE POWERS OF LAW: THEORIES AND LIMITS* (2017).

³²² RAJENDRA SISODIA ET AL., *FIRMS OF ENDEARMENT: HOW WORLD-CLASS COMPANIES PROFIT FROM PASSION AND PURPOSE* (2nd ed. 2014).

³²³ *Accessibility*, APPLE, <https://www.apple.com/accessibility/> (last visited Oct. 20, 2020).

³²⁴ Callis, *supra* note 259.

³²⁵ Chase Horn, *Oklahoma Woman Says She was Refused Service at Fast Food Restaurant Because She’s Deaf*, USA TODAY (Aug. 23, 2019, 3:41 PM), <https://kfor.com/2019/08/22/oklahoma-woman-says-she-was-refused-service-at-fast-food-restaurant-because-shes-deaf/>.

³²⁶ Chris Matyszczyk, *Burger King Fired An Employee For Refusing To Serve A Deaf Woman. Then It Happened Again*, INC (Sept. 14, 2019), <https://www.inc.com/chris-matyszczyk/burger-king-fired-an-employee-for-refusing-to-serve-a-deaf-person-then-this-happened.html>.

In August 2019, signed by CEOs of 181 companies, *The Business Roundtable* announced (with much fanfare and press) a new statement on the *Purpose of a Corporation*, shifting away from shareholder primacy to include a commitment to all stakeholders (including customers, employees, communities, and suppliers).³²⁷ Institutional investors issued a statement in response, commenting that: “[a]ccountability to everyone means accountability to no one.”³²⁸ A corporate law commentator argued, on the other hand, that the *Business Roundtable Statement on Corporate Purpose* is neither legally correct (because in Delaware, corporate boards of directors are legally obligated by fiduciary duty to act in the best interests of the shareholders) nor necessary (because if they believe taking into account views or interests of customers, employees, communities, and suppliers advances shareholders’ interests, then corporate boards of directors already have the authority and power to do so).³²⁹ A current volunteer director of the National Center for Access to Justice and a retired corporate law firm partner, Jamie Gamble, however, believes that his former clients’ employees, namely corporate executives, “are legally obligated to act like sociopaths.”³³⁰ Michael Moore expressed a similar sentiment in his documentary film, *The Corporation*.³³¹ *The Corporation* applied the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (“DSM-IV”)—a tool used by psychiatrists and psychologists to diagnose psychiatric illness—to corporations; unsurprisingly, he found that corporations display highly anti-social psychopathic “personalities.”³³²

³²⁷ *Statement on the Purpose of a Corporation*, BUS. ROUND TABLE (Aug. 19, 2019), <https://opportunity.businessroundtable.org/ourcommitment/>.

³²⁸ *Council of Institutional Investors Responds to Business Roundtable Statement on Corporate Purpose*, COUNCIL OF INSTITUTIONAL INVESTORS (Aug. 19, 2019), https://www.cii.org/aug19_brt_response.

³²⁹ Morton Pierce, *Analysis of the Business Roundtable Statement*, HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE (Sept. 26, 2019), <https://corpgov.lawharvard.edu/2019/09/26/analysis-of-the-business-roundtable-statement/>.

³³⁰ Andrew Ross Sorkin, *Ex-Corporate Lawyer’s Idea: Rein In ‘Sociopaths’ in the Boardroom*, N.Y. TIMES (July 29, 2019), <https://www.nytimes.com/2019/07/29/business/dealbook/corporate-governance-reform-ethics.html>; see also James Gamble, *The Most Important Problem in the World*, MEDIUM (Mar. 13, 2019), <https://medium.com/@jgg4553542/the-most-important-problem-in-the-world-ad22ade0ccfe>.

³³¹ THE CORPORATION (Big Picture Media Corporation 2003).

³³² DAVID PAPKE ET AL., *LAW AND POPULAR CULTURE: TEXT, NOTES, AND QUESTIONS* 471–72 (2d. ed. 2012) (discussing whether corporations have multiple and psychopathic personalities); see also Jayne W. Barnard, *Narcissism, Overt-Optimism, Fear, Anger, and Depression: The Interior Lives of Corporate Leaders*, 77 U. CINCINNATI L. REV. L. 405 (2008) (discussing dysfunctional boards of directors).

One possible rationale behind the *Business Roundtable Statement on Corporate Purpose* is that it was an attempt to preempt proposed federal legislation. For example, Senator Elizabeth Warren's bill, *Accountable Capitalism Act*,³³³ proposes a "constituency statute," which would impose a duty of "creating a general public benefit" on a corporate board of directors, broadening a corporation's stakeholders to include shareholders, employees, and the environment, in addition to the long-term interests of the enterprise.³³⁴

Barsa's proposal that environmental law can raise corporate consciousness is related to Professor Philip Harvey's³³⁵ idea that economic and social human rights are exemplars of aspirational law,³³⁶ such as the notion from the U.S. Declaration of Independence that all people (and not just men) "are created equal." Similarly, in the iconic title sequence of the original *Star Trek* science fiction television series,³³⁷ Captain James T. Kirk, portrayed by actor William Shatner, says in an offscreen voiceover: "Space: the final frontier. These are the voyages of the starship Enterprise. Its five-year mission: to explore strange new worlds. To seek out new life and new civilizations. To boldly go where *no man* has gone before!"³³⁸ In the also iconic title sequence of the rebooted science fiction television series, *Star Trek: The Next Generation*,³³⁹ Captain Jean-Luc Picard, as portrayed by actor Patrick Stewart, says in an offscreen voiceover: "Space: the final frontier. These are the voyages of the starship Enterprise. Its continuing mission: to explore strange new worlds. To seek out new life and new civilizations. To boldly go where *no one* has gone before!"³⁴⁰

Standard (law and) economics, which includes neoclassical (law and) economics and informational (law and) economics, assume that people (behave as if they) maximize exogenously given, fixed preferences.³⁴¹ Behavioral (law and) economics challenges this assumption and analyzes

³³³ Accountable Capitalism Act, S. 3348, 115th Cong. (2018), [https://www.warren.senate.gov/imo/media/doc/Accountable Capitalism Act One-Pager.pdf](https://www.warren.senate.gov/imo/media/doc/Accountable%20Capitalism%20Act%20One-Pager.pdf)

³³⁴ Accountable Capitalism Act, S. 3348, 115th Cong. §§ 3, 5, 6, 8 (2018), <https://www.congress.gov/bill/115th-congress/senate-bill/3348/text>.

³³⁵ Philip L. Harvey, RUTGERS L. SCH., <https://law.rutgers.edu/directory/view/pharvey> (last visited Oct. 20, 2020).

³³⁶ Philip Harvey, *Aspirational Law*, 52 BUFF. L. REV. 701 (2004).

³³⁷ STAR TREK (NBC television series 1966–69).

³³⁸ *Id.*

³³⁹ STAR TREK: THE NEXT GENERATION (Paramount Domestic Television Series 1987–1994).

³⁴⁰ *Id.*

³⁴¹ Ariel Porat, *Changing People's Preferences by the State and the Law*, THEORETICAL INQUIRIES IN LAW (2019).

how and why governments and laws may change people’s preferences.³⁴² The next section focuses on a particular type of endogenously determined belief-dependent preferences, namely those which depend on people wanting to feel pride from adherence to and compliance with (or wanting to avoid feeling anxiety, embarrassment, guilt, remorse, or shame from violation of and non-compliance with) endogenously determined social norms.

B. ACHIEVING LEGAL, POLITICAL, AND SOCIAL CHANGE

In a fascinating book,³⁴³ the Director of Education at Mercy For Animals—a national non-profit animal protection organization—and Nick Cooney—the founder of The Human League—applied over eighty years of psychology research to understand why individuals embrace some ideas and resist others. His “book is about how to create change, particularly in individuals. If you are seeking a more compassionate world, consider this a psychological road map.”³⁴⁴ The field of behavioral economics applies insights from cognitive and social psychology to analyze human economic behavior. The field of behavioral law and economics applies behavioral economics to analyze legal rules and institutions. Harvard Law School Professor Cass Sunstein,³⁴⁵ —the Administrator of the White House Office of Information and Regulatory Affairs from 2009 to 2012—oversaw federal regulations based upon behavioral economics designed to influence choices about healthcare, spending, saving, investing, and retirement planning.³⁴⁶

³⁴² Jennifer Arlen & Lewis A. Kornhauser, *Can the Law Change Preferences?* (NYU Sch. L. 2020) (NYU Pub. L. Rsch. Paper No. 20-27; NYU L. and Econ. Rsch. Paper No. 20-26), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3656461 (clarifying that law changes beliefs about attributes or consequences of choice options, rather than changing preferences).

³⁴³ NICK COONEY, *CHANGE OF HEART: WHAT PSYCHOLOGY CAN TEACH US ABOUT SPREADING SOCIAL CHANGE* (2011).

³⁴⁴ *Id.* at 7.

³⁴⁵ Cass R. Sunstein, *Faculty website*, HARV. L. SCH., <https://hls.harvard.edu/faculty/directory/10871/Sunstein> (last visited Oct. 20, 2020). Sunstein also wrote a book, *THE WORLD ACCORDING TO STAR WARS* (2016), in which he “is perceptive about the way ‘Star Wars’ dramatizes how rebellions take shape and how democracies tumble into dictatorship. See A. O. Scott, *Review: Please Help Me, Obi-Wan Kenobi*, N.Y. TIMES (June 9, 2016), <https://www.nytimes.com/2016/06/10/books/review-the-world-according-to-star-wars-by-cass-sunstein.html>.

³⁴⁶ CASS R. SUNSTEIN, *HOW CHANGE HAPPENS* 59–66 (2019).

In a recent book,³⁴⁷ Sunstein analyzes historical examples of social changes to draw lessons about how to achieve change from the status quo.³⁴⁸ He applies behavioral economics, psychology, and other disciplines to examine how change happens by focusing on the role and dynamics of social norms.³⁴⁹ He draws on the research of Timur Kuran, professor of economics and political science, and Gorter Family Professor of Islamic Studies at Duke University. Kuran developed a theory of preference falsification, in which people hide their actual preferences because they perceive social pressure to do so.³⁵⁰ An everyday example of this ubiquitous phenomenon occurs when dinner guests tell their host that they enjoy the food they actually think does not taste good. When people falsify their true preferences to fit into perceived social norms,³⁵¹ their motivation is in part to avoid experiencing the negative feelings of anxiety, embarrassment, guilt, or shame.³⁵²

Three economists—John Geanakoplos, David Pearce, and Ennio Stacchetti—developed a theory of psychological games in which players' utilities depend on what every player does, what players think other players believe players will do, and other similar, higher order beliefs about players' behavior.³⁵³ Psychological games permit formal game-theoretic models of belief-dependent emotions, such as anger and surprise.³⁵⁴ Professor Ho-Mou Wu, and the law professor co-Author of this Article apply psychological game theory to mathematically analyze such emotions in litigation as anger, pride, and vengeance.³⁵⁵ More relevantly to this Article, they also apply psychological game theory to mathematically analyze such emotions as discomfort, embarrassment, guilt, remorse, and

³⁴⁷ SUNSTEIN, *supra* note 346.

³⁴⁸ Amanda Marcotte, *Cass Sunstein on "How Change Happens": Hope that a Better Society is Possible*, SALON TALKS (Apr. 27, 2019, 4:00 PM), <https://www.salon.com/2019/04/27/cass-sunstein-on-how-change-happens-hope-that-a-better-society-is-possible/>.

³⁴⁹ SUNSTEIN, *supra* note 346, at 1–55.

³⁵⁰ TIMUR KURAN, *PRIVATE TRUTHS, PUBLIC LIES: THE SOCIAL CONSEQUENCES OF PREFERENCE FALSIFICATION* (Reprint ed. 1997).

³⁵¹ Jon Elster, *Rationality, Emotions, and Social Norms*, 98 *SYNTHESE* 21, 23 (1994).

³⁵² JENNIFER JACQUET, *IS SHAME NECESSARY?: NEW USES FOR AN OLD TOOL* (Reprint ed. 2016).

³⁵³ John Geanakoplos et al., *Psychological Games and Sequential Rationality*, 1 *GAMES & ECON. BEHAVIOR* 60 (1989).

³⁵⁴ *Id.* at 60, 62.

³⁵⁵ Peter H. Huang & Ho-Mou Wu, *Emotional Responses in Litigation*, 12 *INT'L REV. L. & ECON.* 31 (1992).

shame.³⁵⁶ They mathematically analyze the maintenance of social order through social norms, instead of laws. In their model, people are motivated to comply with social norms to avoid feeling belief-dependent guilt about norm violations.³⁵⁷ There are multiple psychological equilibria associated with different social norms.³⁵⁸ Social norms can be sustained and upset by a desire to preserve or save face.³⁵⁹

For example, compliance with social norms to gain or keep social approval can strongly influence recycling behaviors. Social psychology research finds that people are less likely to recycle things they perceive as imperfect and more likely to throw them away.³⁶⁰ Additionally, a fear of recycling incorrectly can commonly reduce recycling.³⁶¹ Interestingly,³⁶² norm entrepreneurs use that same desire for social approval to overcome other common psychological recycling inhibitions.³⁶³ Harvard University John F. Kennedy School of Government Albert Pratt Professor of Business and Government and Academic Dean Iris Bohnet,³⁶⁴ applies behavioral economics to provide concrete, workable proposals about how to achieve gender equality by institutional design.³⁶⁵ Bohnet also discusses how norm entrepreneurs can shape organizational norms.³⁶⁶

Sunstein discusses cigarette smoking as an example of where “revisions in norms can result in large-scale changes in an astoundingly short time, including legal reforms, which can entrench and fortify those revisions.”³⁶⁷ How quickly social norms can change is exemplified by the

³⁵⁶ Peter H. Huang & Ho-Mou Wu, *More Order without More Law: A Theory of Social Norms and Organizational Cultures*, 10 J.L. ECON. & ORG. 390 (1992).

³⁵⁷ *Id.* at 390, 392.

³⁵⁸ *Id.* at 390, 391.

³⁵⁹ *Id.* at 395.

³⁶⁰ Remi Trudel et al., *The Recycled Self: Consumers’ Disposal Decisions of Identity-Linked Products*, 43 J. CONS. RES. 246 (2016).

³⁶¹ Julie Sprankles, *Your Fear of Recycling is Common, According to Psychology*, USA TODAY (Sept. 12, 2019, 4:17 PM), <https://www.usatoday.com/story/life/grateful/2019/09/12/psychology-says-fear-recycling-common/1927971001/> (reporting on this research).

³⁶² Shawn M. Burn, *Social Psychology and the Stimulation of Recycling Behaviors*, 21 J. APPLIED SOC. PSYCHOL. 611 (1991).

³⁶³ *Do We Suffer from Psycho-Recycling Inhibitions?*, PLANETAID BLOG (June 28, 2017), <https://www.planetaid.org/blog/do-we-suffer-from-psycho-recycling-inhibitions-2>.

³⁶⁴ Iris Bohnet, *Professor of Public Policy*, HARV. KENNEDY SCH. https://scholarharvard.edu/iris_bohnet/home (last visited Oct. 20, 2020).

³⁶⁵ IRIS BOHNET, WHAT WORKS: GENDER EQUALITY BY DESIGN (2016).

³⁶⁶ *Id.* at 244–65.

³⁶⁷ SUNSTEIN, *supra* note 346, at 7, 47.

change in social norms about cigarette smoking in the United States generally³⁶⁸ and among adolescents particularly.³⁶⁹ Sunstein discusses the sharp decline in cigarette smoking among adolescent African-Americans during the early 1990s due, apparently, to the social meaning of cigarette smoking changing from cool, attractive, rebellious, and independent to dirty, willing to be duped, gullible, and gross.³⁷⁰ Sunstein also explains how rebels can serve as norm entrepreneurs.³⁷¹

An illustration of how “rebel norm entrepreneurs” can rapidly influence the change of social norms is a memorable scene from the movie, *13 Going on 30*,³⁷² in which Jennifer Garner’s character *Jenna Rink* starts dancing to Michael Jackson’s song, *Thriller*,³⁷³ and is joined by Mark Ruffalo’s character *Matty Flamhaff*. Others join in quickly because dancing has all of sudden become “cool” to do and the dance floor fills up.³⁷⁴ In just a matter of mere moments, the social norm in that room had gone from standing around to dancing to *Thriller* on the dance floor.

A 2017 Pew Foundation report states that:

Noise is “the new secondhand smoke issue,” said Bradley Vite, an anti-noise advocate who pushed for regulations in Elkhart, Indiana, that come with some of the nation’s steepest fines. “It took decades to educate people on the dangers of secondhand smoke. We may need decades to show the impact of secondhand noise.”³⁷⁵

The first comprehensive review of research that linked lung cancer and other diseases to smoking tobacco was the 1964 Surgeon General’s Report, *Smoking and Health*,³⁷⁶ which changed public debate about

³⁶⁸ David Burns, *How Far We Have Come in the Last 50 Years in Smoking Attitudes and Actions*, 11 ANNALS AM. THORACIC SOC. 224 (2014).

³⁶⁹ GROWING UP TOBACCO FREE: PREVENTING NICOTINE ADDICTION IN CHILDREN AND YOUTHS (Barbara S. Lynch & Richard J. Bonnie eds., 1994).

³⁷⁰ SUNSTEIN, *supra* note 346, at 47; Cass R. Sunstein, *Social Roles and Social Norms*, 96 COLUM. L. REV. 903 (1996).

³⁷¹ SUNSTEIN, *supra* note 346, at 7–9; Cass R. Sunstein, *Social Roles and Social Norms*, 96 COLUM. L. REV. 903 (1996).

³⁷² 13 GOING ON 30 (Revolution Studios 2004).

³⁷³ MICHAEL JACKSON, *Thriller* (1983); Michael Jackson, Michael Jackson—Thriller (Official Music Video), YOUTUBE (Oct. 2, 2009), <https://www.youtube.com/watch?v=sOnqjJTMAA>.

³⁷⁴ x30SecondsToKadajx, *13 Going On 30 - Michael Jackson Thriller Dance*, YOUTUBE (Aug. 28, 2010), <https://www.youtube.com/watch?v=TWIicd4iOV0>.

³⁷⁵ Fetterman, *supra* note 168.

³⁷⁶ Surgeon General’s Advisory Committee on Smoking and Health, *Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service* (1964).

smoking from a consumer choice issue to a public health issue.³⁷⁷ There is now a considerable amount of clinical and empirical medical data demonstrating that regular exposure to secondhand smoke causes grave (pun intended) health consequences.³⁷⁸ For example, one study found that regular exposure to secondhand smoke led to approximately 50,000 deaths per year in America; annual direct costs—including treatment of disabilities and medical conditions—of \$4.98 billion; annual indirect costs—including wages, fringe benefits, and services lost from disability and premature mortality—of \$4.68 billion; and an increase of 22 percent in lung cancer risk, 41 percent in cervical cancer risk, 44 percent in asthma risk, and 83 percent in chronic pulmonary disease risk.³⁷⁹ The complete and quite intricate history of how American society decided to legislate that airplanes, bars, pubs, restaurants, hospitality venues, malls, public spaces, and workplaces are to be smoke-free³⁸⁰ is a fascinating and path-dependent case study in legal, political, and social change.³⁸¹ The contested path from the scientific research providing clinical and empirical medical data concerning the health risks of secondhand cigarette and tobacco smoke³⁸² to legal action and regulations was long and tortious.³⁸³

Along that protracted road, there was determined, organized, and well-funded corporate resistance from the cigarette and tobacco industries to smoke-free policies.³⁸⁴ Public policy towards,³⁸⁵ including, but not

³⁷⁷ ENDING THE TOBACCO PROBLEM: A BLUEPRINT FOR THE NATION (Institute of Medicine et al. eds., 2007).

³⁷⁸ American Lung Association, *Health Effects of Second Hand Smoke*, <https://www.lung.org/quit-smoking/smoking-facts/health-effects/secondhand-smoke> (providing such data).

³⁷⁹ Donald F. Behan et al., *Economic Effects of Environmental Tobacco Smoke*, SOCIETY OF ACTUARIES (Mar. 31, 2005), <https://www.soa.org/globalassets/assets/files/research/projects/etsreportfinaldraftfinal-3.pdf>.

³⁸⁰ *Smokefree Policies Reduce Secondhand Smoke Exposure*, CDC, https://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/protection/shs_exposure/index.htm (last visited Oct. 20, 2020).

³⁸¹ INSTITUTE OF MEDICINE, *The Background of Smoking Bans*, in *SECONDHAND SMOKE EXPOSURE AND CARDIOVASCULAR EFFECTS: MAKING SENSE OF THE EVIDENCE* 109–23 (2009).

³⁸² U.S. DEP'T HEALTH HUM. SERVS., *Control of Secondhand Smoke Exposure*, in *THE HEALTH CONSEQUENCES OF INVOLUNTARY EXPOSURE TO TOBACCO SMOKE: A REPORT OF THE SURGEON GENERAL* 569–666 (2006).

³⁸³ Jenine K. Harris et al., *Forty Years of Secondhand Smoke Research: The Gap Between Discovery and Delivery*, 36 *AM. J. PREVENTIVE MED.* 538 (2009).

³⁸⁴ Andrew Hyland et al., *Smoke-free Air Policies: Past, Present, and Future*, 21 *BRIT. MED. J. TOBACCO CONTROL* 154 (2012).

³⁸⁵ Sarah Moreland-Russell & Shelly D. Golden, *Public Policy and Tobacco*, in *PREVENTION, POLICY, AND PUBLIC HEALTH* 117–39 (Amy A. Eyster et al. eds., 2016).

limited to, the regulation of smoking raises a number of theoretical and empirical issues implicating neoclassical and behavioral law and economics.³⁸⁶ The history and political economy of how America came to arrive at our current legal, political, and social stances towards secondhand smoke is one to study and learn from, if not heed. It is worth remembering that the struggle against secondhand smoke took many years and was only successful after much effort against concerted, deep-pocketed, and hypocritical corporate opposition.

Moreover, Americans today are free to smoke cigarettes and tobacco in their homes and cars because there is no legal prohibition against self-harm from primary smoke inhalation. In fact, the American Civil Liberties Union (“ACLU”) is against “bans on smoking, drinking, diet, and hobbies in a person’s own home.”³⁸⁷ In other words, the ACLU opposes bans on firsthand smoke. The ACLU supports banning smoking “in public buildings, in the workplace, or in locations where non-smokers may be subjected to secondary smoke”³⁸⁸ including for example an outdoor pool area of a condominium.

Even today, unlike America, most European and Asian countries have not mandated smoke-free areas to mitigate the harmful effects of secondhand smoke. In fact, smokers in those countries smoke freely in public without social shaming. This difference is quite notable and striking to American tourists abroad. Why these countries did not ban public smoking is a fascinating comparative law question that would take us too far afield to attempt to answer. We turn instead now to consider a variety of possible ways to reduce NIHL and NIHHL today.

C. MITIGATING NIHL AND NIHHL THROUGH CHANGING ATTITUDES

On one level, this Article is a wake-up call for hearing society to be (more) mindful of deafness, NIHL, and NIHHL. We hope to convince hearing people to pay attention to issues related to deafness, NIHL, and NIHHL. As a 1972 recipient of the Sveriges Riksbank Prize in Economic

³⁸⁶ Jonathan Gruber, *The Economics of Tobacco Regulation*, 21 HEALTH AFF. 146 (2002); Jonathan Gruber, *Tobacco at the Crossroads: The Past and Future of Smoking Regulation in the United States*, ECON. PERSP., Spring 2001, at 193.

³⁸⁷ Ryan D. Poliakoff, *Public-Area Smoking Bans and the ACLU*, FL. COMM. ASSOC. J., http://pubs.royle.com/publication/?i=298743&article_id=2460107&view=articleBrowser&ver=html5 - {"issue_id":298743,"view": "articleBrowser", "article_id": "2460107"} (last visited Oct. 20, 2020).

³⁸⁸ *Id.*

Sciences in Memory of Alfred Nobel,³⁸⁹ Kenneth Joseph Arrow insightfully stated “the real value of putting an item on the agenda”³⁹⁰ is that once an item is on the agenda it has in a very real sense arrived and can no longer be ignored because it now commands attention and discussion as a bona fide, full-fledged part of the agenda. Arrow was referring to how passage of the federal law that is known as the Employment Act of 1946,³⁹¹ “amounted to nothing more than a statement that full employment was at last on the Federal agenda; and many felt that this was a hollow victory indeed. But those who opposed it so violently were not deceived; in the long run, this recognition was decisive.”³⁹² Similarly, we are placing deafness, NIHL, and NIHHL on the agenda of law professors, at the very least, and hopefully society-at-large.

On methodological and theoretical levels, this part of the Article introduces the idea that informal law and economics discussions, as well as formal law and economics analytical models, incorporate the social psychological concept of attitudes and suggest laws be a vehicle to influence and change attitudes.³⁹³ “In psychology, an attitude refers to a set of emotions, beliefs, and behaviors toward a particular object, person, thing, or event. Attitudes are often the result of experience or upbringing, and they can have a powerful influence over behavior. While attitudes are enduring, they can also change.”³⁹⁴ Attitudes have these three components, known as the “CAB” or the ABC’s of attitudes: Cognitive (beliefs and thoughts), Affective (emotions and feelings), and Behavioral (actions and behaviors).³⁹⁵

Mathematically, attitudes are ordered triplets: $ATT = (A, B, C)$, where ATT stands for an attitude and A stands for a vector measuring the intensities and valences of certain emotions; B stands for a vector measuring the magnitudes of relevant behaviors or choices; and C stands

³⁸⁹ *Kenneth J. Arrow*, NOBEL PRIZE, <https://www.nobelprize.org/prizes/economic-sciences/1972/arrow/facts/> (last visited Oct. 20, 2020).

³⁹⁰ KENNETH J. ARROW, *THE LIMITS OF ORGANIZATION* 47 (1974).

³⁹¹ Employment Act of 1946, 15 U.S.C. §1021 (1978).

³⁹² ARROW, *supra* note 390, at 47.

³⁹³ It would take us too far afield now to apply the mathematics of difference equations or differential equations to model the probably nonlinear dynamics of attitude changes. *See, e.g.*, John Gottman et al., *The Mathematics of Marital Conflict: Dynamic Mathematical Nonlinear Modeling of Newlywed Marital Interaction*, 13 J. FAM. PSYCHOL. 13 (1999); JOHN M. GOTTMAN ET AL., *THE MATHEMATICS OF MARRIAGE: DYNAMIC NONLINEAR MODELS* (2005).

³⁹⁴ Kendra Cherry, *Attitudes and Behavior in Psychology*, VERYWELLMIND (Aug. 2, 2019), <https://www.verywellmind.com/attitudes-how-they-form-change-shape-behavior-2795897>.

³⁹⁵ *Id.*

for a vector measuring the levels of certain beliefs and thoughts. As the reader can see, attitudes can be high dimensional variables. Notice that a model about attitudes generalizes psychological games,³⁹⁶ by setting A = belief-dependent emotions; B = strategy choices in the game; and C = beliefs about strategy choices. A companion paper about the law and economics of attitudes,³⁹⁷ mathematically formally analyzes and models how equilibrium attitudes are determined endogenously and how law can influence and change attitudes.³⁹⁸ For now, we note that attitudes can be implicit (unconscious) or explicit (conscious).³⁹⁹ Examples of attitudes (that might be familiar to lawyers and law professors)⁴⁰⁰ are those that the well-known Implicit Association Tests measure.⁴⁰¹ For law and economics, the psychological construct of attitudes is related to, and yet differs from, preferences, probability beliefs (over payoff-relevant states or players' strategies), and choices. This Article advocates that societies can and should consider designing laws and policies to influence and change people's attitudes, and in so doing, influence and change their behavior. Law and economics can and should incorporate and study how to encourage and foster caring,⁴⁰² compassion,⁴⁰³ empathy,⁴⁰⁴ and fairness.⁴⁰⁵

Throughout his book, Sunstein illustrates his account of how change happens with numerous examples of, and references to, sudden changes about environmentalism and ethnic, racial, sexual, and sexual orientation discrimination. NIHL and NIHHL induced by exposure to CRAAP have

³⁹⁶ Geanakoplos et al., *supra* note 353.

³⁹⁷ Peter H. Huang, *The Law and Economics of Changing Equilibrium Attitudes* (unpublished manuscript on file with author).

³⁹⁸ Gottman et al., *The Mathematics of Marital Conflict*, *supra* note 393; GOTTMAN ET AL., *THE MATHEMATICS OF MARRIAGE*, *supra* note 393.

³⁹⁹ Cherry, *supra* note 394.

⁴⁰⁰ See, e.g., Jerry Kang, *Getting Up to Speed on Implicit Bias*, JERRY KANG (Mar. 13, 2011), <http://jerrykang.net/2011/03/13/getting-up-to-speed-on-implicit-bias/>.

⁴⁰¹ Anthony G. Greenwald et al., *Measuring Individual Differences in Implicit Cognition: The Implicit Association Test*, 74 J. PERSONALITY & SOC. PSYCHOL. 1464 (1998).

⁴⁰² CARING ECONOMICS: CONVERSATIONS ON ALTRUISM AND COMPASSION, BETWEEN SCIENTISTS, ECONOMISTS, AND THE DALAI LAMA (Tania Singer & Matthieu Ricard eds., 2015)

⁴⁰³ ECONOMICS OF COMPASSION INITIATIVE, <https://www.econofcompassion.org/> (last visited Oct. 20, 2020); Gene Steuerle, *The Economics of Compassion*, URBAN INSTITUTE (Jan. 5, 2012), <https://www.urban.org/sites/default/files/publication/26001/901472-The-Economics-of-Compassion.PDF>.

⁴⁰⁴ J. D. TROUT, *THE EMPATHY GAP: BUILDING BRIDGES TO THE GOOD LIFE AND THE GOOD SOCIETY* (2015).

⁴⁰⁵ CLAIR BROWN, *BUDDHIST ECONOMICS: AN ENLIGHTENED APPROACH TO THE DISMAL SCIENCE* (2017).

analogies to environmentalism as well as to ethnic, racial, sexual, and sexual orientation discrimination. CRAAP-caused NIHL and NIHHL stems from pollution of a certain aspect of our environment, namely sound. In the intentional torts case of *Leichtman v. WLW Jacor Communications, Inc.*,⁴⁰⁶ the defendant Andy Furman—a radio talk show host—blew cigar smoke in the face of the plaintiff, Ahron Leichtman, a guest on the show and a self-proclaimed, nationally-known anti-smoking advocate. The trial court dismissed Leichtman’s complaint and Leichtman appealed, claiming that the facts he alleged demonstrate an assault. Relying on the allegation that Furman desired to cause an offensive contact, the appellate court reversed and remanded for trial. The appellate court found there was battery based on smoke being “particulate matter” that came in contact with the plaintiff’s face. In this case, there was no evidence of harm in the sense of physical detriment, but there was injury in the sense of an invasion of a legally protected interest.

In the case of NIHL and NIHHL, the sound waves of noise come in contact with listeners’ ears and there is physical damage to nerve cells in those listeners’ ears. In this sense, CRAAP causes mass torts. Because the Environmental Protection Act of 1990 defines noise nuisance to be “an unlawful interference with a person’s use or enjoyment of land or some right over it, or in connection with it,” road noise by definition can’t be a noise nuisance.⁴⁰⁷ “Noise is subjective: people have different thresholds of what they’re able to withstand. It’s also intimately entwined with social relations. People tend to be more irritated by noises that come from unpredictable human sources (loud music, loft conversions . . .) than predictable impersonal ones (roads).”⁴⁰⁸ It is crucial to remember that the law is just one of multiple possible ways to achieve sustainable change.

More generally, Haben Girma—the first Deafblind person to graduate from Harvard Law School—explained, “‘suing people is one way to create change,’ but providing education and training, on what it means to have an accessible website and app, ‘is also a powerful way to create change.’”⁴⁰⁹ NIHL and NIHHL are related to discrimination against people with hearing loss, whether it be from birth or later in life. People who are

⁴⁰⁶ *Leichtman v. WLW Jacor Communications, Inc.*, 634 N.E.2d 697 (Ohio Ct. App. 1994).

⁴⁰⁷ Richard Goodwin, *Sonic Doom: How Noise Pollution Kills Thousands Each Year*, THE GUARDIAN (July 3, 2018), <https://www.theguardian.com/lifeandstyle/2018/jul/03/sonic-doom-noise-pollution-kills-heart-disease-diabetes>.

⁴⁰⁸ *Id.*

⁴⁰⁹ Randy Maniloff, *Harvard Law’s First Deaf-Blind Graduate Tells Her Story*, LAW (Sept. 12, 2018, 11:38 AM), <https://www.law.com/2019/09/12/deaf-and-blind-harvard-educated-lawyer-tells-her-story/?sreturn=20190812214446>.

deaf or have hearing loss often face discrimination in education, employment, medical care, criminal justice, and cultural opportunities.⁴¹⁰ Those who are deaf or have hearing loss are likely often denied admission to institutions of higher education; fail to be hired or promoted; experience a medical misdiagnosis; face wrongful arrest; and may not have access to concerts and theaters.⁴¹¹ Some of these adverse outcomes may not be the result of any animus or malice, but rather result from laziness or a desire to not be bothered.⁴¹² Unfortunately, even today, audism is rampant, where audism “is the belief that those with the ability to hear are superior or ‘normal.’”⁴¹³

Audism is a form of ableism, which is “the belief that people with disabilities are inferior to the nondisabled.”⁴¹⁴ Girma’s recent book, *Haben: The Deafblind Woman Who Conquered Harvard Law*,⁴¹⁵ describes her incredible life story. She recounts her experience in college when she asked the Bon Appetit cafeteria manager to provide menus in Braille or some other accessible format.⁴¹⁶ Girma was told the cafeteria staff was too busy to do this, that is, until Girma did some research on the ADA and informed the manager of her legal rights.⁴¹⁷ All of a sudden, the Bon Appetit staff was no longer too busy to comply with the law, apologized (with a “peace offering” of warm chocolate chip cookies), and made their menus accessible. As Girma cogently observes, reframing “the access barrier as a civil rights issue rather than an act of charity helped shift the culture in the cafeteria.”⁴¹⁸

When Bill, a blind student, attended the same college the following year, he did not have to complain to obtain accessible menus.⁴¹⁹ Girma,

⁴¹⁰ Callis, *supra* note 259.

⁴¹¹ *Id.*

⁴¹² See, e.g., David Bradshaw, *The Silent Dinner*, YOUTUBE (May 2, 2019), <https://www.youtube.com/watch?v=IkE-FVkvsl4>; BuzzFeedVideo, *Deaf People Answer Commonly Googled Questions About Being Deaf*, YOUTUBE (Dec. 18, 2019), <https://www.youtube.com/watch?v=IgmB9c29UKU>; Gemma Matheson, *What is Audism? 5 Examples*, A.I., <https://blog.ai-media.tv/blog/what-is-audism> (last visited Oct. 20, 2020); David R. Meek, *Dinner Table Syndrome: A Phenomenological Study of Deaf Individuals’ Experiences with Inaccessible Communication*, 25 QUALITATIVE RPT. 1676 (2020).

⁴¹³ *Id.*

⁴¹⁴ Maniloff, *supra* note 409.

⁴¹⁵ HABEN GIRMA, *HABEN: THE DEAFBLIND WOMAN WHO CONQUERED HARVARD LAW* (2019).

⁴¹⁶ *Id.* at 153-66.

⁴¹⁷ *Id.*

⁴¹⁸ *Id.* at 164.

⁴¹⁹ *Id.* at 165.

thus, learned that her advocacy could help others and that attending law school would empower her to do so.⁴²⁰ Today, “Girma is a disability rights lawyer, author, and public speaker”⁴²¹ who advocates for equal opportunities for people with disabilities. Girma “combines her knowledge of law, sociology, and technology to teach organizations the benefits of fully accessible products and services. Her insights help to expand our thinking, creating lasting positive change among people and communities.”⁴²² President Obama named Girma a White House Champion of Change,⁴²³ and President Clinton, German Chancellor Angela Merkel, and Canadian Prime Minister Justin Trudeau all have also honored Girma.⁴²⁴ Girma was bestowed with the Helen Keller Achievement Award and a spot on *Forbes* 30 Under 30 list.⁴²⁵ Her “work has been featured in the *Financial Times*, BBC, NPR, GOOD Magazine, the *Washington Post*, and more.”⁴²⁶

The stories that Girma includes in her book teach readers about ableism “and what we all can do to remove ableism from society and create more opportunities for people with disabilities.”⁴²⁷ Girma “defines disability as an opportunity for innovation.”⁴²⁸ Girma’s book also includes a wonderful resource, *A Brief Guide to Increasing Access for People with Disabilities*,⁴²⁹ in which she details why organizations should invest in accessibility;⁴³⁰ how organizations can be more accessible;⁴³¹ how society and the media should discuss disability and promote positive disability stories;⁴³² examples of positive messages about disability;⁴³³ how to avoid of negative messages about disability;⁴³⁴ positive disability storytelling

⁴²⁰ *Id.* at 165-66.

⁴²¹ GIRMA, *supra* note 415, at 273.

⁴²² *Id.*

⁴²³ *Id.*

⁴²⁴ *Id.* at 273.

⁴²⁵ *Id.*

⁴²⁶ *Id.*

⁴²⁷ Maniloff, *supra* note 409.

⁴²⁸ Haben Girma, *Haben: The Deafblind Woman Who Conquered Harvard Law*, HABEN GIRMA, <https://habengirma.com/book/> (last visited Oct. 20, 2020).

⁴²⁹ GIRMA, *supra* note 415, at 265-71.

⁴³⁰ *Id.* at 265-66.

⁴³¹ *Id.* at 266.

⁴³² *Id.* at 266-67.

⁴³³ *Id.* at 267.

⁴³⁴ *Id.* at 267-68.

practices;⁴³⁵ how to create accessible digital content;⁴³⁶ and other organizational resources.⁴³⁷ Girma starts off her *Brief Guide to Increasing Access for People with Disabilities* as follows:

All of our bodies change over time. We all deserve dignity and access at every stage in our lives. Most people will need to seek accessibility solutions at some point, whether for a family member, a colleague, or for oneself. Disability is part of the human experience. We all need to engage in the work to make our world accessible to everyone. Inclusion is a choice.⁴³⁸

The above quote is reminiscent of this sentence from an opinion about private securities fraud litigation by Supreme Court Justice William Rehnquist: “we deal with a judicial oak which has grown from little more than a legislative acorn.”⁴³⁹ Both quotes remind us that people and things are not static, people and things change, sometimes with the mere passage of time, other times in reaction to events and other people and things. Hearing loss is most likely in everyone’s future, if not their present. It is only a matter of the degree or extent of hearing loss—not whether loss will occur. Many, in particular law professors and lawyers, too often forget that humans are not disembodied minds, but rather are brains inside fragile bodies that inevitably depreciate, deteriorate, and ultimately fail us. Moreover, people’s attitudes towards deafness and hearing loss affect their own and other people’s life experiences and subjective well-being. Both audism and ableism are attitudes that are non-inclusive and harmful. Law can play a powerful role in eradicating both the attitudes of audism and ableism.

In many communities, the prevailing view, perhaps unspoken, is that people who are deaf or have hearing loss are inferior or “abnormal,” instead of an inclusive perspective and welcoming attitude that individuals who are deaf or have hearing loss “are capable of everything hearing people can do except hear.”⁴⁴⁰ Approximately 15 percent of American adults report some hearing loss and that percentage increases to 25 percent

⁴³⁵ GIRMA, *supra* note 415, at 268-69.

⁴³⁶ *Id.* at 269-70.

⁴³⁷ *Id.* at 265-71.

⁴³⁸ *Id.* at 265.

⁴³⁹ *Blue Chip Stamps v. Manor Drug Stores*, 421 U.S. 723, 737 (1974).

⁴⁴⁰ Callis, *supra* note 259.

of Americans over the age of 65.⁴⁴¹ It is simply good business, perceptive optics, and savvy public-relations to not produce CRAAP, which causes additional NIHL and NIHHL.

Not only do NIHL and NIHHL implicate discrimination against deaf and HoH people, whether it be from birth or later in life, NIHL and NIHHL also raise concerns about intersectionality,⁴⁴² a term Columbia law school Isidor and Seville Sulzbacher Professor of Law and UCLA School of Law Distinguished Professor of Law Kimberlé W. Crenshaw coined. For example, Kelly’s mother is a Deaf and Hispanic woman, so she faces three possible sources of discrimination. As with the intersectionality of all social identities, such as gender, nationality, race, sexual orientation, and class, the resulting combination of discrimination sources can be interdependent, overlapping, and super-additive, amounting to more than the sum of the individual prejudices. A pair of married epidemiologists, Kate Pickett and Richard Wilkinson, in their book, *The Inner Level*,⁴⁴³ “cite extensive statistical evidence that unequal societies are responsible for less fulfilling personal lives, and in turn harm public health, scupper educational progress, increase crime and lower life expectancy.”⁴⁴⁴ Their book demonstrates

pretty much any social problem worsens the more unequal a society is. U.S. studies have shown that the more economically divided and racially segregated a city is, the louder it is for everyone – even the comparatively advantaged. It’s also true that the more disadvantaged you are, the louder your life will be, creating what researchers term a “double jeopardy” effect.⁴⁴⁵

Both of this Article’s co-Authors have a strong independent streak and value our individual personal autonomy. We often think or even say, “you’re not the boss of me.” For people like us, which include many

⁴⁴¹ *Quick Statistics About Hearing*, NAT’L INST. ON DEAFNESS OTHER COMM’N DISORDERS (Dec. 15, 2016), <https://www.nidcd.nih.gov/health/statistics/quick-statistics-hearing>.

⁴⁴² Kimberlé Crenshaw, *Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics*, 1989 U. CHI. LEGAL F. 139 (1989).

⁴⁴³ KATE PICKETT & RICHARD WILKINSON, *THE INNER LEVEL: HOW MORE EQUAL SOCIETIES REDUCE STRESS, RESTORE SANITY AND IMPROVE EVERYONE’S WELL-BEING* (2019).

⁴⁴⁴ Dawn Foster, *Kate Pickett and Richard Wilkinson: “Inequality Strikes at Our Health and Happiness,”* THE GUARDIAN (Sept. 18, 2018), <https://www.theguardian.com/inequality/2018/sep/18/kate-pickett-richard-wilkinson-mental-wellbeing-inequality-the-spirit-level>.

⁴⁴⁵ Goodwin, *supra* note 407.

Americans,⁴⁴⁶ paternalism can back-fire and nudges can be perceived as shoves. We believe that humor offers a non-confrontational medium to provide information and perhaps help people (and corporations) to become (more) aware of CRAAP, NIHL, and NIHHL. “If you can make someone laugh, you can make someone listen.”⁴⁴⁷ For example, in Iowa, on interstate I-80 west there were amusing periodic overhead highway signs that read: “Rubber Cement Seatbelt or Glue / Which One is Holding You / Over 200 Traffic Deaths This Year.” Another example is that on a Hyundai Ioniq, equipped with the Driver Warning Attention (“DAW”) system,⁴⁴⁸ there will appear on the driver LCD display a message that states: “Consider taking a break” with an icon of a simmering coffee cup,⁴⁴⁹ which appears in conjunction with a warning that sounds if the driver’s attention falls below a certain level the car is monitoring.⁴⁵⁰

In the context of this Article, we believe the U.S. Department of Health and Human Services (“HHS”), NIH, and NIDCD can and should produce an entertaining, one-minute public service YouTube video (that viewers can skip after 5 seconds) with animation or cartoon infographic about CRAAP causing NIHL and NIHHL. Alternatively, HHS, NIH, and NIDCD can sponsor a contest where anyone can submit fun public service message videos by and/or for kids displaying the benefits of covering your ears using your hands if you are subjected to CRAAP. Perhaps a cartoon, comic strip, or animated video showing: “This is your brain stressed by chronic exposure to loud noises.” In the 1980s, the Partnership for a Drug-Free America produced an amusing and memorable video,⁴⁵¹ where a man said: “this is your brain” while picking up an egg. He then says: “this is drugs” as he points to a frying pan on a burner. He cracks the egg on the rim of the frying pan and says: “this is your brain on drugs . . . any questions,” as he picks up the pan with the egg being fried. Public school newspapers or blogs could feature human interest stories about deafness

⁴⁴⁶ RICHARD E. NISBETT, *THE GEOGRAPHY OF THOUGHT: HOW ASIANS AND WESTERNERS THINK DIFFERENTLY . . . AND WHY* (2004).

⁴⁴⁷ Adam Garone, *Interview of Morgan Spurlock*, MOVEMBER (Sept. 28, 2017), https://us.movember.com/story/11510/morgan-spurlock-if-you-can-make-someone-laugh-you-can-make-someone-listen/?search-scope=global&category_id=

⁴⁴⁸ *Driver Attention Warning (DAW) system*, 2019 HYUNDAI IONIQ OWNER’S MANUAL, at 5–68 to 5–72 (2019), https://ownershyundaiusa.com/content/dam/hyundai/us/myhyundai/glovebox-manual/2019/ioniq-ev/2019_Ioniq_EV_OM.pdf.

⁴⁴⁹ *Id.* at 5–69.

⁴⁵⁰ *Id.*

⁴⁵¹ Anthony Kalamut, *This Is Your Brain...This Is Your Brain On Drugs - 80s Partnership For A Drug Free America*, YOUTUBE <https://www.youtube.com/watch?v=GOENVyIxPI>.

and hearing loss. Such stories could feature hyperlinks to celebrity spokespeople, such as Matt Maxey, Chance the Rapper, or Marlee Matlin signing in ASL.

Currently, there is variation among states in their Medicaid hearing aid coverage for older adult beneficiaries.⁴⁵² There are compelling reasons why state Medicaid programs should cover hearing aids for adults.⁴⁵³ We strongly advocate that Congress revise Medicare⁴⁵⁴ to, and mandate private health insurance to, offer affordable coverage of hearing aids, cochlear implants, and hearing loss testing. The average retail price of a pair of hearing aids in 2013 was \$4,700 and thus unaffordable for many people.⁴⁵⁵ The Over-the-Counter Hearing Aid Act of 2017 (as part of the Food and Drug Administration Reauthorization Act of 2017) made available over the counter hearing aids that are “intended to be used by adults to compensate for perceived mild to moderate hearing impairment.”⁴⁵⁶ These types of hearing aids are intended to be similar to basic reading glasses that are also available over the counter without a prescription. Recently, a professor at the Marshall-Wythe School of Law at the College of William & Mary told Peter there are cork floors in their library to absorb noise. Government regulators might consider adopting or changing building codes or construction requirements to reward or subsidize usage of sound proofing or noise reduction materials.

Federal, state, and local governments can follow Phoenix, Arizona’s example where to dampen noise pollution, more than 200 miles of highways have been resurfaced utilizing a concrete mix that contains more than 6,000 recycled old tires per mile of rubberized four-lane highway.⁴⁵⁷ The majority of highway noise is actually due to tires rolling on roads, instead of exhaust or engine noise.⁴⁵⁸ Traditional concrete grooves that drain water run across roads, while quieter concrete grooves run with

⁴⁵² Michelle L. Arnold et al., *MEDICAID Hearing Aid Coverage for Older Adult Beneficiaries: A State-By-State Comparison*, 36 HEALTH AFF. 1476 (2017).

⁴⁵³ Amber Willink et al., *Why State Medicaid Programs Should Cover Hearing Aids for Adults*, 145 J. AM. MED. ASS’N: OTOLARYNGOLOGY HEAD NECK SURGERY 999 (2019).

⁴⁵⁴ 42 U.S.C. § 1395 (2018); 42 C.F.R. § 400 (2012).

⁴⁵⁵ NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE, *HEARING HEALTH CARE FOR ADULTS: PRIORITIES FOR IMPROVING ACCESS AND AFFORDABILITY* 207 (2016), <https://www.nap.edu/download/23446>.

⁴⁵⁶ Over-the-Counter Hearing Aid Act, Pub. L. 115–52 (2017).

⁴⁵⁷ Mindy Fetterman, *Noise Exposure is Becoming “The New Secondhand Smoke,”* WASH. POST (May 12, 2018), https://www.washingtonpost.com/national/health-science/noise-exposure-is-becoming-the-new-secondhand-smoke/2018/05/11/dd080c30-52d3-11e8-9c91-7dab596e8252_story.html.

⁴⁵⁸ *Id.*

traffic and in so doing reduce highway noise by 5.8 decibels, which is the sound equivalent of a 70 percent reduction in traffic.⁴⁵⁹ Texas is testing a “quiet concrete” on two highways, where “the \$12.4 million project is aimed at replacing concrete sound barriers that won’t be needed because highway traffic will be quieter.”⁴⁶⁰

The federal government should fund basic and applied research to find innovative ways to reduce highway traffic noise.⁴⁶¹ For example,

a team of scientists from NYU, working with collaborators at Ohio State University, have launched a first-of-its-kind comprehensive research initiative to understand and address noise pollution in New York and beyond. The project—which involves large-scale noise monitoring—leverages the latest in machine learning technology, big data analysis, and citizen science reporting to more effectively monitor, analyze, and mitigate urban noise pollution. Known as Sounds of New York City (SONYC), this multi-year project has received a \$4.6 million grant from the National Science Foundation and has the support of City health and environmental agencies The SONYC project will work closely with city agencies and industry in both research and implementation. Identifying noise events and designing and testing data-driven interventions will be done in cooperation with the New York City Department of Environmental Protection. The New York City Department of Health and Mental Hygiene will work with the team on using SONYC to study the public health effects of noise.⁴⁶²

Federal, state, and local governments may consider zoning regulations based on acoustic sound decibel levels and perhaps mandating or subsidizing construction of low-noise housing communities or “serene”

⁴⁵⁹ *Id.*

⁴⁶⁰ *Id.*

⁴⁶¹ Meryl Davids Landau, *On Highway Noise Barriers, the Science Is Mixed. Are There Alternatives?* UNDARK (Dec. 27, 2017), <https://undark.org/article/highway-noise-barrier-science/>; see also Krishna Prapoorna Biligiri & George Bert Way, *Noise-damping Characteristics of Different Pavement Surface Wearing Courses*, 15 ROAD MATERIALS & PAVEMENT DESIGN 925 (2014).

⁴⁶² *NYU Launches Initiative to Combat NYC Noise Pollution*, NYU (Nov. 7, 2016), https://www.nyu.edu/about/news-publications/news/2016/november/SONYC_Launch.html.

residential zones. For example, local ordinances typically prohibit jet airplanes from landing or taking off during night hours.⁴⁶³ Zoning authorities can take into consideration CRAAP in promulgating regulations. Construction and interior design can mitigate NIHL and NIHHL. For example, Peter had to stay overnight at the LAX airport and was pleasantly surprised at how effective the soundproofing was at the Hyatt Regency hotel, which is adjacent to LAX with guestrooms with “double-paned, soundproof windows and blackout Roman shades.” When Peter stayed at the conference hotel of the 2019 Midwestern Behavioral Law and Economics Association annual meeting at Villanova University Charles Widger School of Law and the John F. Scarpa Center for Law and Entrepreneurship to present this article, he took a photo with his cellphone of a sign by the elevator that read:

The
Radnor
Hotel
Quiet Time
Between the Hours 10:00 PM - 8:00 AM
In consideration for all our guests we ask that
Quiet Time hours be observed.
After a long day of travel, business, or
pleasure, our guests look forward to a restful
evening.
Thank You and enjoy your stay with us.⁴⁶⁴

Another hotel had this similar sign posted by an elevator: “To ensure an enjoyable stay for all our guests. The Holiday Inn Express & Suites Broomfield strictly enforces a one strike policy on reported noise complaints from all guest rooms and hallways between the hours of 10PM-7AM.”⁴⁶⁵

Technological advances can also help reduce NIHL and NIHHL. For example, older gas-powered leaf blowers rated at 75 decibels can impact up to 15 times more households in densely populated neighborhoods than newer battery-powered leaf blowers also rated at 75 decibels, because of more sound energy production in the low-frequency noise range, which

⁴⁶³ See, e.g., FRANK, *supra* note 288, at 542 (discussing local ordinances banning airplane landings and take offs during nighttime hours).

⁴⁶⁴ Photograph on file with the first author.

⁴⁶⁵ Photograph on file with the first author.

“goes through walls, cement barriers, and many kinds of hearing-protection devices.”⁴⁶⁶

We also support mandating informational disclosures and warnings about NIHL and NIHHL for patrons, customers, and employees at airports, construction sites, and dance clubs, as well as before rock concerts, monster truck jams, air shows, and fireworks. Such mandatory disclosure regulation may create new opportunities for entrepreneurial businesses to sell designer fashion earplugs or noise canceling headphones in assorted and attractive (possibly, pastel or tie-dyed) colors. Businesses on the cutting-edge of reducing CRAAP, NIHL, and NIHHL may adopt designated quiet areas or zones in certain spaces of airports, department stores, museums, restaurants, schools, shopping malls, supermarkets, and other places. These quiet spaces are analogous to quiet cars on Amtrak trains that are cellphone-free or sections of libraries that are cellphone-free. For example, the professional National Football League (“NFL”) team Philadelphia Eagles, in a partnership with the Children’s Hospital of Philadelphia and KultureCity,[®] constructed inside the Eagles’ home stadium a state-of-the-art sensory room “to accommodate fans and families managing sensory challenges. They became the first NFL team to create a fully dedicated sensory room inside their stadium.”⁴⁶⁷ KultureCity[®] is a non-profit organization dedicated to making “environments inclusive for people with autism”⁴⁶⁸ and rethinking accessibility to “create acceptance and inclusion for all individuals with unique abilities.”⁴⁶⁹ A number of other NFL teams “will be considered sensory-inclusive certified, meaning fans will have sensory bags available if they need them. Sensory bags contain noise-canceling headphones, fidget tools, verbal cue cards and weighted lap pads.”⁴⁷⁰

To forestall public regulation about maximum decibels of CRAAP, private companies might voluntarily decide to decrease the volumes of

⁴⁶⁶ James Fallows, *Get Off My Lawn*, THE ATLANTIC (Apr. 2019), <https://www.theatlantic.com/magazine/archive/2019/04/james-fallows-leaf-blower-ban/583210/>; see also James Fallows, *Leafblower Menace*, THE ATLANTIC <https://www.theatlantic.com/author/james-fallows/leafblower-menace/> (last visited Oct. 20, 2020).

⁴⁶⁷ Rob Maaddi, *Eagles Build Room in Linc for Fans with Sensory Needs*, ASSOCIATED PRESS (Sept. 7, 2019), <https://www.apnews.com/ea88d8026ebb4c42b86a4ab5ec2fb548>.

⁴⁶⁸ *KultureCity Helps People with Autism Find Sensory Inclusive Locations*, ASSISTIVE TECHNOLOGY BLOG (Sept. 24, 2018), <https://assistivetechnologyblog.com/2018/09/kulturecity-helps-people-autism-find-sensory-inclusive-locationshtml>.

⁴⁶⁹ KULTURECITY[®], <https://www.kulturecity.org/> (last visited Oct. 20, 2020).

⁴⁷⁰ *Id.*

elevator music, phone on-hold waiting music, and televisions in (car dealership, hospital, and other types of) waiting rooms. Corporations may decide that quiet is the default sound baseline, unless people explicitly and specifically opt into hearing ambient sound or noise. The 2020 Hyundai Palisade has a one-button Quiet Mode which turns off the speakers in the third row of the SUV, “so that tired children can nap while the driver listens to Lite Rock through the available Harman Kardon premium sound system up front.”⁴⁷¹ AppleCare phone support offers a choice of waiting music: pop, classical, jazz, or silence! Crowd-sourced real-time Decibel map cellphone mobile apps, such as iHEARu⁴⁷² and the previously discussed SoundPrint,⁴⁷³ allow individuals to search and report ambient noise levels.

The European regional office of the World Health Organization (“WHO”) warns that children chronically exposed to aircraft noise have worse cognitive performance, lower well-being, reduced motivation, higher blood pressure, and increased catecholamine hormone secretion.⁴⁷⁴ The European regional office of the WHO also estimates “at least one million healthy life years are lost every year from traffic-related noise in the western part of Europe.”⁴⁷⁵ America can and should learn from the experience of the European Union (“EU”) adopting in 2000 the Environmental Noise Directive (“END”) 2002/49/EC, which provides information to the public about noise levels in their living environment and assess and manage environmental noise.⁴⁷⁶ The END offered the EU member states a shared and uniform way to avoid, mitigate, or prevent harmful effects of environmental noise.⁴⁷⁷ In step one, the relevant

⁴⁷¹ Sebastian Blanco, *2020 Hyundai Palisade Wants to Mother You, and Does*, FORBES (June 25, 2019), <https://www.forbes.com/sites/sebastianblanco/2019/06/25/2020-hyundai-palisade-wants-to-mother-you-and-does/> - 7efbe3532165.

⁴⁷² iHEARU, <http://ihearuc.co/> (last visited Oct. 20, 2020).

⁴⁷³ SoundPrint, *supra* note 175.

⁴⁷⁴ Regional Office for Europe, *Noise Data and Statistics*, World Health Organization [WHO] (2011), <http://www.euro.who.int/en/health-topics/environment-and-health/noise/data-and-statistics>.

⁴⁷⁵ Regional Office for Europe, *Burden of Disease from Environmental Noise*, World Health Organization [WHO] (2011), http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf?ua=1.

⁴⁷⁶ Directive 2002/49/EC, of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise—Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise, 2002 O.J. (L 189) 1, 16, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2002:189:FULL&from=EN>.

⁴⁷⁷ *Id.* at 14-16.

authorities in the EU member states were required to produce strategic noise maps for airports, major roads, railways and urban areas.⁴⁷⁸ In step two, the relevant authorities in the EU member states had to inform and consult with the public.⁴⁷⁹ In step three, the relevant authorities in the EU member states reduce noise.⁴⁸⁰ “In 2009, the E.U. set noise guidelines of 40 decibels at night to ‘protect human health.’ And it said steady, continuous noise in the daytime—such as the noise on highway—should not exceed 50 decibels.”⁴⁸¹ In contrast, America’s “Environmental Protection Agency has said that noise below an average of 70 decibels over 24 hours is safe and will not cause hearing loss. The National Institute for Occupational Safety and Health holds that noise registering below 85 decibels will not cause hearing loss for workers exposed to loud machinery.”⁴⁸²

It is important to remember the law has its limits.⁴⁸³ Unlike the futuristic science fiction movie, *Minority Report*,⁴⁸⁴ where people can be accused of future crimes they have not yet committed, present-day societies cannot (successfully) legislate directly against animus, bigoted attitudes, discriminatory beliefs, or prejudiced thoughts. Societies can only indirectly legislate indirectly against animus, bigoted attitudes, intolerant beliefs, or prejudiced thoughts by directly legislating against discriminatory behavior. Anti-discrimination legislation not only makes discriminatory behavior illegal, but it also expresses and reinforces a social norm against discriminatory behavior. Society must learn that our differences do not make society weaker, but instead strengthen it.

As the characters Dr. Miranda Jones, as portrayed by the actress Diana Muldaur, and Spock, as portrayed by the actor Leonard Nimoy, famously said in the classic science fiction series *Star Trek: The Original Series*⁴⁸⁵ episode, *Is There in Truth No Beauty?*⁴⁸⁶ in their parting conversation: Dr. Miranda Jones: “I understand, Mr. Spock. The glory of creation is in its infinite diversity.” Mr. Spock: “And the ways our

⁴⁷⁸ Directorate-Gen. for Env’t, *Handbook for Implementation of EU Environmental Legislation*, at 1038-39 (Dec. 2008), <https://ec.europa.eu/environment/archives/enlarg/handbook/noise.pdf>.

⁴⁷⁹ *Id.* at 1039.

⁴⁸⁰ *Id.*

⁴⁸¹ Fetterman, *supra* note 457.

⁴⁸² *Id.*

⁴⁸³ ROBERT C. ELLICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* (1994).

⁴⁸⁴ *MINORITY REPORT* (20th Century Fox, DreamWorks Pictures, Amblin Entertainment 2002).

⁴⁸⁵ *Star Trek* (NBC television series 1966–69).

⁴⁸⁶ *Star Trek: Is There in Truth No Beauty?* (NBC television broadcast Oct. 18, 1968).

differences combine, to create meaning and beauty.” Dr. Jones is making reference to a Vulcan philosophy known by its acronym IDIC, which stands for Infinite Diversity in Infinite Combinations.

It represents a Vulcan belief (also Roddenberry’s belief) that that beauty, growth, progress—all result from the union of the unlike. And the symbol, a triangle intersecting a circle, with a stone in the center, represents this with unlike shapes—one smooth and one angular—combining together with a gemstone in the middle, as the union of words and music creates song, or the union of marriage creates children. The circle can represent infinity, nature, woman, etc.; the triangle can represent the finite, art, man, etc.⁴⁸⁷

As Anaïs Nin,⁴⁸⁸ a French-Cuban American author said, “[w]e don’t see things as they are; we see them as we are.”⁴⁸⁹ As sight is one of the five senses, perhaps the above quote should be modified to: we don’t perceive things as they are; we perceive them as we are. For example, one of us, Peter, upon hearing or seeing SEC immediately thinks of the United States Securities Exchange Commission,⁴⁹⁰ while (the University of Alabama⁴⁹¹) college football fans upon hearing or seeing SEC instinctively think Southeastern Conference.⁴⁹² It is thus important for all of us to realize that we perceive reality through our personal blinders, filters, or prisms and that others do the same.⁴⁹³

One way to remember this obvious point is to practice mindfulness, which can help all of us when confronted with noisy restaurant diners.⁴⁹⁴

⁴⁸⁷ *IDIC: I Do Not Think It Means What You Think It Means*, WOMEN AT WARP (July 13, 2017), <https://www.womenatwarp.com/idic-i-do-not-think-it-means-what-you-think-it-means/> (internal quotation marks omitted).

⁴⁸⁸ *An Introduction to the World of Anaïs Nin*, ANAÏS NIN FOUNDATION <https://theanaïsninfoundation.org/bio> (last visited Oct. 20, 2020).

⁴⁸⁹ ANAÏS NIN, *SEDUCTION OF THE MINOTAUR* 124 (1961, 1972 sixth printing); see also Quotersearch, *We Don’t See Things As They Are, We See Them As We Are*, QUOTE INVESTIGATOR (Mar. 9, 2014), <https://quoteinvestigator.com/2014/03/09/as-we-are/>.

⁴⁹⁰ U.S. Securities Exchange Commission website, <https://www.sec.gov/>.

⁴⁹¹ Billy Witz, *Orwellabama? Crimson Tide Track Locations to Keep Students at Games*, N.Y. TIMES (Sept. 12, 2019), <https://www.nytimes.com/2019/09/12/sports/alabama-tracking-apphtml> (last updated Sept. 14, 2019, 9:04 AM).

⁴⁹² SOUTHEASTERN CONFERENCE, <https://www.secsports.com/> (last visited Oct. 20, 2020).

⁴⁹³ SARA TAYLOR, *FILTER SHIFT: HOW EFFECTIVE PEOPLE SEE THE WORLD* (2017).

⁴⁹⁴ *How to Turn Your Restaurant Rage into Kindness*, AWARENESS IN ACTION (July 29, 2019), <https://www.awarenessinaction.org/turn-restaurant-rage-kindness/>.

University of San Francisco Law School professor Rhonda V. Magee adapted contemplative practices to cultivate awareness of racial bias,⁴⁹⁵ known as Mindfulness-Based ColorInsight Practices.⁴⁹⁶ Magee wrote a book detailing how practicing mindfulness can lead to, nurture, and sustain racial and social justice.⁴⁹⁷ Practicing mindfulness also has been found to reduce implicit age and racial bias,⁴⁹⁸ racially discriminatory behavior,⁴⁹⁹ affective forecasting biases,⁵⁰⁰ sunk-cost bias,⁵⁰¹ and unwillingness to accept inequitable or unfair outcomes.⁵⁰² It would be of interest to learn if practicing mindfulness can reduce audism and ableism.

A particular type of mindfulness practice known as LKM meditation,⁵⁰³ uses “words, images, and feelings to evoke a loving kindness and friendliness to oneself and others.”⁵⁰⁴ Neuroscientific research demonstrates “that mindfulness and kindness actually alter the behavior of genes, turning down those that promote inflammation, which can lead to heart disease or certain cancers, and turning up the activity of genes that protect against infections.”⁵⁰⁵ A large body of neuroscience research finds numerous potential benefits to practicing LKM

⁴⁹⁵ Rhonda V. Magee, *How Mindfulness Can Defeat Racial Bias*, GREATER GOOD MAGAZINE (May 24, 2015),

https://greatergood.berkeley.edu/article/item/how_mindfulness_can_defeat_racial_bias.

⁴⁹⁶ Rhonda V. Magee, *The Way of ColorInsight: Understanding Race and Law Effectively Through Mindfulness-Based ColorInsight Practices*, 8 GEO. L.J. MOD. CRIT. RACE PERSP. 251, 253 (2016).

⁴⁹⁷ RHONDA V. MAGEE, *THE INNER WORK OF RACIAL JUSTICE: HEALING OURSELVES AND TRANSFORMING OUR COMMUNITIES THROUGH MINDFULNESS* (2019).

⁴⁹⁸ Adam Lueke & Bryan Gibson, *Mindfulness Meditation Reduces Implicit Age and Race Bias: The Role of Reduced Automaticity of Responding*, 6 SOC. PSYCHOL. & PERSONALITY SCI. 284 (2015).

⁴⁹⁹ Adam Lueke & Bryan Gibson, *Brief Mindfulness Meditation Reduces Discrimination*, PSYCHOL. CONSCIOUSNESS: THEORY, RES. & PRAC. 34, 39 (2016).

⁵⁰⁰ Amber S. Emanuel et al., *The Role of Mindfulness Facets in Affective Forecasting*, 49 PERSONALITY & INDIVIDUAL DIFFERENCES 815, 816-18 (2010).

⁵⁰¹ Andrew C. Hafenbrack et al., *Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias*, 25 PSYCHOL. SCI. 369, 374 (2014).

⁵⁰² Ulrich Kirk et al., *Mindfulness Training Increases Cooperative Decision Making in Economic Exchanges: Evidence from fMRI*, 138 NEUROIMAGE 274, 281 (2016); Ulrich Kirk et al., *Interoception Drives Increased Rational Decision-Making in Meditators Playing the Ultimatum Game*, 5 FRONTIERS NEUROSCI., Apr. 2011, Art. 49, 49 (2011).

⁵⁰³ *A Loving-Kindness Meditation to Boost Compassion*, GREATER GOOD SCIENCE CENTER (Mar. 31, 2016), <https://www.mindful.org/a-loving-kindness-meditation-to-boost-compassion/>.

⁵⁰⁴ Jack Kornfield, *Meditation on Loving Kindness*, JACK KORNFIELD, <https://jackkornfield.com/meditation-on-lovingkindness/> (last visited Oct. 20, 2020).

⁵⁰⁵ Watanabe, *supra* note 281.

meditation,⁵⁰⁶ including decreasing implicit intergroup bias,⁵⁰⁷ increasing brain matter,⁵⁰⁸ curbing self-criticism,⁵⁰⁹ diminishing posttraumatic stress disorder,⁵¹⁰ mitigating negative symptoms of schizophrenia spectrum disorders,⁵¹¹ reducing chronic (lower back) pain,⁵¹² and even slowing aging.⁵¹³ The UCLA Mindful Awareness Research Center (“MARC”)⁵¹⁴ developed a free smartphone app called UCLA Mindfulness,⁵¹⁵ which includes (in English and some Spanish) guided meditations, fostering mindfulness, kindness, and well-being. It also has podcasts about equanimity, loving kindness, mindfulness, and (self-) compassion.⁵¹⁶

To practice LKM meditation, the specific words can vary and simply convey a set of caring, loving, and kind sentiments that start with yourself; then someone dear to you; someone who you feel neutral towards; someone toward whom you feel animosity; and finally to all (carbon-based) living beings:

May I be filled with lovingkindness
 May I be held in loving kindness. . .
 May I feel connected and calm. . .
 May I accept myself just as I am. . .
 May I be happy. . .

⁵⁰⁶ Emma Seppälä, *18 Science-Backed Reasons to Try Loving-Kindness Meditation*, PSYCHOLOGY TODAY (Sept. 15, 2014), <https://www.psychologytoday.com/us/blog/feeling-it/201409/18-science-backed-reasons-try-loving-kindness-meditation>; Xiangiong Zeng et al., *The Effect of Loving-Kindness Meditation on Positive Emotions: A Meta-Analytic Review*, 6 FRONTIERS PSYCHOL. 1693 (2015).

⁵⁰⁷ Yoona Kang et al., *The Nondiscriminating Heart: Lovingkindness Meditation Training Decreases Implicit Intergroup Bias*, 143 J. EXPERIMENTAL PSYCHOL. GEN. 1306 (2014).

⁵⁰⁸ Mei-Kei Leung et al., *Increased Gray Matter Volume in the Right Angular and Posterior Parahippocampal Gyri in Loving-Kindness Meditators*, 8 SOC. COGNITIVE & AFFECTIVE NEUROSCI. 34 (2013).

⁵⁰⁹ Ben Shahar et al., *A Wait-List Randomized Controlled Trial of Loving-Kindness Meditation Programme for Self-Criticism*, 22 CLINICAL PSYCHOL. & PSYCHOTHERAPY 346 (2015).

⁵¹⁰ David J. Kearney et al., *Loving-Kindness Meditation for Posttraumatic Stress Disorder: A Pilot Study*, 26 J. TRAUMATIC STRESS 426 (2013).

⁵¹¹ David P. Johnson et al., *A Pilot Study of Loving-Kindness Meditation for the Negative Symptoms of Schizophrenia*, 129 SCHIZOPHRENIA RES. 137 (2011).

⁵¹² James W. Carson et al., *Loving-Kindness Meditation for Chronic Low Back Pain: Results From a Pilot Trial*, 23 J. HOLISTIC NURSING 287 (2005).

⁵¹³ Elizabeth A. Hoge et al., *Loving-Kindness Meditation Practice Associated with Longer Telomeres in Women*, 32 BRAIN, BEHAV. & IMMUNITY 159 (2013).

⁵¹⁴ UCLA MINDFUL AWARENESS RESEARCH CENTER, <https://www.uclahealth.org/marc/>.

⁵¹⁵ *UCLA Mindful*, APP STORE PREVIEW, <https://apps.apple.com/us/app/ucla-mindful/id1459128935?ls=1> (last visited Oct. 20, 2020).

⁵¹⁶ *Id.*

May I know the natural joy of being alive. . .

May you be filled with lovingkindness

May you be held in loving kindness. . .

May you feel connected and calm. . .

May you accept myself just as I am. . .

May you be happy. . .

May you know the natural joy of being alive. . .⁵¹⁷

Another way to bridge our idiosyncratic perceptions is of course through translation. However, a drawback of this method is that much can be lost in translation. An AT&T wireless television commercial, *OK: Translator*,⁵¹⁸ depicts a meeting where an Asian businessman hired a “just OK” translator to communicate with some Dutch businesspeople. That translator mistakenly translates “tell him we’re flexible,” as “this man is very bendy,” and translates “tell him we need this merger,” as “he says he needs a hug.”

KODA and CODA can be more than just OK translators between the deaf and hearing communities. KODA and CODA can also be private rebel norm entrepreneurs who help change social norms and societal attitudes towards deafness and hearing loss. Because they are part of the deaf and hearing communities and cultures, KODAs and CODAs are uniquely qualified to lead the deaf and hearing communities into forming a more harmonious and stronger union.

Neuroscience and positive psychology research suggest practical ways to overcome prejudices and move towards a future in which people celebrate and embrace differences.⁵¹⁹ For example, Susan Fiske—the Eugene Higgins Professor of Psychology at Princeton University—has conducted social psychology and neuroscience research showing how the social dynamics and forces of competition, cooperation, and power can exacerbate or inhibit discrimination, prejudice, and stereotyping.⁵²⁰ People find it cognitively less demanding to categorize others, especially by such observable attributes as deafness or hearing loss, than it is to learn about

⁵¹⁷ *Lovingkindness Meditation*, U.S. DEP’T VETERANS, https://www.fresno.va.gov/docs/Transcript_Lovingkindness_Meditation_.pdf (last visited Oct. 20, 2020).

⁵¹⁸ ISPOT.TV, <https://www.ispot.tv/ad/o6VN/at-and-t-wireless-ok-translator> (last visited Oct. 20, 2020).

⁵¹⁹ ARE WE BORN RACIST? NEW INSIGHTS FROM NEUROSCIENCE AND POSITIVE PSYCHOLOGY (Jason Marsh et al., eds. 2010).

⁵²⁰ See generally SUSAN FISKE, ENVY UP, SCORN DOWN: HOW STATUS DIVIDES US (2012) (examining the neuroscience and psychology of prejudice).

others as individuals because learning about others requires motivation.⁵²¹ Fiske's research demonstrates that being teammates or having to depend on another motivates people to go past stereotyping.⁵²² Other studies also find that increasing social interactions with diverse groups, particularly working together face-to-face in shared activities, reduces bias.⁵²³ KODAs and CODAs can help deaf and hearing work together and come to appreciate others as individuals with much in common as opposed to members of groups who differ in their degrees of hearing.

ASL is a wonderful and fun language for the hearing to learn and the hearing community can and should be more accepting and inclusive of the d/Deaf community. All of us benefit in cognitive, emotional, and psychological ways from promoting diversity. The d/Deaf and hearing cultures and communities have much to offer each other and are stronger together than apart. Audism and ableism hurt not only those discriminated against; they also hurt society.

IV. CONCLUSION

This Article has analyzed the looming public health crisis of many Americans having NIHL and NIHHL due to CRAAP. This Article detailed the clinical and empirical medical data about CRAAP causing NIHL and NIHHL. It considered the normative implications of that data in American society today and in the future. By applying neoclassical, informational, and behavioral economics, this Article advocates legal policies to raise political awareness and social consciousness about deafness, NIHL, and NIHHL. In particular, this Article introduced the social psychology idea of attitudes into the law and economics literature as worthy of study and levers for law and policy to act upon in achieving individual and societal behavior change.

Ultimately and fundamentally, this Article advocates changing hearing people's attitudes and thinking about deafness and hearing loss. We fully appreciate that deafness and hearing loss are related, yet differ. A mathematical view is that deafness and hearing are opposite endpoints of a continuum of hearing capabilities. Hearing loss moves one along that spectrum away from hearing towards deafness. Because one can view

⁵²¹ *Id.*

⁵²² *Id.*

⁵²³ Rupert Brown & Miles Hewstone, *An Integrative Theory of Intergroup Contact*, 37 *ADV. EXPERIMENTAL SOC. PSYCHOL.* 255 (2005); Thomas F. Pettigrew & Linda R. Troop, *A Meta-Analytic Test of Intergroup Contact Theory*, 90 *J. PERSONALITY & SOC. PSYCHOL.* 751 (2006).

deafness as having 100 percent hearing loss, the notions of deafness and hearing loss are related and often conflated. We, therefore, believe changing people's attitudes towards, and social norms about, hearing loss are related to changing people's attitudes towards, and social norms about deafness.

We hope to have changed how readers of this Article view deafness, from the dominant view that deafness or hearing loss is a biological handicap to a more inclusive view that people who are d/Deaf or have hearing loss happen to communicate in a visual language, namely ASL. Just as those who communicate in another spoken language are not perceived as being disabled or handicapped, the same should apply to those who happen to communicate by signing in ASL. Ironically, some individuals often do speak louder and even shout when attempting to communicate with another individual who does not speak their language. In non-U.S. countries, most people speak English as a second language (and mathematics as a third language, that of science and commerce). Unfortunately, many Americans speak neither a second nor a third language. As an additional language, even babies can learn to sign in ASL before they can learn to speak other languages.

Being d/Deaf or having hearing loss only becomes a socially constructed disability and economically determined handicap when hearing people are not inclusive and not supportive. Audism leads to implicit, if not explicit, bias and discrimination against d/Deaf people and people with NIHL and NIHHL. Such discrimination harms all people because it robs corporations, organizations, and society of the cognitive diversity that d/Deaf people and people with hearing loss provide.⁵²⁴ Being able to communicate in ASL can offer a competitive advantage in certain situations, such as those depicted in the fictional drama, scary, thriller movie *A Quiet Place*.⁵²⁵ After all, you just never know what our future may hold (there already is a forthcoming sequel, namely *A Quiet Place: Part II*).⁵²⁶

⁵²⁴ Huang, *supra* note 41; *see also* SCOTT E. PAGE, *THE DIFFERENCE: HOW THE POWER OF DIVERSITY CREATES BETTER GROUPS, FIRMS, SCHOOLS, AND SOCIETIES* (rev. ed. 2008); SCOTT E. PAGE, *THE DIVERSITY BONUS: HOW GREAT TEAMS PAY OFF IN THE KNOWLEDGE ECONOMY* (2017).

⁵²⁵ *A QUIET PLACE* (Paramount Pictures 2018).

⁵²⁶ *A QUIET PLACE: PART II* (Paramount Pictures 2020); *see also* Ian Sandwell, Gabriella Geisinger, & Sam Ashurst, *A Quiet Place: Part II Release Date, Plot, Cast and Everything You Need to Know*, *DIGITAL SPY* (Feb. 1. 2020) <https://www.digitalspy.com/movies/a858528/a-quiet-place-2-release-date-trailer-plot-cast/>.

Haben Girma observed that she paradoxically is highly visible and yet also invisible,⁵²⁷ because she is “a black woman with a dog and strange computer”⁵²⁸ meaning people will stare at her and yet many people including those who stare at her will also avoid interaction with her based on the assumption that she has nothing of value to contribute.⁵²⁹ Women generally occupy a similarly confounding position of being extremely visible physically, yet often highly invisible in a world that men design for other men due to gender data bias.⁵³⁰ Carolina Criado Perez—an award-winning author and feminist campaigner—exposes how there is a gender data gap that is the root cause of perpetual, systemic discrimination against half the human race, namely women.⁵³¹ Perez explains how much our world is designed by men for other men, including automobile crash-test dummies, cellphone apps, construction site equipment, fitness monitors, health-monitoring trackers, office temperature settings, personal protective body equipment and gear, research about carcinogenic chemical occupational exposures, restrooms, smartphone sizes, smartwatch sizes, and voice-recognition software.⁵³² In doing so, Perez “details how women’s perspectives and input have been absent in fields such as technology, construction, emergency response, and vehicular safety; and how that increases the risk of injury and death.”⁵³³ A modern mathematical example of how a woman’s perspective contributes to cognitive diversity is the path-breaking research in hyperbolic geometry by Latvian mathematician Daina Taimina, whose crocheting background allowed her to see and model hyperbolic planes and hyperbolic space.⁵³⁴ In 2012, the American Mathematical Association awarded her book, *Crocheting*

⁵²⁷ GIRMA, *supra* note 415, at 210.

⁵²⁸ *Id.* at 210.

⁵²⁹ *Id.* at 210.

⁵³⁰ CAROLINE CRIADO PEREZ, *INVISIBLE WOMEN: EXPOSING DATA BIAS IN A WORLD DESIGNED BY MEN* (2019).

⁵³¹ PEREZ, *supra* note 530.

⁵³² Caroline Criado Perez, *The Deadly Truth About A World Built for Men – From Stab Vests to Car Crashes*, THE GUARDIAN (Feb. 23, 2019, 3:59 PM), <https://www.theguardian.com/lifeandstyle/2019/feb/23/truth-world-built-for-men-car-crashes>.

⁵³³ Thanks to University of Colorado law school fall 2019 Torts I student, Ms. Erin Vanek, for informing us about Perez’s work. (Email dated Aug. 28, 2019, at 7:22 PM on file with the first author).

⁵³⁴ PEREZ, *supra* note 530, at 310–12.

Adventures with Hyperbolic Planes,⁵³⁵ the prestigious Euler prize for “an outstanding book about mathematics.”⁵³⁶

Jane Austen wrote: “The quarrels of popes and kings, with wars or pestilences, in every page; the men all so good for nothing, and hardly any women at all—it is very tiresome.”⁵³⁷ The same can be said more generally, namely that all of us live in a world designed by and for the hearing, the abled, and the seeing. There is a disability data gap that corporations, organizations, and societies can, should, and must address to change attitudes and behavior to improve all of our lives.

Audism was historically born out of ableist fear and ignorance and is a present-day superstitious remnant of discrimination and prejudice. As a society, we must strive to eliminate audism and ableism because those are the ethical, healthy, and moral things to do. If we live long enough, all of us will inevitably experience hearing loss due to aging. NIHL and NIHHL are, however, endogenously determined by legal, political, and social policies informed by individual and societal attitudes. We hope to have convinced our readers that NIHL and NIHHL in the future are serious public health issues we can and should do something about now. One way to reduce audism and ableism is to change cultural beliefs and societal attitudes to appreciate—and even celebrate—instead of merely tolerate our differences.

We conclude by once again quoting Dr. Kelli Harding—a diplomat of the American Board of Psychiatry and Neurology and board certified in the specialty of psychosomatic (mind-body) medicine—who spent much of her medical career in the ER at New York-Presbyterian Hospital: “be kind. You never know what somebody else has going on. We can learn to be more empathetic towards one another, and boy, do we need it right now.”⁵³⁸ LKM meditation is a way to practice the good habits of caring, compassion, kindness, inclusion, and tolerance—instead of the bad habits of animus, bias, discrimination, intolerance, and prejudice.

Post Script: We completed our Article before the COVID-19 pandemic and its devastating health impacts. There is some preliminary suggestive evidence that the SARS-CoV-2 virus responsible for the

⁵³⁵ DAINA TAIMINA, *CROCHETING ADVENTURES WITH HYPERBOLIC PLANES: TACTILE MATHEMATICS, ART AND CRAFT FOR ALL TO EXPLORE* (2d ed. 2018).

⁵³⁶ *2012 Euler Winner Announced*, MAA (Dec. 9, 2011), <https://www.maa.org/programs/maa-awards/journal-writing-awards/euler-book-prize/2012-euler-winner-announced>.

⁵³⁷ JANE AUSTEN, *NORTHANGER ABBEY* 73 (Dover Publications, Unabridged ed., 2000) (1817).

⁵³⁸ Harding, *supra* note 240.

COVID-19 pandemic may cause hearing loss.⁵³⁹ Additionally, ototoxicity is a known side-effect from a number of the drugs proposed to treat SARS-CoV-2.⁵⁴⁰

We note that reductions in some human activities due to COVID-19 dramatically reduced CRAAP,⁵⁴¹ even diminished seismic noise so drastically⁵⁴² as to change how our planet moves,⁵⁴³ and possibly decreased cardiovascular risk.⁵⁴⁴ Although this quiet period is already fading,⁵⁴⁵ the rise in remote working⁵⁴⁶ and education,⁵⁴⁷ combined with

⁵³⁹ Bruce Y. Lee, *Can Covid-19 Coronavirus Cause Hearing Problems Even With No Other Symptoms?* FORBES (July 26, 2020), <https://www.forbes.com/sites/brucelee/2020/07/26/can-covid-19-coronavirus-cause-hearing-problems-even-with-no-other-symptoms/#98ec0a619020>; Shin Jie Yong, *Hearing Loss: An Odd Covid-19 Symptom We Overlooked*, MEDIUM (June 11, 2020), <https://medium.com/microbial-instincts/hearing-loss-an-odd-covid-19-symptom-we-overlooked-6cdf81a5e70>.

⁵⁴⁰ Andrea Ciorba et al., *Don't Forget Ototoxicity During the SARS-CoV-2 (COVID-19) Pandemic!*, 34 INT'L J. IMMUNOPATHOLOGY & PHARMACOLOGY 1 (2020); see also Won Sriwijitalai and Viroj Wiwanitkit, *Hearing Loss and COVID-19: A Note*, AM. J. OTOLARYNGOLOGY, Apr. 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7132500/>; Shin Jie Yong, *Hearing Loss: An Odd Covid-19 Symptom We Overlooked*, MEDIUM (June 11, 2020), <https://medium.com/microbial-instincts/hearing-loss-an-odd-covid-19-symptom-we-overlooked-6cdf81a5e70>.

⁵⁴¹ See, e.g., Auotrung Bui & Emily Badger, *The Coronavirus Quieted City Noise. Listen to What's Left*, N.Y. TIMES (May 22, 2020), <https://www.nytimes.com/interactive/2020/05/22/upshot/coronavirus-quiet-city-noise.html>; Christine Ro, *Is Coronavirus Reducing Noise Pollution?* FORBES (Apr. 19, 2020), <https://www.forbes.com/sites/christinero/2020/04/19/is-coronavirus-reducing-noise-pollution/#771b3351766f>.

⁵⁴² See, e.g., Thomas Lecocoq et al., *Global Quieting of High-Frequency Seismic Noise due to COVID-19 Pandemic Lockdown Measures*, 369 SCI. 1338 (2020).

⁵⁴³ See, e.g., Elizabeth Gibney, *Coronavirus Lockdowns Have Changed the Way the Earth Moves*, NATURE (Mar. 31, 2020), <https://www.nature.com/articles/d41586-020-00965-x>.

⁵⁴⁴ See, e.g., Christina Antza & Stella Stabouli, *Reduction in Environmental Noise During COVID-19 Pandemic and Cardiovascular Disease: A Mystery for Further Investigation*, J. CLIN. HYPERTENSION (2020), <https://onlinelibrary.wiley.com/doi/full/10.1111/jch.14018>.

⁵⁴⁵ See, e.g., Mary Ellen Eagan, *Will We See Permanent Noise Reduction from the COVID-19 Pandemic?*, HMMH BLOG (Aug. 27, 2020), <https://hmmh.com/resources/news-insights/blog/will-we-see-permanent-noise-reduction-from-the-covid-19-pandemic/>; John Letzing, *COVID-19 Lockdowns have Silenced Urban Noise. Now it's Coming Back*, WORLD ECON. FOR. (May 27, 2020), <https://www.weforum.org/agenda/2020/05/covid19-lockdowns-silenced-urban-noise-now-its-coming-back/>.

⁵⁴⁶ See, e.g., Jessica Powell, *The Rise of Remote Working Can Be Unexpectedly Liberating*, N.Y. TIMES (Sept. 25, 2020), <https://www.nytimes.com/2020/09/25/opinion/remote-work-from-home-office.html>.

⁵⁴⁷ See, e.g., Peter H. Huang & Debra S. Austin, *Unsafe at Any Campus: Don't Let Colleges Become the Next Cruise Ships, Nursing Homes, and Food Processing Plants*, 96 IND. L.J. SUP. 25 (2020).

the concomitant drop in driving may usher in a new age of more peace and quiet, less din and noise.

It is too early to tell if humanity's experiences with COVID-19 will cause fundamental and transformative shifts in human behavior with lasting impacts on reducing CRAAP, NIHL, and NIHHL. Erika Walker, who is a postdoctoral research associate in environmental health at the School of Public Health at Boston University,⁵⁴⁸ founded Community Noise Lab to undertake research to help create "a more just and equitable community soundscape."⁵⁴⁹ Walker who believes that quiet should be a human right, instead of a luxury for the wealthy, thinks the serenity brought on by COVID-19 may set a new reference point of what quietness there can be in our world.⁵⁵⁰ COVID-19 is a wake-up call and reminder about other future public health crises, including the impending public health problem of noise pollution. COVID-19 also teaches us important lessons about gender balanced leadership and overcoming racism based on fear and hate.⁵⁵¹

Finally, we believe that COVID-19 can and should remind all people of our commonality. The SARS-CoV-2 infects human hosts, regardless of their age, class, (dis)abilities, education, ethnicity, gender, height, income, political affiliation, religion, sexual orientation, status, and weight.⁵⁵² Too

⁵⁴⁸ Erika Walker, SCH. PUB. HEALTH BOSTON UNIV., <https://www.bu.edu/sph/profile/erica-walker/> (last visited Oct. 20, 2020).

⁵⁴⁹ *Community Noise Lab*, SCH. PUB. HEALTH BOSTON UNIV., <http://communitynoiselab.org/> (last visited Oct. 20, 2020).

⁵⁵⁰ Josh Simes, *Will the World be Quieter after the Pandemic?*, BBC (June 16, 2020), <https://www.bbc.com/future/article/20200616-will-the-world-be-quieter-after-the-pandemic>.

⁵⁵¹ See also Peter H. Huang, *Put More Women in Charge and Other Leadership Lessons from COVID-19* 15 FIU L. REV. (forthcoming 2021) (analyzing gender differences in leadership in response to COVID-19); Peter H. Huang, *COVID-19, Anti-Asian Racism, and Anti-Asian American Racism*, 28 ASIAN AM. L.J. (forthcoming 2021) (analyzing responses to increased anti-Asian racism due to COVID-19); Peter H. Huang, *Pandemic Emotions: The Good, the Bad, and the Unconscious—Implications for Public Health, Financial Economics, Law, and Leadership*, 16 NW. J.L. SOC. & POL'Y (forthcoming 2021); Peter H. Huang, *Phobias About Health, Finances, Law, Leadership, and Loneliness*, NW. U. L. REV. (May 15, 2020), <https://blog.northwesternlaw.review/?p=1408>; Peter H. Huang et al., *Addressing Emotions from COVID-19, Racial Inequity, and Civil Unrest*, ABA DISP. RESOL. SECTION (June 18, 2020), https://americanbar.zoom.us/rec/play/vZQkfr-h-j03GIGc5QSDUaIoW47sLK6sh3IY-_JenU_mAXUBMAGgMuNHN7ZEtYee96BjLEGdsTzliQGx?continueMode=true (enter password "5D%7g6w?").

Carice Witte, *Reimagining Governance After Covid-19*, MODERN DIPLOMACY (Sep. 18, 2020), <https://moderndiplomacy.eu/2020/09/18/reimagining-governance-after-covid-19/>.

⁵⁵² Maria Foraster, *Noise: Much More Than a Nuisance*, BARCELONA INST. GLOB. HEALTH (May 21, 2019), https://www.isglobal.org/en_GB/healthisglobal/-/custom-blog-portlet/el-ruido-mucho-mas-que-una-molestia/6002085/0.

often, we focus too much on our differences and too little on our similarities and relationships to each other.⁵⁵³ As U.S. Senator from New Jersey Cory Booker eloquently said, “The lines that divide us are nowhere near as strong as the ties that bind us.”⁵⁵⁴

We are quite fragile carbon-based life forms. COVID-19 also reminds us that our time on this planet we share is uncertain and finite. It would be unfortunate to not utilize our precious time alive to improve the world for all. For example, on September 23, 2020, the International Day of Sign Language, Zoom announced new accessibility features to facilitate ASL interpretation, including capabilities to pin and spotlight multiple video screens at a time, thus keeping someone who is signing alongside a speaker or on the main screen and always in view.⁵⁵⁵ These features also benefit others such as law professors who now can have a panel of (up to nine) students on call during a Zoom class. This is an example of how providing accessibility can have unintended social benefits.

⁵⁵³ See generally EUGENIA CHENG, *X + Y: A MATHEMATICIAN’S MANIFESTO FOR RETHINKING GENDER* (2020); see also Meghna Chakrabarti & Anna Bauman, *Rethinking Gender with Mathematician Eugenia Cheng*, ON POINT, WBUR PODCAST (Sept. 16, 2020) (interviewing Eugenia Cheng), <https://www.wbur.org/onpoint/2020/09/16/rethinking-gender-with-mathematician-eugenia-cheng>; Eugenia Cheng, *How to Undo Gender Stereotypes in Math—With Math!*, WIRED (Aug. 25, 2020), <https://www.wired.com/story/how-to-undo-gender-stereotypes-in-math-with-math/>; Katy Guest, *x + y by Eugenia Cheng Review – An End to the Gender Wars?*, GUARDIAN (July 22, 2020), <https://www.theguardian.com/books/2020/jul/22/x-y-by-eugenia-cheng-review-an-end-to-the-gender-wars>; Jory C. Lerback, *Equity: A Mathematician Shares her Solution*, 583 NATURE 681 (2020) (reviewing EUGENIA CHENG, *X + Y: A MATHEMATICIAN’S MANIFESTO FOR RETHINKING GENDER*); Cathey O’Neil, *Want a Better Way to Think About Gender? Use Math*, N.Y. TIMES (Sept. 4, 2020), <https://www.nytimes.com/2020/09/04/books/review/x-y-mathematicians-manifesto-gender-eugenia-cheng.html>; Jillian Tamaki, *To the Mathematician Eugenia Cheng, There’s No Gap Between Art and Science*, N.Y. TIMES (Aug. 13, 2020), <https://www.nytimes.com/2020/08/13/books/review/eugenia-cheng-by-the-book-interview.html>.

⁵⁵⁴ The Late Show with Stephen Colbert, *Sen. Cory Booker’s Live Reaction to Trump’s Frightening Message to White Supremacists*, YOUTUBE (Sept. 30, 2020), https://www.youtube.com/watch?v=o_ls5xpXX1s (featuring U.S. Sen. Booker speaking at 8:32 to 8:37).

⁵⁵⁵ Jefferson Graham, *Move Speaker Windows, Add Closed Captioning: Zoom Adds Accessibility Features for Video Meetings*, USA TODAY (Sept. 23, 2020), <https://www.usatoday.com/story/tech/2020/09/23/zoom-adds-accessibility-features-now-you-can-move-windows-around/3495730001/>; Sasha Lekach, *Zoom Catches up with New Accessibility Features for Sign Language Interpretation*, MASHABLE (Sept. 23, 2020), <https://mashable.com/article/zoom-video-accessibility-features/>.