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"HOW'S MY DRIVING?" FOR EVERYONE (AND EVERYTHING?)

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This is an Article about using reputation-tracking technologies to displace criminal law enforcement and improve the tort system. The Article contains an extended application of this idea to the regulation of motorist behavior and examines the broader case for using technologies that aggregate dispersed information in various settings where reputational concerns do not adequately deter uncooperative behavior.

The Article proposes a compulsory "How's My Driving?" program for all motor vehicles. Although more rigorous study is warranted, the initial data from voluntary "How's My Driving?" programs is quite promising, suggesting that the use of "How's My Driving?" placards on commercial trucks is associated with fleet accident reductions ranging from 20% to 53%. By delegating traffic regulation to the motorists themselves, the state might free up substantial law enforcement resources, more effectively police dangerous and annoying forms of driver misconduct, reduce information asymmetries in the insurance market, and alleviate road rage and driver frustration.

The Article addresses obvious objections to the displacement of criminal traffic enforcement with a system of "How's My Driving?"-based civil fines. Namely, it suggests that using the sorts of feedback algorithms that eBay and other reputation-tracking systems have employed can ameliorate the problems associated with false and malicious feedback. The Article also explains why driver distraction costs would be manageable and addresses privacy and due process implications of the proposed regime.

The core strategy animating "How's My Driving?" for Everyone is to use technology to transform loose-knit environments, where reputation often fails to constrain antisocial behavior, into close-knit environments, where reputation constrains misbehavior more effectively. Using such technologies, society can replace state policing with citizen policing and laws with norms. The Article concludes by examining various nondriving applications of feedback technologies to help regulate the conduct of soldiers, police officers, hotel guests, sports spectators, and participants in virtual worlds, among others.

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INTRODUCTION

Harnessing the knowledge created by technologies that aggregate dispersed information has become a central concern of legal academics, economists, and policymakers in the new millennium. Some academic work has focused on information aggregators like Wikipedia, an online encyclopedia to which anyone can contribute

and that is more extensive than Britannica and nearly as accurate.[1] Others have explored the virtues of information markets, which seem capable of predicting future events with greater accuracy than any assembled group of experts.[2] Still more academic work examines the growing importance of open source collaboration and peer production of intellectual property, where thousands of computer programmers scattered around the world team up to produce better code and then disperse immediately thereafter.[3] Simultaneously, many economists have explored eBay's extraordinarily successful system for aggregating and displaying reputation information for millions of unique users.[4] And organizational theorists have proselytized on behalf of various knowledge-transfer strategies that improve performance in

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[1] *See, e.g.*, CASS R. SUNSTEIN, INFOTOPIA: HOW MANY MINDS PRODUCE KNOWLEDGE (forthcoming 2006) (describing benefits of Wikipedia and other resources for aggregating dispersed information); Jim Giles, *Internet Encyclopaedias Go Head to Head: Jimmy Wales' Wikipedia Comes Close to Britannica in Terms of the Accuracy of Its Science Entries, a* Nature *Investigation Finds*, 438 NATURE 900, 900 (2005) (discussing *Nature* investigation that found Wikipedia is not significantly less accurate than Britannica).

[2] *See, e.g.*, SUNSTEIN, *supra* note 1 (discussing performance of information markets in predicting future events); Michael Abramowicz, *Information Markets, Administrative Decisionmaking, and Predictive Cost-Benefit Analysis*, 71 U. CHI. L. REV. 933, 933–43, 949–51 (2004) (analyzing use of information markets to improve government decisionmaking); Michael Abramowicz, *The Law-and-Markets Movement*, 49 AM. U. L. REV. 327, 328–35 (1999) (discussing and critiquing proposals to use market mechanisms in various legal contexts); Saul Levmore, *Simply Efficient Markets and the Role of Regulation: Lessons from the Iowa Electronic Markets and the Hollywood Stock Exchange*, 28 J. CORP. L. 589, 591 (2003) (discussing Iowa Electronic Market and noting that it outperformed major polling organizations); Charles R. Plott, *Markets As Information Gathering Tools*, 67 S. ECON. J. 1, 9–12 (2000) (describing experiments that involved simulated markets collecting, broadcasting, and aggregating information); Charles R. Plott et al., *Parimutuel Betting Markets as Information Aggregation Devices: Experimental Results*, 22 ECON. THEORY 311 (2003) (exploring ability of parimutuel betting systems to aggregate fragmented information and accurately predict probabilities of certain outcomes); Cass R. Sunstein, *Group Judgments: Statistical Means, Deliberation, and Information Markets*, 80 N.Y.U. L. REV. 962, 967, 1024 (2005) (arguing that information markets outperform deliberating groups).

[3] *See, e.g.*, YOCHAI BENKLER, THE WEALTH OF NETWORKS 63–90 (2006); SUNSTEIN, *supra* note 1; Yochai Benkler, *Coase's Penguin, or, Linux and* The Nature of the Firm, 112 YALE L.J. 369 (2002).

[4] *See, e.g.*, Mikhail I. Melnik & James Alm, *Does a Seller's Ecommerce Reputation Matter? Evidence from eBay Auctions*, 50 J. INDUS. ECON. 337, 340–47 (2002) (analyzing empirical data on effect of seller's eBay reputation on price of products); Paul Resnick & Richard Zeckhauser, Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System 3 (Feb. 5, 2001) (unpublished manuscript, available at http://www-csag.ucsd.edu/teaching/cse225s04/Reading%20List/E-bay-Empirical-BodegaBay.pdf) (discussing manner in which eBay's reputation system operates); Stephen S. Standifird, *Reputation and E-commerce: eBay Auctions and the Asymmetrical Impact of Positive and Negative Ratings*, 27 J. MGMT. 279, 281 (2001) (discussing importance of reputation as mechanism for reducing risks of e-commerce).

companies and agencies by facilitating the efficient flow of information up and down the chain of command.[5]

This Article takes the next step in the aggregation of dispersed information literature. Namely, it explores the use of information aggregation technologies to deter, detect, and punish citizen misconduct. This Article focuses on the most promising and significant application of this approach to law enforcement: traffic regulation.

The stakes associated with traffic accidents and commuting-related stresses are enormous. Vehicular collisions are the leading killer of Americans aged fifteen to twenty-nine[6] and the nation's fourth largest cause of lost disability-adjusted life years.[7] Worldwide, traffic accidents kill nearly 1.2 million people annually.[8] Recent economic research has placed commuting at the very bottom of the happiness index, easily ranking as the least pleasurable major life activity in which Americans engage.[9] Despite this, the average American worker spends more than forty-eight miserable minutes a day commuting to and from work,[10] completely frustrated by his inability to do

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[5] *See, e.g.*, Linda Argote & Paul Ingram, *Knowledge Transfer: A Basis for Competitive Advantage in Firms*, 82 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 150 (2000) (arguing that knowledge transfer can create competitive advantage for firms); Bradley C. Karkainnen, *Information As Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257 (2001) (analyzing EPA's Toxic Release Inventory and arguing that it succeeds by creating transparent, information-rich environment); Margit Osterloh & Bruno S. Frey, *Motivation, Knowledge Transfer, and Organizational Forms*, 11 ORG. SCI. 538 (2000) (arguing that some organizational forms provide better motivation for knowledge transfer); Jeremy C. Stein, *Information Production and Capital Allocation: Decentralized Versus Hierarchical Firms*, 57 J. FIN. 1891 (2002) (discussing ways in which organizational design affects capital allocation to competing projects).

[6] Michael Sivak, *How Common Sense Fails Us on the Road: Contribution of Bounded Rationality to the Annual Worldwide Toll of One Million Traffic Fatalities*, 5 TRANSP. RES. PART F 259, 260 (2002); *see also* Reginald G. Smart & Robert E. Mann, *Is Road Rage a Serious Traffic Problem?*, 3 TRAFFIC INJ. PREVENTION 183, 187 (2002) (noting that car accidents "account for about 40% of all deaths of those between the ages of 15 and 24 in Canada").

[7] Sivak, *supra* note 6, at 260. For an exploration of the social costs of traffic fatalities, see Gunnar Lindberg, *Traffic Insurance and Accident Externality Charges*, 35 J. TRANSPORT ECON. & POL'Y 399, 414 (2001), which estimates that the total social costs of traffic accidents in Sweden are equal to 2.7% of gross domestic product.

[8] Margie Peden, The World Report on Road Traffic Injury Prevention: Getting Public Health to Do More 3 (2005) (unpublished manuscript, available at www.rospa.com/roadsafety/conferences/congress2005/info/peden.pdf).

[9] Daniel Kahneman et al., *A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method*, 306 SCIENCE 1776, 1777 tbl.1 (2004).

[10] *See* Press Release, U.S. Census Bureau News, Americans Spend More than 100 Hours Commuting to Work Each Year, Census Bureau Reports (Mar. 30, 2005), *available at* http://www.census.gov/Press-Release/www/releases/archives/american_community_survey_acs/004489.html (noting average morning commute of twenty-four minutes). This data includes all Americans who work outside their homes. The average roundtrip com-

anything about the relatively small number of obnoxious drivers who are imposing substantial costs on everyone else.

There is, in short, far more blood on the pavement in the realm of traffic law than there can ever be from intellectual property, corporate, or e-commerce law. Yet while scholars in those fields have begun showing how aggregated information can be harnessed to improve laws and lives, scholars interested in transportation policy have virtually ignored these insights.[11] That blind spot is surprising, given that the dispersed information relevant to transportation regulation is so readily available and can be gathered quite inexpensively, yet virtually all of it presently goes to waste. Were that information harnessed, by contrast, it might be used to save thousands of lives and push criminal laws to the margins.

Among the various technologies that have facilitated the aggregation of dispersed information, eBay's reputation system may be the most successful so far. We can underscore the importance of eBay's seller reputation scores by imagining what it would be like to buy items on eBay without them: Buyers would face the constant risk that a seller might abscond with the proceeds of a sale, necessitating significant expenditures on escrow services for nearly every transaction. Even using escrow, there would be substantial problems in the absence of seller reputation rankings. Some buyers would discover after the fact that they had purchased counterfeit, defective, or stolen goods, and they would be left with little recourse beyond tracking down and suing far-flung sellers. Law enforcement authorities might occasionally prosecute the worst offenders for mail fraud or trafficking in counterfeit goods, but the vast majority of wrongdoers would escape into the ether, taking the money of trusting buyers with them. As a result, buyers would be scared away from dealing with obscure sellers, and the prices paid for goods on eBay would drop substantially.[12]

A modern, urban freeway is a lot like eBay without reputation scores. Most drivers on the freeway are reasonably skilled and willing

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mute exceeded one hour per day in New York City, Newark, Chicago, and Riverside, California. *Id.*

[11] Traffic law scholarship is presently peripheral in legal academic discourse. It is not at all clear why that should be so. Besides the enormous number of lives and dollars at stake, traffic law remains the body of law with which ordinary Americans interact most frequently, and it is the primary locus of citizens' interactions with the police. Moreover, traffic law is the only set of laws about which adult Americans are routinely tested, and it is probably the body of law best understood by the lay public.

[12] This outcome reflects the "lemons" scenario developed in George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q.J. ECON. 488, 495 (1970).

to cooperate conditionally with fellow drivers, but there is a sizable minority that imposes substantial costs on other drivers, in the form of accidents, delays, stress, incivility, and rising insurance premiums. Because enforcement of the traffic laws by police officers is sporadic and often targeted toward those offenses that are easiest to prove as opposed to those that impose the greatest harm on motorists, insurance companies face substantial obstacles sorting among the good drivers and the bad. As a result, safe drivers pay higher premiums, and good drivers who are part of demographic groups that are accident-prone pay far higher premiums, than they would if insurance companies had perfect information.

Just as eBay developed a successful technological solution to the problem of online auctions among Internet users, there are sensible and attainable technological solutions to the problems created by motorist anonymity. These technological solutions could produce enormous social benefits in the form of lives saved, property damage avoided, everyday unhappiness alleviated, road rage mitigated, and law enforcement resources redeployed. An urban freeway contains thousands of motorists who are watching their fellow motorists drive and who are often talking (to themselves or passengers) about who is driving well or poorly. Using available technologies to harness this dispersed information could generate great welfare gains.

Can this information be put to use? It appears so. The best available evidence suggests that using "How's My Driving?" placards on commercial vehicles substantially improves fleet safety. This Article proposes a massive expansion of these primitive placards with the implementation of a novel program called "'How's My Driving?' for Everyone."

Part I discusses the central role that anonymity and obscurity play in creating dysfunction on urban, suburban, and exurban roadways. It discusses the existing studies regarding "How's My Driving?" programs for commercial fleets, all of which suggest that the programs substantially reduce vehicular collisions. Lastly, it introduces a universal "How's My Driving?" program, whereby all drivers would be required to participate in a reputation-monitoring regime. Part II makes the case for this program, which would enable society to put scarce law enforcement resources to better use, ensure that the forms of motorist misconduct that impose the greatest costs on others receive the harshest sanctions, and reduce information asymmetries in the insurance market. It could also make commuting a far less miserable experience, both by making driving safer and by reducing road rage. Part III explores the potential drawbacks associated with a mandatory and universal "How's My Driving?" program. This Part

assesses the magnitude of the inaccurate or malicious feedback problem, examines the associated driver distraction costs, compares the effectiveness of "How's My Driving?" feedback to automated safe driving technologies, and considers the privacy and due process objections to such a system. This Part concludes by examining whether a mandatory, universal "How's My Driving?" scheme is preferable to letting the market do as it will. Part IV discusses the many variations and policy options that would arise if the government implemented a "How's My Driving?" for Everyone regime. Part V considers the broader theoretical importance of the insights derived from this case study by exploring other policy domains in which the approach of replacing state policing with reputation tracking and decentralized enforcement could pay dividends. It suggests that "How's My Driving"–style regimes have the capacity to displace the state's traditional role of enacting and enforcing substantive laws. To that end, it ponders the question of when such displacement is appropriate.

I
ANONYMITY AND AGGRESSIVE DRIVING

"Motorist anonymity" arises when another driver observes my behavior but is unable to identify me as Lior Strahilevitz, as opposed to, say, some guy in a dark green Honda Civic.

The problems associated with urban and suburban driving are, by and large, creatures of motorist anonymity. That statement may seem too bold to readers accustomed to hearing about drunken driving, drowsy driving, and road rage. But a review of the literature on driving suggests that these problems largely stem from roadway anonymity. If society were able to monitor its roadways around the clock and to analyze this data immediately to identify and punish problematic motorists, many of the traffic accident deaths that occur every year would be averted. A dangerous driving environment is the almost inevitable consequence of sporadic traffic law enforcement by the police combined with rare traffic norm enforcement by motorists.

The evidence of a link between anonymity and aggressive driving is reflected in numerous studies, all of which reach essentially the same conclusion: People are more likely to drive aggressively when they can avoid sanctions, but drive courteously when they believe they will be held accountable for misconduct.[13] The cleverest of these

[13] *See, e.g.*, Ann M. Brewer, *Road Rage: What, Who, When, Where and How?*, 20 TRANSPORT REVIEWS 49, 55 (2000) ("Drivers feel anonymous in their vehicles and consequently behave differently in a driving context compared with a non-driving one."); Patricia A. Ellison et al., *Anonymity and Aggressive Driving Behavior: A Field Study*, 10 J. SOC. BEHAV. & PERSONALITY 265, 266–71 (1995) (finding that more anonymous drivers

studies found that drivers of convertibles behave more aggressively with their tops up than their tops down,[14] even though hotter weather is associated with both one's top being down and aggressive driving.[15] This observational evidence is consistent with data showing that road rage is relatively rare in those areas where roadway anonymity is diminished, such as small rural communities,[16] and that people drive more aggressively when they are driving alone than when there are passengers in their cars.[17]

The link between aggressive driving and undesirable roadway incidents, such as accidents, near misses, high-stress situations, and road rage, is similarly uncontroversial, though its magnitude is the subject of some debate.[18] In the most extensive literature review to

honked sooner, longer, and more frequently); Richard W. Harding et al., *Road Rage and the Epidemiology of Violence: Something Old, Something New*, 7 STUD. ON CRIME & CRIME PREVENTION 221, 235–36 (1998) (arguing that anonymity of driving facilitates aggression); Rebecca Lawton & Amanda Nutter, *A Comparison of Reported Levels and Expression of Anger in Everyday and Driving Situations*, 93 BRIT. J. PSYCHOL. 407, 408, 420 (2002) (concluding, based on empirical data, that anonymity encourages aggressive behavior); Leo Tasca, A Review of the Literature on Aggressive Driving Research 3 (2000) (unpublished manuscript, available at http://www.aggressive.drivers.com/papers/tasca/tasca.pdf) (finding that drivers are more likely to engage in aggressive behavior in situations that confer anonymity).

[14] Ellison et al., *supra* note 13, at 266–71.

[15] L.F. Lowenstein, *Research into Causes and Manifestations of Aggression in Car Driving*, 70 POLICE J. 263, 265–66 (1997). In commuting environments where strangers interact face-to-face, levels of cooperation and friendly behavior are higher than they are on urban freeways. *See, e.g.*, Matthew L. Fried & Victor J. DeFazio, *Territoriality and Boundary Conflicts in the Subway*, 37 PSYCHIATRY 47, 55 (1974) (describing cooperative behavior among subway passengers, such as standing in a crowded section of a subway car so as to provide opposite-sex couples with extra personal space).

[16] Mark Asbridge et al., *The "Homogamy" of Road Rage: Understanding the Relationship Between Victimization and Offending Among Aggressive and Violent Motorists*, 18 VIOLENCE & VICTIMS 517, 528 (2003); *see also* Harding et al., *supra* note 13, at 225 (noting that "only 7% of road rage incidents occurred in non-metropolitan areas . . . even though 27% of the population resides there"); Chris S. Dula, Validity and Reliability Assessment of a Dangerous Driving Self-Report Measure 1 (Mar. 26, 2003) (unpublished Ph.D. dissertation, Virginia Polytechnic Institute) (on file with the *New York University Law Review*) ("In metropolitan areas, aggressive driving and road rage seem to be of particular concern.").

[17] Trinidad Rueda-Domingo et al., *The Influence of Passengers on the Risk of the Driver Causing a Car Collision in Spain: Analysis of Collisions from 1990 to 1999*, 36 ACCIDENT ANALYSIS & PREVENTION 481, 486 (2004); David Shinar & Richard Compton, *Aggressive Driving: An Observational Study of Driver, Vehicle, and Situational Variables*, 36 ACCIDENT ANALYSIS & PREVENTION 429, 433 (2004).

[18] *See* ELIZABETH M. GREY ET AL., FED. OFFICE OF RD. SAFETY, REPORT NO. CR 81, DRIVER AGGRESSION: THE ROLE OF PERSONALITY, SOCIAL CHARACTERISTICS, RISK AND MOTIVATION 49 (1989) (noting that most accident-free drivers tend to be compulsively nonaggressive); Frank A. Drews et al., *On the Fast Lane to Road Rage*, *in* PROCEEDINGS OF THE SECOND INTERNATIONAL DRIVING SYMPOSIUM ON HUMAN FACTORS IN DRIVER ASSESSMENT, TRAINING AND VEHICLE DESIGN 194, 194 (2003), *available at* http://ppc.uiowa.edu/driving-assessment/2003/Summaries/Downloads/Final_Papers/PDF/44_Drews

date, Galovski, Malta, and Blanchard concluded that "more than 40 years of descriptive and experimental research studies have supported a reliable association between aggressive driving and increased risk of [motor vehicle accidents]."[19] According to the National Highway Traffic Safety Administration, aggressive driving causes approximately one-third of all motor vehicle accidents in the United States and two-thirds of all domestic vehicular fatalities.[20] Motorists agree that the problem is very serious: Aggressive driving is three-and-one-half times more likely than drunken driving to be identified as the most pressing traffic safety problem.[21]

So far, our story is straightforward. People are prone to aggressive driving when they feel that anonymity shields them from liability or social sanctions. This aggressive driving, in turn, causes substantial traffic accidents and fatalities. But that is not the only connection between roadway anonymity and adverse traffic outcomes. A study by Harding and coauthors presents the most comprehensive account of the psychology of aggressive driving. The authors make a convincing case that aggressive behavior by anonymous drivers triggers further aggression by those around them, who wish to punish violations of driving norms but feel powerless to do so in light of the anonymity of the norm violators.[22] That is, many motorists who witness bad driving or aggressive driving become frustrated by their inability to sanction the offending motorists, and, as a result, they often engage in retaliatory aggressive driving or, worse yet, extreme acts of felo-

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format.pdf (citing Department of Transportation estimate that two-thirds of 42,000 automobile accident deaths in 1996 were from aggressive driving); Jerry L. Deffenbacher et al., *Development of a Driving Anger Scale*, 74 PSYCHOL. REP. 83, 84 (1994) (concluding that anger while driving may cause aggressive behavior that increases accident risk); Reginald G. Smart et al., *Can We Design Cars to Prevent Road Rage?*, 1 INT'L J. VEHICLE INFO. & COMM. SYS. 44, 46 (2005) (describing road rage as "a serious social and public health problem"); Tasca, *supra* note 13, at 3 (arguing that there is insufficient data to determine whether road rage is increasing); Louis Tijerina, Issues in the Evaluation of Driver Distraction Associated with In-Vehicle Information and Telecommunications Systems 6 (unpublished manuscript, available at http://www-nrd.nhtsa.dot.gov/departments/nrd-13/driver-distraction/PDF/3.pdf) (discussing connection between "close car following" (i.e., tailgating) and crashes).

[19] TARA E. GALOVSKI ET AL., ROAD RAGE: ASSESSMENT AND TREATMENT OF THE ANGRY, AGGRESSIVE DRIVER 13 (2006).

[20] *Road Rage: Causes and Dangers of Aggressive Driving: Hearing Before the Subcomm. on Surface Transportation of the H. Comm. on Transportation and Infrastructure*, 105th Cong. 10 (1997) (statement of Ricardo Martinez, Administrator, National Highway Traffic Safety Administration), *available at* http://www.nhtsa.dot.gov/nhtsa/announce/testimony/aggres2.html.

[21] Shinar & Compton, *supra* note 17, at 429.

[22] Harding et al., *supra* note 13, at 222–31.

nious road rage.[23] This research suggests that the absence of a measured social sanction for roadway norm violations can prompt extreme overreactions. Many aggressive drivers, on this account, drive aggressively in an attempt "to communicate to other road users that they are angry."[24] Yet the nature of roadway interactions makes it difficult to express this anger in a proportional way and even more difficult for offending drivers to express remorse unambiguously.

In light of this data, we should expect to see programs that reduce roadway anonymity substantially decreasing aggressive driving and vehicular collisions. The best available data from the most prominent such program strongly supports that hypothesis.

A. "How's My Driving?" for Commercial Fleets

It is likely that readers of this Article have seen bumper stickers or placards emblazoned on the back of commercial trucks, vans, and buses asking the question: "How's My Driving? Call 1-800-XXX-XXXX with compliments or complaints." Motorists dial these phone numbers, typically using cellular phones, to report good or bad behavior by commercial drivers. The monitoring company employees who answer these calls then make a report of each incident, including details about the incident, the reporter's identity, and the road conditions. This data is immediately provided to the fleet operator, who usually investigates each incident, tracks reports about each driver, conducts training sessions to correct recurring problems, and sanctions repeat offenders where appropriate.[25]

In recent years, companies that operate "How's My Driving?" (HMD) programs have expanded their operations substantially.[26] This expansion has been fueled by various studies, mainly conducted by insurance companies, showing that the implementation of HMD placards, along with systems for monitoring the performance of individual drivers and investigating complaints, engender substantial

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[23] *Id.*; *see also* Smart et al., *supra* note 18, at 47 (stating that obscene gestures or verbal abuse are precipitating factors in sixty-four percent of road rage cases); Raymond W. Novaco, *Automobile Driving and Aggressive Behavior* 20–21 (Univ. of Cal. Transp. Ctr., Working Paper No. 42, 1991) (noting that aggressive driving and pursuit are common responses, especially among males, when other motorists drive in annoying manner); Sheila Sarkar et al., Spatial and Temporal Analyses of the Variations in Aggressive Driving and Road Rage Behaviors Observed and Reported on San Diego Freeways 6 (2000) (unpublished manuscript, available at http://www.aggressive.drivers.com/papers/smekw/smekw.pdf) (arguing that road rage can result from retaliation against aggressive driving).

[24] Lawton & Nutter, *supra* note 13, at 407.

[25] RONALD R. KNIPLING ET AL., COMMERCIAL TRUCK AND BUS SAFETY § 4.7 (2003).

[26] Trebor Banstetter, *How's My Driving Calls Keep Truckers in Line, Studies Say*, PALM BEACH POST, Apr. 20, 1999, at 1A.

reductions in accidents and losses. Reviewing these studies, Knipling et al. reported:

> [S]everal studies, mostly by insurance providers, have researched the efficacy of using safety placards, such as "How's My Driving" stickers in improving safety in [commercial motor vehicles]. These studies have shown significant reductions in vehicle crashes, insurance premiums, and DOT reportable crashes when fleets used safety placards with an effective feedback loop, that is, feedback combined with training and instruction. For example, the Hanover Insurance Co. conducted a study with 11 different trucking fleets (n = 445 trucks) using "How's My Driving" safety placards and reported a 22% reduction in crash rate and a 52% reduction in crash costs after 1 year.[27]

Other insurance company analyses, reported in press accounts, have found similarly substantial benefits from HMD: Reliance Insurance Company found that implementing HMD placards was associated with a 35% reduction in crash costs in the first year,[28] and Fireman's Fund Insurance found a 20% reduction in accidents.[29] Unpublished insurance company studies—supplied to the author by Driver's Alert, a major player in the HMD market—suggested similar results: A Great West Casualty Company study of 78 trucking companies found that in the two years after they implemented HMD programs, loss ratios[30] improved by 51%, and accident frequency dropped by 53%.[31] John Deere Transportation Insurance's study of 63 companies found a 45% decline in loss ratio and a 33% decline in accidents.[32] Other fleets instituting HMD programs have seen similar improvements.[33] Insurance studies of the installation of electronic monitoring "black boxes" in commercial fleets and passenger vehicles have shown, by contrast, only a 20% reduction in accidents.[34]

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[27] KNIPLING ET AL., *supra* note 25, § 5.3.4 (citations omitted); *see also* Jim Emerson, *Driving Test: Hanover Insurance Co. Uses Teleservices Monitoring to Cut Insurance Losses*, DIRECT, Feb. 1, 1999, *available at* 1999 WLNR 5531465 (reporting results from same Hanover study).

[28] Banstetter, *supra* note 26.

[29] Deb Riechmann, *Firms Get Good Mileage out of "How's My Driving?,"* PHILA. INQUIRER, Mar. 26, 1999, at C1.

[30] To calculate a loss ratio, an insurer aggregates the costs associated with accident claims and divides that amount by net earned premiums.

[31] Driver's Alert: Safety Management Systems (unpublished manuscript, on file with the *New York University Law Review*) [hereinafter Driver's Alert].

[32] *Id.*

[33] *See, e.g.*, Joey Ledford, *"How's My Driving?" Draws a Response*, ATLANTA J.-CONST., Dec. 24, 2001, at B5; *How's My Driving? Helps Firms Slash Accident Rates*, FLEET NEWS, July 3, 1998, at 32.

[34] MATTHIAS ROETTING ET AL., LIBERTY MUT. RESEARCH INST. FOR SAFETY, TRUCK DRIVERS' ATTITUDES AND OPINIONS TOWARDS FEEDBACK BY IN-VEHICLE TECHNOLOGY,

These results are striking, suggesting that existing HMD programs may result in large cost savings and prevent many injuries and deaths. That said, to the best of my knowledge, no study of the effectiveness of HMD programs has ever appeared in a peer-reviewed journal. This dearth of peer-reviewed studies should prompt caution, in part because it would be useful to know whether the insurance industry studies adequately accounted for selection effects,[35] and also because of a concern that any studies finding HMD programs to be ineffective may have been suppressed. The published data, however, is almost uniformly positive. One survey did suggest that many commercial fleet safety managers were not enamored with the effectiveness of HMD programs; however, the survey had significant design problems that may explain the result.[36] On the other hand, those intrigued by the data presented above can take some comfort that all of the available studies point in the same direction, that some sophisticated insurance companies are willing to put their money where their mouths are by providing discounts to commercial fleets that implement HMD programs,[37] and that the market for HMD services has

available at http://www.psychology.nottingham.ac.uk/IAAPdiv13/ICTTP2004papers2/ITS/Roetting.pdf; Peter I.J. Wouters & John M.J. Bos, *Traffic Accident Reduction by Monitoring Driver Behaviour with In-Car Data Recorders*, 32 ACCIDENT ANALYSIS & PREVENTION 643, 649 (2000).

35 More specifically, it may be that companies sign up for HMD programs when they are also implementing other beneficial safety measures, or that they are likely to sign up for HMD programs after incurring unusually large losses from accidents during a particular year and that the HMD improvements reflect regression to the mean.

36 Whereas many safety coordinators at commercial trucking companies did not rank "How's My Driving placards and 800 numbers" highly as an effective safety strategy, they ranked "continuous tracking of driver's crashes/incidents/violations" as the third most important safety strategy among twenty-eight strategies. KNIPLING ET AL., *supra* note 25, § 2.2.1 tbl.2. Tracking crashes and violations is relatively easy for commercial fleets, but if "incidents" refers to something other than "crashes" and "violations," then the only way to track such "incidents" would be through driver reports obtained from HMD. Indeed, all HMD services provide a toll-free hotline and detailed incident reports and tracking reports for particular drivers. It therefore seems likely that the survey designers' decision to distinguish HMD placards from "continuous tracking" of driver conduct resulted in the former being ranked as less effective. Knipling and coauthors themselves echo a similar concern, noting forthrightly the puzzling fact that "safety managers and other experts rated the practice of crash, incident, and violation tracking as highly effective . . . but they did not highly value the monitoring of the source safety behaviors creating these outcomes." *Id.* § 5.3.5. An alternative explanation for the poor performance of HMD placards in the Knipling survey is that fleet safety managers are almost always former truck drivers, *id.* § 1.1, and survey research reveals that truck drivers are typically hostile to receiving motorist feedback via HMD numbers, though they generally welcome feedback from fellow truckers and their safety supervisors, ROETTING ET AL., *supra* note 34; Yueng-Hsiang Huang et al., *In-Vehicle Safety Feedback*, PROF. SAFETY, Jan. 2005, at 20, 24 tbl.3, 27.

37 Riechmann, *supra* note 29; *see also State Encounters Problem with Plan for "How's My Driving?" Stickers*, CHARLESTON DAILY MAIL, Sept. 29, 2004, at 5A (describing 2002

grown dramatically in the last few years, both in the United States and abroad.[38] In short, an increasing number of businesses have been betting big on this technology in recent years, and they seem pleased with their investment. At the end of the day, then, there is reasonably persuasive evidence that HMD programs produce substantial improvements in fleet safety, and the evidence is certainly strong enough to warrant rigorous investigation by transportation scholars.

Assuming the existing data reveals a causal effect, and HMD programs do reduce collisions and collision-related losses, to what can we attribute these improvements in fleet safety? There appear to be two mechanisms at play. First, the presence of these placards reminds commercial fleet drivers that they are accountable for behavior that is likely to annoy fellow motorists.[39] Being watched acts as a deterrent to bad acts. Second, the information obtained from HMD calls allows commercial fleets to identify the worst drivers for extra training or dismissal.[40] Typically, 80% of fleet drivers receive complaints rarely, and 10–20% receive complaints frequently.[41] This data is consistent with other industry data showing that at most commercial trucking firms studied, the worst 10–20% of drivers are responsible for the majority of all collisions.[42] It is also worth noting that the nature of the complaints logged by HMD companies suggests that motorists generally call to complain about driving behaviors that are particularly likely to lead to accidents. Driver's Alert data classifies all calls into one of the following categories, and reports the frequency of calls as follows: speeding (21%); tailgating (11%); unsafe lane change (23%); illegal passing (4%); failure to yield (5%); failure to stop (6%); illegal parking (2%); compliment (8%); weaving (15%); miscellaneous (5%).[43] If most of these reports are truthful, then it is easy to see how commercial fleet managers can use HMD data to identify the most accident-prone drivers.[44]

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study by West Virginia's Governor's Office of Fiscal Risk Analysis and Management that predicted state government would save $2.5 million annually by placing HMD stickers on all state vehicles).

[38] *See, e.g.*, IrishTrucker.com, How's My Driving?, http://irishtrucker.com/articles/2004/april/hmd.asp (last visited July 5, 2006).

[39] KNIPLING ET AL., *supra* note 25, § 4.7.

[40] *Id.*

[41] *Id.* § 5.3.4; Emerson, *supra* note 27; *see also* Riechmann, *supra* note 29.

[42] KNIPLING ET AL., *supra* note 25, § 5.2.1; *see also* Riechmann, *supra* note 29.

[43] Driver's Alert, *supra* note 31; *see also* Emerson, *supra* note 27 (stating that most common complaints to HMD call centers "include tailgating, running red lights, speeding, improper lane changes and cutting off other drivers").

[44] *Truckers Turn Toward Safety When Being Monitored*, J. COM., Nov. 16, 1998, at 12A ("Most commercial drivers are good drivers, but about 10 percent to 15 percent drive aggressively—tailgating, weaving in and out of traffic and speeding . . . . That kind of

B. *The Expansion of "How's My Driving?" Programs to Automobiles*

HMD programs began in the 1980s as a system for reducing commercial fleet crashes.[45] During the 1990s and in this decade, several companies began targeting a second market niche: passenger vehicles driven by teenagers.[46] The idea is basically the same as in the commercial context. Vehicular collisions are the leading cause of death for American youths.[47] Little wonder, then, that parents worry about their children's safety and the safety of nearby motorists and pedestrians. Under HMD-for-teens programs, placards and bumper stickers are installed on the teenagers' cars, and all incident reports are conveyed directly to the parents. So far, it does not appear that the effectiveness of these programs has been studied, although there is little reason to expect that the results would be much different from those associated with commercial fleet HMD programs.[48] HMD programs for teens elicit information that supplements accident reports and tickets. Parents of teens with "clean" driving records report receiving valid critical feedback through HMD stickers, which they then use to take corrective action.[49]

C. *Inadequacies of Existing HMD Programs*

The apparent effectiveness of HMD programs is rather surprising in light of the fact that complaints flow into HMD call centers at an unimpressive rate. For example, HMD decals on 3000 Sysco trucks prompted only 435 incident reports to the HMD call center during

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driving causes severe crashes [and also] gets people annoyed enough to call the 800 number on the sticker.").

45 Ledford, *supra* note 33.

46 Rex Bowman, *An Eye on Teen-Agers*, RICHMOND TIMES-DISPATCH, Sept. 3, 2000, at E-1; Michael Squires, *New Program to Help Parents Monitor Their Teenage Drivers*, LAS VEGAS REV.-J., Jan. 19, 2003, at 2B; Lynn Waddell, *Teen Driving: I'm Gonna Go Tell Mom!*, NEWSWEEK, May 10, 2004, at 9.

47 Sivak, *supra* note 6, at 260.

48 Where HMD programs have achieved little market penetration, commercial and noncommercial drivers evidently engage in aggressive driving at approximately the same rates. Shinar & Compton, *supra* note 17, at 434. Shinar and Compton reached this conclusion on the basis of a large-scale observational study near Tel Aviv prior to 2003. *Id.* at 429–30. "How's My Driving?" stickers first appeared on Israeli trucks and busses during 2005. Barry Newman, *Steering Committee*, JERUSALEM POST, Dec. 8, 2005, at 4. Parents may have fewer driver training resources at their disposal than commercial fleet companies, but they also have fewer drivers to monitor. Parents might limit or revoke the driving privileges of teenagers whose actions generate complaints, while rewarding those whose call logs suggest they are good drivers.

49 Jean Nash Johnson, *Moms Make a Web Site to Monitor Teen Drivers*, PRESS OF ATLANTIC CITY, July 31, 2005, at G1.

1998.[50] Data provided to the author by Driver's Alert revealed slightly higher call volumes: 260 calls in a five-month period for Sonic Express's 1330 vehicles in 1999; 14 calls in the same period for Northern Beverage's 98 vehicles; and 8 calls during the five-month period for Mass Construction's 20 vehicles.[51] Yet despite these rather low call volumes, insurance studies conducted during this period still showed that HMD programs produced substantial reductions in accidents and losses.

This relative dearth of calls is not entirely surprising, given that reports to HMD call centers are something of a public good. Drivers have virtually no economic incentive to complain about commercial fleet drivers whose vehicles sport HMD placards, and they incur some costs when doing so. In addition to the time and effort required to make the call, callers incur cell phone airtime charges and are exposed to an increased risk of a collision while reaching for the phone or a pen to facilitate an HMD report. Using a simplistic model of *homo economicus*, the question is why *anyone* bothers to contribute to this public good when doing so is costly.[52]

Yet the same question can be asked in the eBay context and in the context of services like Wikipedia, CNET.com, Amazon's product ratings, the Zagat Survey, Download.com, and Tripadvisor.com. Nevertheless, in all those contexts, an extraordinarily valuable public good—accurate and helpful information that is readily available to the public—has arisen based on the voluntary contribution of feedback from mostly anonymous or pseudonymous users. EBay is the online forum that attracts the greatest level of participation. Feedback is provided in half of all eBay transactions,[53] even though transaction partners do not expect to, and probably never will, engage in future transactions,[54] and even though a buyer whose seller has already provided favorable feedback has no economic incentive to provide feedback about the seller.[55]

Not coincidentally, eBay is also the service where users face the lowest costs of providing feedback. Indeed, eBay's software encourages users to leave feedback by reminding them after each transaction has been completed. The incentive to provide feedback is cast in

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[50] Riechmann, *supra* note 29.

[51] Driver's Alert, *supra* note 31.

[52] Asking and answering these questions is a theme in some of my other work. *See, e.g.*, Lior Jacob Strahilevitz, *Charismatic Code, Social Norms, and the Emergence of Cooperation on the File-Swapping Networks*, 89 VA. L. REV. 505 (2003) (examining users' willingness to upload content on peer-to-peer file-swapping networks).

[53] Resnick & Zeckhauser, *supra* note 4, at 3.

[54] *Id.* at 9.

[55] *Id.* at 20.

various ways: as a civic duty, an act of reciprocity, a common courtesy, or a chance to reward good conduct and avenge misconduct.[56] Though eBay's reputation system is admittedly imperfect, it has been extraordinarily successful at preventing fraud among auction participants.[57]

Robert Frank has suggested that an emotional desire for vengeance often motivates people to sanction those whose misbehavior imposes costs on others.[58] If we examine the nature of calls to HMD services, it appears that this desire for vengeance and concern for personal and community safety are the primary factors motivating individuals to call in complaints.[59] We know from a study of San Diego's freeways that motorists do call the police in nontrivial numbers to complain about fellow motorists' aggressive driving, despite the absence of any organized program to encourage such calls and the nonexistence of any organized effort by law enforcement to respond to these calls in a timely manner.[60] And in 1995, when Maryland instituted a campaign asking motorists who observed aggressive driving to inform the state police by dialing #77 on their cell phones, the line received as many as 200 calls a day.[61] Yet when police receive reports of aggressive driving, they do not usually issue a citation unless they can intercept the vehicle that sparked the complaint and observe

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[56] *Id.* at 5.

[57] Rong-Ruey Duh et al., *Control and Assurance in E-Commerce: Privacy, Integrity, and Security at eBay*, 3 TAIWAN ACCT. REV. 1, 15 (2002) ("The eBay feedback forum seems to be an efficient . . . way of enforcing . . . integrity in online auctions."); Nolan Miller et al., *Eliciting Honest Feedback in Electronic Markets* 3 (John F. Kennedy Sch. of Gov't, Working Paper No. RWP02-039, 2002), *available at* http://ssrn.com/abstract_id=348940 ("[EBay's] overall rate of successful transactions remains astonishingly high.").

[58] ROBERT H. FRANK, PASSIONS WITHIN REASON: THE STRATEGIC ROLE OF THE EMOTIONS 53 (1988).

[59] *See supra* text accompanying note 43 (listing types of behavior reported by callers). Because of this dynamic, whereby people obtain utility by sanctioning those who engage in antisocial behavior, the methodological challenges that arise when surveys and other instruments attempt to elicit accurate information from respondents are mitigated. For discussions of some of these challenges in the survey context, see Tomas Philipson, *Data Markets and the Production of Surveys*, 64 REV. ECON. STUD. 47, 60–67, 70–71 (1997), describing biases in the production of survey data, and Tomas Philipson & Anup Malani, *Measurement Errors: A Principal Investigator-Agent Approach*, 91 J. ECONOMETRICS 273, 280–96 (1999), discussing the use of incentives to decrease errors in the supply of survey information.

[60] Sarkar et al., *supra* note 23, at 2. The Sarkar study found that during a three-month period in which the California Highway Patrol tracked calls related to aggressive driving on San Diego freeways, it logged nearly 2000 such calls. *Id.* Ten percent of survey respondents in the same study reported that they have called the police on their cell phones to report aggressive drivers in the past. *Id.* at 18.

[61] Kevin Johnson, *Frustration Drives Road Rage*, TRAFFIC SAFETY, July/Aug. 1997, at 8, 11.

unlawful conduct.[62] It is also worth noting that unlike eBay, which exhibits a "Pollyanna effect," whereby feedback is overly positive,[63] HMD services elicit responses that are overwhelmingly negative.[64] The lesson here is that when it comes to driving, some people do gain welfare by reporting misconduct because they see it as a welcome opportunity to punish the misbehaving driver. We can expect that when the costs of tattling fall, the quantity of tattling will rise.

Of course, the costs of tattling are falling substantially. In the past decade, the number of Americans who own cell phones has skyrocketed,[65] as has the prevalence of cell phone use by motorists.[66] One would predict that the increased availability of cell phones has resulted in increased call volumes to HMD call centers, although in the last couple of years some states have tried to curtail driver distraction by mandating the use of hands-free devices.[67] The hypothesis put forward to explain the HMD program's effectiveness—that it deters bad driving and allows firms to target the worst drivers for training and/or dismissal—suggests that as call volumes increase, the effectiveness of these programs also increases.

I shall conclude this subsection with what I regard as a critical fact that supports the hypothesis that there is a great deal of additional information about individual drivers that currently goes to waste. It comes from an ingenious experiment run by Andrew McGarva and Michelle Steiner.[68] McGarva and Steiner set up a controlled experiment whereby subjects, driving their own motor vehicles, believed their driving tendencies and behaviors were being evaluated by a researcher sitting in the passenger seat.[69] In fact, the questions the researcher asked each subject were a ruse, designed to

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[62] Michael Miller, *How's My Driving? Behavior Can Impact Business Image*, S. FLA. BUS. J., Dec. 14, 2001.

[63] Resnick & Zeckhauser, *supra* note 4, at 11. For a description of the Pollyanna effect, see *infra* text accompanying note 215.

[64] *See supra* text accompanying note 43.

[65] *See* Press Release, U.S. Census Bureau, U.S. Cell Phone Use Up More than 300 Percent (Dec. 9, 2004), *available at* http://www.census.gov/Press-Release/www/releases/archives/miscellaneous/003136.html (reporting that number of cell phones in United States increased from 34 million in 1995 to 159 million in 2003).

[66] DONNA GLASSBRENNER, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., DEP'T OF TRANSP., DOT HS 809 580, CELL PHONE USE ON THE ROADS IN 2002, at 7 fig.4 (2005) (estimating that between 2000 and 2002, number of drivers using cell phones at any given time between 8 a.m. and 6 p.m. in United States increased from 501,593 to 850,753).

[67] MELISSA A. SAVAGE ET AL., NAT'L CONFERENCE STATE OF LEGISLATURES, TRAFFIC SAFETY AND PUBLIC HEALTH: STATE LEGISLATIVE ACTION, 2004, at 10 (2004), *available at* http://www.ncsl.org/print/transportation/04trafficsafety.pdf.

[68] Andrew R. McGarva & Michelle Steiner, *Provoked Driver Aggression and Status: A Field Study*, 3 TRANSP. RES. PART F 167 (2000).

[69] *Id.* at 172.

distract the subject from the actual experimental stimulus. After several blocks, the subject's vehicle approached a stop sign, at which point the researcher hesitated to provide directions about how to proceed. In the meantime, a confederate driver approached the back of the vehicle and began honking his horn.[70] The experimenter then measured the subject's response to this aggressive act, which was followed by the confederate's vehicle rapidly passing the subject's vehicle soon after the subject had made a right turn at the stop sign.

McGarva and Steiner found that three-quarters of the subjects verbalized a negative response to this provocation.[71] "In the majority of cases, angered participants made negative statements about the other driver, such as 'what a jerk!' or 'this guy behind me is really ticked off!' as well as some common expletives."[72] This data suggests that drivers' verbal responses to aggressive driving are often essentially automatic. It is buttressed by survey research finding that sizable majorities of drivers admit that while driving alone they complain aloud about the conduct of their fellow drivers.[73] Sometimes, frustrated drivers feel the need to vent by saying something derogatory to the source of their frustration, and this venting can escalate existing roadway conflicts.[74]

To recap, people are already complaining to themselves about aggressive drivers. People are complaining to their passengers as well. And some people are complaining to the government even when not prompted to do so. If only we could develop a system that harnessed these complaints without imposing too heavy a burden on drivers, an enormous amount of additional evidence would be revealed about the identities of aggressive drivers. If McGarva and Steiner's result is generalizable, the public goods problem would essentially disappear.[75]

So let us survey this terrain. HMD placards generate rather modest per-vehicle call volumes, yet these occasional calls are evi-

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70 *Id.*

71 *Id.* at 173.

72 *Id.*

73 Dula, *supra* note 16, at 6.

74 Jacob L. Cayanus et al., *The Relationships Between Driver Anger and Aggressive Communication Traits*, 22 COMM. RES. REP. 189, 195 (2005).

75 It is possible that drivers are more likely to complain about an aggressive driver if there is a passenger in the car and that some drivers are uncomfortable muttering to themselves. On the other hand, it is also possible that the presence of an authority figure actually inhibited subjects' willingness to express negative comments about the aggressive driver. The available data on this question suggests that these conflicting effects roughly cancel each other out and that motorists are approximately as likely to complain when driving alone as when driving with others. *See* Dula, *supra* note 16, at 6 (reporting survey finding that 77% of men and 56% of women swear underneath their breath at other drivers).

dently sufficient to improve commercial fleets' safety performance through some combination of deterring aggressive driving and allowing firms to identify their worst drivers in an expeditious manner. These placards were apparently successful even when cellular phones were far less prevalent than they are today, and even though there are monetary and safety costs associated with reporting a driver's misconduct to an HMD call center. It stands to reason that by lowering the costs of reporting driver misconduct further, HMD systems could do a much better job of identifying the worst offenders, even among a much larger population of drivers. The next Section sketches out such a system.

D. "How's My Driving?" for Everyone

HMD placards, which began with commercial fleets, are now migrating toward noncommercial vehicles driven by teens. Georgia required all state-owned vehicles, with the exception of police cars, to display HMD placards in June of 2005.[76] That same year, Israel became the first nation to mandate the display of HMD placards on all commercial vehicles.[77] This expansion of HMD raises the question: Why stop there? Why not, rather, expand HMD programs to include all motor vehicles driven in the United States and install in each vehicle a voice-activated device that facilitates the reporting and tracking of motorist misconduct?[78]

Just as each new passenger vehicle is required to have seat belts,[79] the federal government could mandate the installation of HMD placards or bumper stickers on the front and rear of each passenger vehicle in the United States. Each placard would provide a unique identifier for each vehicle, piggybacking on existing license plate numbers if appropriate.[80] By pressing a button on their dashboards and speaking into a steering wheel–mounted microphone, motorists would

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[76] Government Fleet, New Program Allows Public to Report Bad Drivers in Georgia State Cars, http://www.fleet-central.com/gf/t_inside.cfm?action=news_pick&storyID=19805 (last visited June 25, 2006).

[77] Newman, *supra* note 48, at 4.

[78] As best I can tell, this idea was first proposed publicly in a short post by a pseudonymous blogger in 2004. The blog post proposed a driver-to-driver feedback mechanism, discussed the possible use of the derived data by insurers, and suggested that eliminating anonymity among drivers would improve motorist performance. The blog post did not develop the idea in further detail or depth. *See* Red Herring Blog, How Am I Driving?, http://blog.redherring.com/MT/archives/main/000220.html (May 19, 2004, 13:52).

[79] 49 C.F.R. § 571.208 (2005).

[80] The argument against using existing license plates relates to the accuracy of high-speed identifications. Motorists sometimes have difficulty identifying out-of-state plates, which could generate false positives (e.g., a motorist means to complain about Maryland FGE 344 but instead identifies the plate as Virginia FGE 344). HMD placards on the

be able to contact a national HMD call center and provide the vehicle's unique identifier in order to lodge compliments or complaints.[81] The law would require the illumination of the placard at night and mandate its visibility whenever the vehicle was moving. Law enforcement officials would be able to use the unique identifiers as well—for example, to gauge instantly whether a particular vehicle's liability insurance is valid, after accessing a single centralized registry.

For reasons that will be discussed in Part IV, an optimal "How's My Driving for Everyone" (HMDFE) program might make use of additional new technologies beyond placards and call centers. A more expensive system would use in-vehicle GPS technologies or cell phone triangulation to enable reporting without resort to a unique identifier (e.g., "Red Toyota behind me, subtract 2 points"). This would lower the risk of driver distraction and possibly reduce the probability of erroneous reports resulting from misread license plate numbers or placards. These higher-tech versions of HMD are described more fully in Part IV, but for the time being, we can discuss the low-tech versions currently being managed by Fleetsafe, Driver's Alert, and other HMD companies for use in commercial fleets, supplemented by readily available vehicle-integrated cell phone technologies.[82]

Here is how a low-tech version would work: Suppose motorist *A* was driving along Interstate 5 and was suddenly cut off by motorist *B*, who failed to signal a lane change and abruptly hit the brakes, forcing motorist *A* to brake suddenly. Under HMDFE, motorist *A* could contact an HMD call center, and say the following words: "896JXD402, subtract 1 point, driver cut me off without signaling." Each motorist would be allotted a set number of positive and negative points that they could distribute to other motorists during a particular month. These points could be dispensed one at a time or cumulatively, for extreme acts of aggression or kindness. The call center would then convert the call reports into incident data for each vehicle on the road, possibly using automated voice recognition software.[83]

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fronts of cars also could be mounted ambulance-style, so as to facilitate reading them in rearview mirrors.

[81] The system could provide a 1-800 number to enable pedestrians, bicycle riders, and bus passengers to phone in reports as well.

[82] *See, e.g.*, R. Lind et al., *The Network Vehicle: A Glimpse into the Future of Mobile Multi-Media*, IEEE AEROSPACE & ELECTRONIC SYS. MAG., Sept. 1999, at 27, 27–28 (describing initiative for development of vehicle with integrated web, phone, and processing functions).

[83] Such software already produces reasonably high accuracy levels, and dramatic improvements in accuracy are expected in the next few years. Scott S. Washburn, *Speech Recognition for On-Site Collection of License Plate Data: Exploratory Application Development and Testing*, 128 J. TRANSP. ENGINEERING 481, 488 (2002).

The financial consequences of any particular report would not be substantial, but the aggregate consequences for a month's worth of extremely courteous or discourteous driving could be significant. Vehicle owners would receive a monthly or quarterly invoice from the HMDFE monitoring center, along with a bill (if negative points on their driving exceeded positive points) or a check (if positive points substantially exceeded negative points).[84] These would be styled as civil fines and rewards.[85]

Call centers would record the phone number and name of the complainant, though this information would not be provided to the motorist whose driving sparked this complaint. HMDFE could be designed as a revenue-neutral subsidy from bad drivers to good drivers, or, more likely, revenue collected could be used to offset the loss of government revenue from speeding tickets and other moving violations. Reports could also be made available to insurers, who would be free to use the data to set premiums.

Given the apparent safety improvements associated with HMD programs, we can conceptualize HMDFE as a vehicular safety device designed to save lives and dollars. It is a new kind of device, however—one that harnesses the value of dispersed information that currently goes to waste. A few readers may be chomping at the bit to know how HMDFE could cope with false or malicious feedback, driver distraction costs, and other likely objections. These problems turn out to be manageable, though readers will have to wait until Part III to hear how.

II
THE CASE FOR "HOW'S MY DRIVING?" FOR EVERYONE

A world without HMDFE is a lot like a world in which students evaluate their professors' teaching, but no one ever reads or analyzes

[84] These fines and rewards would be applied at the vehicle level. As a result, one spouse's courteous driving of the family vehicle could offset another spouse's inconsiderate driving of the same vehicle. There is nothing objectionable about such an approach. Indeed, automobile insurance policies are usually issued to families in multiple-driver households. Where one spouse suffers for another spouse's driving, or a teenager's driving of the family car engenders financial penalties for his or her parents, self-help remedies (such as taking away the teenager's car keys or chastising the husband for his poor driving) should be prevalent and effective.

[85] The civil nature of the system is also essential to avoid conflicting with the Sixth Amendment's Confrontation Clause. *Cf.* Van Harken v. City of Chicago, 103 F.3d 1346, 1350–52 (7th Cir. 1997) (holding that where parking violations were civil offenses, plaintiffs had no right under Confrontation Clause to cross-examine ticketing officer). As explained below, HMDFE permits motorists to penalize those who impose substantial costs on them, with the state acting as a clearinghouse that enforces those penalties (and distributes any rewards for courteous driving).

these evaluations. The students are sitting in class each day. They form opinions about the quality of the teaching. They discuss with classmates the quality of the teaching without prompting. In such a world, someone should design a standardized form to solicit feedback and designate a place where feedback forms can be deposited and tabulated. No one is saying student evaluations should be the only measure of teaching performance. But it would be crazy to deny the value of collecting and analyzing the data at a school where administrators care about the quality of the educational experience. It is similarly silly to leave professors without the accountability that student evaluations provide; many professors would still teach conscientiously, but more than a few would not. Yet in the driving context, the government's policy does nothing to facilitate the collection of this readily available feedback, and even when motorists call in to complain about their fellow drivers anyway, the government rarely bothers to investigate to see whether the complaints have merit.

In the remainder of this Part, I argue that the driving context may be particularly well suited to harnessing the value of dispersed information. In the process, I spend a fair amount of time discussing the criminal law and tort systems, which currently regulate traffic in the United States. In some ways, it is a shame that these two legal systems have already occupied this terrain, for HMDFE could prove to be a more attractive regulatory regime than either one. But the existence of these two systems hardly eliminates the need for HMDFE. Rather, we should consider HMDFE as a regime that will allow society to improve the performance of its tort system substantially and significantly scale back the resources currently devoted to criminal traffic enforcement.

A. Putting Scarce Law Enforcement Resources to Better Use

It is largely because of the absence of an effective HMDFE program or other effective reputation-tracking regime that society must assign substantial law enforcement resources to policing the roadways. In state courts, traffic violations account for 55% of all incoming cases.[86] Moreover, when traffic citations are issued and motorists decide to contest their citations, police officers must travel to traffic court to testify and present evidence,[87] an inefficient use of their time

[86] RICHARD Y. SCHAUFFLER ET AL., NAT'L CTR. FOR STATE COURTS, EXAMINING THE WORK OF STATE COURTS, 2004: A NATIONAL PERSPECTIVE FROM THE COURT STATISTICS PROJECT 59 (2005), *available at* http://www.ncsconline.org/D_Research/csp/2004_Files/EWSC_Full_Report.pdf.

[87] Roger C. Cramton, *Driver Behavior and Legal Sanctions: A Study of Deterrence*, 67 MICH. L. REV. 421, 433–34 (1969).

that inevitably follows from the criminal nature of many traffic penalties.[88]

Needless to say, an HMDFE program would enable the government to redirect traffic police to other endeavors where dispersed information aggregation systems would be less effective. Alternatively, HMDFE would enable state and local governments to shift resources towards other objectives, such as health care, education, or infrastructure. That is not to say that an HMDFE program would allow governments to dispense with traffic police altogether. Some police would still be necessary to help direct traffic around collision sites, to ensure that drivers did not disable their vehicles' HMD placards, to identify and impound cars driven by uninsured drivers, and perhaps to intervene immediately when an extremely reckless motorist's behavior triggers substantial numbers of reports from motorists.

Some tasks currently performed by traffic police, like writing tickets for motorists who drive at excessive speeds or run red lights, could be delegated entirely to the HMDFE program. Indeed, when crashes occur, detailed police reports usually would be unnecessary. HMDFE communications centers could expect to receive several contemporaneous reports from other drivers who witnessed the collision, which would help resolve blameworthiness in many cases where it might otherwise be contested. This would also solve the chronic problem of collision underreporting, which is one of the more severe information asymmetries currently faced by automobile insurers.

B. Optimizing Monitoring of Roadway Violations

Police officers are probably only a little better than individual motorists at recognizing traffic violations. Officers have tools like radar detectors at their disposal, and perhaps somewhat better expertise regarding various traffic rules, but little comparative advantage beyond that. Whatever advantage individual police officers have over individual motorists is swamped by two factors: First, the presence of a marked police car induces motorists to change their driving behavior

[88] Police time, of course, is not the only scarce resource. Respect for the police is scarce as well—too scarce in many urban environments. It is common to see motorists cooperating in an effort to thwart police enforcement of traffic laws. For example, motorists often flash their high-beam headlights to warn oncoming traffic that a radar gun–toting traffic patrol officer is hiding behind the next bend. In this context, motorist cooperation to evade the law may reflect frustration with police enforcement, and that frustration may have spillover effects in other contexts where the presence of citizen respect for the police's law enforcement function becomes a life or death matter.

significantly, so as to comply with the law.[89] Second, police cruisers are dramatically outnumbered by other vehicles on the roadway.[90] An effective HMDFE program would essentially turn every vehicle into an unmarked police car, resulting in substantial reductions in unlawful or inconsiderate driving behavior.

Beyond their numerical advantage, there are reasons to expect that the quality of self-policing by motorists would exceed the quality of governmental policing. As an initial matter, it is worth examining the problems associated with the present regime. It will then be possible to explore the ways in which using HMDFE data could improve the functioning of the three interconnected regimes that currently regulate driving behavior: the criminal law system, the tort system, and the automobile insurance market.

1. Suboptimal Police Monitoring

The bread and butter of many state and local police departments is writing speeding tickets. Published data on traffic citations issued in the United States, broken down by violation type, is frustratingly rare. That said, Wisconsin is charmingly meticulous about tracking both traffic citations and crashes, and its data suggests that citations issued for speeding dramatically outnumber the citations issued for other dangerous driving activities. For example, in 2003, Dane County, Wisconsin issued more than sixty times as many speeding citations as tailgating citations.[91] Indeed, speeding citations outnumbered the *combined* citations issued for tailgating, running stop signs, running red lights, illegal turns, illegal passing, unsafe backing, unsafe lane deviations, and inattentive driving by a factor of 6.6.[92] Targeting those who drive at excessive speeds may well be the optimal police strategy for raising revenue and minimizing traffic contests, as radar guns provide relatively objective evidence of violations. Yet unless we make a series of unrealistic assumptions about the differential costs of

[89] A.S. Hakkert et al., *The Evaluation of Effects on Driver Behavior and Accidents of Concentrated General Enforcement on Interurban Roads in Israel*, 33 ACCIDENT ANALYSIS & PREVENTION 43, 59–61 (2001).

[90] *See* Cramton, *supra* note 87, at 435 ("There is so much driving behavior, and it is so dispersed in time and space, that traffic police, using present methods of surveillance and enforcement, face a virtually insurmountable task.").

[91] Dane County Sheriff's Office, Citations Issued, http://www.danesheriff.com/03annual/citations.htm (last visited June 25, 2006). A survey study of newly licensed teenaged drivers in Northeast states found that, of their first traffic citations, 66% were for speeding and 10% were for running a red light or stop sign, while failing to buckle up and making an illegal turn accounted for 4% of citations each. Anne T. McCartt et al., *Driving Experience, Crashes and Traffic Citations of Teenage Beginning Drivers*, 35 ACCIDENT ANALYSIS & PREVENTION 311, 316 (2003).

[92] Dane County Sheriff's Office, *supra* note 91.

speeding and speed limit enforcement versus other traffic infractions, it is unlikely that this substantial commitment of law enforcement resources to policing speed limits is the optimal strategy for improving road safety.[93] The Wisconsin data, along with recent data from other states, suggests that a failure to yield contributes to more vehicle crashes than speeding, and tailgating contributes to slightly more accidents as well, although speeding does contribute to marginally more fatal crashes.[94]

As a result of this emphasis on speeding, other traffic laws go underenforced. Survey data reveals that only 6.4% of motorists who admitted to running a red light recently have ever been ticketed for the practice, and that motorists are far more likely to have been involved in an accident where one motorist ran a red light than they are to have received a ticket for running a red light.[95] Police officers, in short, seem to be overpolicing the motorist misconduct that is easiest to detect and underpolicing the misconduct that leads to the most collisions. Perhaps these distortions explain the public's profound resentment of traffic police, especially among U.S. drivers, who are more aggravated by traffic police presence than they are by much of the misconduct that these police are supposed to deter.[96] In the minds

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[93] *See* John J. Bowen, *A Driver Looks at Traffic Enforcement*, 57 J. CRIM. L., CRIMINOLOGY & POLICE SCI. 218, 218 (1966) (noting arbitrariness and ineffectiveness of police enforcement of speeding laws).

[94] *See* Wisconsin Department of Transportation, Contributing Factors to Aggressive Driving, http://www.dot.wisconsin.gov/safety/motorist/behaviors/aggressive/factors.htm (last visited June 25, 2006). New York's Department of Motor Vehicles reviewed 2003 crash data and concluded that a failure to yield contributed to 16% of crashes, tailgating contributed to 14% of crashes, and speeding contributed to 11% of crashes. *See* Governor's Traffic Safety Comm., 2006 Highway Safety Strategic Plan, http://www.nysgtsc.state.ny.us/hssp-06.htm (last visited June 25, 2006). Oklahoma data from the early 1990s presents similar findings, though speeding contributed to slightly more crashes than tailgating and inattention: Failure to yield contributed to 19% of crashes, speeding contributed to 12% of crashes, tailgating contributed to 11% of crashes, and inattention contributed to 9% of crashes. Michael J. Goodman et al., *Using Cellular Telephones in Vehicles: Safe or Unsafe?*, 1 TRANSP. HUM. FACTORS 3, 11 tbl.6 (2000).

[95] Bryan E. Porter & Thomas D. Berry, *A Nationwide Survey of Self-Reported Red Light Running: Measuring Prevalence, Predictors, and Perceived Consequences*, 33 ACCIDENT ANALYSIS & PREVENTION 735, 739 (2001); *see also* Smart & Mann, *supra* note 6, at 184 (noting that many manifestations of road rage are not illegal); Dula, *supra* note 16, at 3 (noting that 61% of survey respondents believe that antitailgating laws are inadequately enforced); Smart Motorist, How's Your Driving?, http://www.smartmotorist.com/dri/dri.htm (last visited June 25, 2006) (discussing various types of unsafe driving behaviors that are not proscribed by law or for which relevant traffic laws are underenforced).

[96] Timo Lajunen et al., *Dimensions of Driver Anger, Aggressive and Highway Code Violations and Their Mediation by Safety Orientation in UK Drivers*, 1 TRANSP. RES. PART F 107, 113 tbl.2 (1998) (reporting that U.S. respondents were, on average, more annoyed by police presence on the roads than by illegal driving). This hierarchy was reversed among British respondents. *Id.* There is a gender skew to this data, with American men

of many drivers, the cure for most unlawful driving is worse than the disease.

An additional shortcoming associated with primary police enforcement of traffic rules involves the entirely punitive nature of police regulation. That is to say, police officers focus almost exclusively on punishing poor driving and do nothing to reward good driving. HMDFE can supplement intrinsic rewards for cooperative roadway behavior.[97]

2. *Inadequacies of the Tort System*

The criminal law system does not drive solo; the tort system also deters and punishes motorists involved in collisions.[98] In a world with no automobile insurance and no judgment-proof drivers, we might anticipate that the tort system would deter collisions rather well. Of course, there would still be costs involved: Litigation is expensive and slow; these costs make it difficult to deter frequent but low-magnitude collisions; and trial outcomes are often unpredictable because of problems of proof and other factors,[99] engendering uncertainty that affects settlements that occur in the shadow of trial outcomes.[100]

For related reasons, legal scholars like Bob Ellickson have hypothesized that within close-knit groups, reputation-based systems for enforcing social norms may outperform the tort system at preventing misconduct and resolving disputes about entitlements.[101] Ellickson studied the interactions of cattle ranchers in rural California, a classic close-knit group, and found that in their dealings with each other they ignored the law of trespass, replacing it with

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being noticeably more annoyed than American women by the presence of traffic police, and American women being noticeably more annoyed than American men by illegal driving. *See* Deffenbacher et al., *supra* note 18, at 88 tbl.4, 88–90.

97 Monetary rewards for cooperative driving should never be so high as to encourage people to engage in courteous driving as a full-time job. *Cf.* Saul Levmore, *Carrots and Torts*, *in* CHICAGO LECTURES IN LAW AND ECONOMICS 203, 208 (Eric A. Posner ed., 2000) (making same point about inadvisability of rewards for those who wear seatbelts, as opposed to penalties for those who do not). There are too many cars on most urban and suburban roads as it is.

98 Gary T. Schwartz, *Auto No-Fault and First-Party Insurance: Advantages and Problems*, 73 S. CAL. L. REV. 611, 614 (2000).

99 *See* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 602–04 (5th ed. 1998) (noting factors that can cause error in civil cases).

100 Samuel R. Gross & Kent D. Syverud, *Don't Try: Civil Jury Verdicts in a System Geared to Settlement*, 44 UCLA L. REV. 1, 51 (1996).

101 ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES 167 (1991); *see also* Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 MICH. L. REV. 338, 409 (1997) (discussing subsequent scholarship evaluating Ellickson's hypothesis).

neighborliness norms that were more efficient.[102] One can conceptualize HMDFE as a use of technology to transform a loose-knit group into a close-knit group, thereby enhancing the probability that welfare-maximizing social norms will emerge.[103] We might expect that just as norms evidently outperform trespass law in regulating cattle encroachments in rural California, norms might outperform tort suits in regulating motorist behavior.

There is a critical difference between HMDFE and the type of norm enforcement regime that Ellickson described: the heightened importance of the automobile insurance market. In short, an assessment of the tort system for regulating collisions requires an assessment of that market. In the automobile insurance market there are three fundamental and well-understood problems: adverse selection, moral hazard, and judgment-proof motorists.[104] HMDFE has the potential to ameliorate each of them.

The adverse selection problem stems from information asymmetries. Motorists know more about their driving skills and propensities than insurance companies do, so unsafe drivers may try to take advantage of this asymmetry by obtaining generous insurance policies. Insurers will have difficulty distinguishing between safe and unsafe drivers within the ranks of those seeking generous policies, and they will expend substantial resources trying to exclude the latter while insuring the former. By providing insurers with far more information about individual drivers' behavior than they currently have, HMDFE can reduce this information asymmetry, thereby allowing the insurance market to function much more efficiently.[105] The next Section

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[102] ELLICKSON, *supra* note 101, at 185–89.

[103] *See generally* Lior Jacob Strahilevitz, *Social Norms from Close-Knit Groups to Loose-Knit Groups*, 70 U. CHI. L. REV. 359, 359–60 (2003) ("Loose-knit groups are clusters of individuals among whom information pertinent to informal control does not circulate easily. These loose-knit groups are typically composed of members who do not expect to be repeat players or who are unable to gather accurate information about another member's reputation . . . .").

[104] *See* Alma Cohen & Rajeev Dehejia, *The Effect of Automobile Insurance and Accident Liability Laws on Traffic Fatalities*, 47 J.L. & ECON. 357, 358 (2004) (finding statistical evidence for existence of moral hazard in automobile insurance market); Steven W. Pottier & Robert C. Witt, *On the Demand for Liability Insurance: An Insurance Economics Perspective*, 72 TEX. L. REV. 1681, 1686–87 (1994) (discussing adverse selection problem); S. Shavell, *The Judgment Proof Problem*, 6 INT'L REV. L. & ECON. 45 (1986) (discussing problems created by judgment-proof defendants in insurance markets).

[105] Indeed, this information could have second-order benefits as well. The lack of information about driving propensities becomes a problem in tort trials, heightening the risk of an erroneous judgment. If HMDFE scores correlate strongly with accident risks, making these scores admissible at trial could enhance the efficiency of the tort system. Presently, however, evidence of past accidents or traffic citations is inadmissible in most jurisdictions, except in cases where no eyewitnesses to an accident survived. *See* 61 C.J.S. *Motor Vehi-*

will examine the problems created by these information asymmetries in more detail.

Moral hazard generally arises from the existence of insurance coverage. When the cost of engaging in a given activity, such as unsafe driving, is reduced due to insurance compensation, individuals are more likely to engage in the activity at an increased rate. The moral hazard problem is unlikely to arise under HMDFE because one would not expect an insurance market to develop for HMDFE fines. Just as one cannot insure against parking tickets or moving violations, we would not expect insurers to view the HMDFE fines system as a regime that warrants their time. The fines would be too small for most motorists and the adverse selection problem too great for insurers. So whereas automobile insurance will reduce drivers' safety incentives somewhat, HMDFE should not be susceptible to the same problem.

Finally, HMDFE can address the problem of judgment-proof defendants. Vehicular accidents are expensive occurrences, easily destroying thousands of dollars in property even if no injuries occur. Uninsured motorists may well be judgment-proof with respect to these amounts. Where injuries do occur, the costs can escalate into the hundreds of thousands of dollars, an amount that vastly exceeds the payout limits on most drivers' insurance policies. Many Americans will be judgment-proof when such figures are involved. Accidents, in short, are low-probability, high-cost events. HMDFE fines, by contrast, are high-probability, low-cost events. Many motorists who would be judgment-proof with respect to tort damages, or who have insufficient income to obtain automobile insurance, will have sufficient assets to pay HMDFE fines, and the state will be in a strong position to collect these fines. Thus, HMDFE stands ready to deter those individuals, especially the uninsured, whose unsafe driving is insufficiently deterred by the present regime.[106]

3. *Reducing Information Asymmetries*

As I suggested in the previous Section, obtaining more complete information about driver conduct could permit insurers to make more fine-grained decisions about individual drivers' risk profiles and eliminate pernicious actuarial practices. Insurance companies, of course, do get information about drivers from citation reports, reported colli-

cles § 1079 (2002). The inadmissibility of this information might itself be connected to the sporadic nature of such data for most drivers, in which case the less sporadic nature of HMDFE might address these concerns.

[106] *See infra* note 126.

sions, and other losses, but the data available as a result of these sources still leaves large gaps in the system. These gaps are filled, in large measure, by setting group-based premiums,[107] which impose a collective sanction on all motorists who fit a particular profile. Information asymmetries thus raise substantial distributive justice concerns in the automobile insurance market.

Part of the problem stems from the fact that, for most motorists, crashes are freakishly rare events.[108] As a result, *A*'s past experience with crashes will not predict *A*'s future likelihood of a crash particularly well.[109] The problem is exacerbated by the substantial underreporting of vehicular collisions and systematic inaccuracies in collision reports,[110] as well as the prevalence of hit-and-run crashes, which account for approximately twelve percent of all collisions.[111] If insurers had more data about near misses, future accidents could be predicted with improved accuracy;[112] but near misses are rarely reported. In short, crashes occur rarely enough to render collision history an insufficient data source for safety evaluations. If crash data could be supplemented with observational data, insurers could assess risks with much greater accuracy.[113]

Information asymmetries present particularly daunting challenges for two high-risk groups: the youngest drivers and the oldest

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107 For example, California insurers began relying heavily on insured drivers' zip codes to set automobile insurance premiums after finding that drivers residing in certain neighborhoods were more likely to be involved in accidents. *See* Michael Liedtke, *Study Hits Insurance Rate Disparities*, CONTRA COSTA TIMES, Dec. 20, 2005, at F4. While insurers are prohibited by law from charging differentially on the basis of race, a good driver who moved from a predominantly white neighborhood to a predominantly African-American neighborhood could expect to pay between $537 and $974 more for annual automobile insurance premiums. *Id.*

108 GREY ET AL., *supra* note 18, at 19.

109 Tijerina, *supra* note 18, at 6 (noting that past involvement in property damage crashes is poor predictor of fatal crashes); *see also* Baojin Wang et al., *Safety in the Road Environment: A Driver Behavioural Response Perspective*, 29 TRANSPORTATION 253, 255 (2002) (discussing other problems associated with using past accidents to predict future accidents).

110 A.E. af Wåhlberg, *Some Methodological Deficiencies in Studies on Traffic Accident Predictors*, 35 ACCIDENT ANALYSIS & PREVENTION 473, 474 (2003); M.J. Williams, *Validity of the Traffic Conflicts Technique*, 13 ACCIDENT ANALYSIS & PREVENTION 133, 142 (1981). Even countries that mandate the reporting of all accidents experience substantial underreporting. Jonathan Alsop & John Langley, *Under-Reporting of Motor Vehicle Traffic Crash Victims in New Zealand*, 33 ACCIDENT ANALYSIS & PREVENTION 353, 353–54 (2001).

111 In 2004 in Wisconsin, there were 17,176 hit-and-run crashes and 140,265 total crashes. WIS. DEP'T OF TRANSP., 2004 WISCONSIN TRAFFIC CRASH FACTS 21 (2005), *available at* http://www.dot.state.wi.us/safety/motorist/crashfacts.

112 *Cf.* Tijerina, *supra* note 18, at 9 (describing obstacles to predicting crashes with current data).

113 *See id.* at 5 (explaining predictive advantages of observation data over crash data).

drivers.[114] Begin with the former group. Teenagers who have just received their driver's licenses are particularly accident prone[115] and unusually likely to tailgate other drivers.[116] Yet information about teens' driving abilities is in short supply because they have driven so few miles, and even poor drivers have received few citations and been involved in few crashes.[117]

The situation with the elderly is in many ways similar. Seniors have lengthy driving records, but they may see their driving abilities deteriorate rapidly because of slowed reflexes, worsening eyesight, dementia, and other health problems.[118] Within a few years, as the population ages, it is estimated that seniors will cause approximately one-fourth of all fatal collisions,[119] and they suffer disproportionately from collisions because of their lessened resiliency to trauma.[120] Indeed, per mile driven, older drivers are just as likely to be involved in accidents as novice drivers.[121] At the same time, seniors who retain their car keys do not drive very much,[122] so information about their driving abilities may be in short supply. Seniors typically compensate for their diminished driving abilities by driving more slowly.[123] As a result, their fading driving skills may not be reflected in increased traffic citations. Governments,[124] health care providers, and relatives often fail to recognize cognitive impairments in time or feel reluctant to take the keys away from a loved one.[125] Reference to HMD data

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114 On the heightened risks faced by very young and very old drivers, see David Schlundt et al., *Reducing Unintentional Injuries on the Nation's Highways: A Literature Review*, 15 J. HEALTH CARE FOR POOR & UNDERSERVED 76, 84–85 (2004).

115 McCartt et al., *supra* note 91, at 320.

116 M. McDonald et al., Close Following on the Motorway: Initial Findings of an Instrumented Vehicle Study § 3.5 (Sept. 1997) (unpublished manuscript, available at http://www.trg.soton.ac.uk/research/platform/VIVforweb.pdf).

117 McCartt et al., *supra* note 91, at 313, 320.

118 Schlundt et al., *supra* note 114, at 85; Jane C. Stutts & Jean W. Wilkins, *On-Road Driving Evaluations: A Potential Tool for Helping Older Adults Drive Safely Longer*, 34 J. SAFETY RES. 431, 431 (2003).

119 Margaret F. Brinig et al., *Public Choice of Driving Regulations* 4 (Univ. of Iowa, Legal Studies Research Paper No. 05-27, 2005).

120 Schlundt et al., *supra* note 114, at 85; Stutts & Wilkins, *supra* note 118, at 431.

121 Marilyn Di Stefano & Wendy Macdonald, *Assessment of Older Drivers: Relationships Among On-Road Errors, Medical Conditions, and Test Outcome*, 34 J. SAFETY RES. 415, 415 (2003).

122 ROBIN OLSON, INT'L RISK MGMT. INST., INC., SENIOR DRIVING ISSUES: UPCOMING CHALLENGES AND SOLUTIONS 9–10 (2004), http://www.irmi.com/expert/Articles/2004/Olson10.pdf.

123 *Id.* at 10; Sivak, *supra* note 6, at 266; *see also* Di Stefano & Macdonald, *supra* note 121, at 416 (noting that senior drivers rarely drive in excess of speed limit).

124 Stutts & Wilkins, *supra* note 118, at 431.

125 Margaret A. Perkinson et al., *Driving and Dementia of the Alzheimer Type: Beliefs and Cessation Strategies Among Stakeholders*, 45 GERONTOLOGIST 676, 677 (2005); Victor G. Valcour et al., *Self-Reported Driving, Cognitive Status, and Physician Awareness of Cog-*

on individual teens and seniors would allow insurers to sort the good drivers from the bad more accurately.[126]

C. Controlling Secondary Effects from Aggressive Driving

The foregoing discussion focused on the tangible effects of reducing aggressive driving, as they relate to driver safety, lives saved, property damage averted, and traffic obstructed. Quite apart from these considerations, there are a number of external benefits that might be associated with the implementation of an HMDFE program to curtail aggressive driving. These benefits help underscore the value of HMDFE because they are benefits that the criminal law and tort systems do an exceedingly poor job of promoting.

1. Everyday Unhappiness

While the costs associated with driver deaths and injuries are quite substantial, they may well be dwarfed by the sheer unhappiness associated with commutes to and from work. There is reason to believe that HMDFE would alleviate much of this unhappiness. By making drivers accountable, HMDFE could make driving more pleasurable, and this effect, in and of itself, could result in enormous improvements in human happiness.

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nitive Impairment, 50 J. AM. GERIATRICS SOC'Y 1265, 1266–67 (2002); *see also* Stutts & Wilkins, *supra* note 118, at 431 (noting that seniors often lose self-esteem and personal freedom when they lose their driving privileges).

126 The suboptimal policing point and the information asymmetries point, in conjunction, tell us something interesting about optimal law enforcement policy. Classic economic approaches to crime assume that society should set the penalty for a crime so as to make the crime's costs (to the criminal) exceed its benefits (to the criminal). *See* POSNER, *supra* note 99, at 242–43; Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169, 176–77 (1968). If existing penalties prove inadequate, resulting in too much crime, society can respond by raising the likelihood of apprehension or raising the penalty for those caught. In theory, the state will be indifferent as between these two strategies. In practice, given the costs associated with raising the likelihood of detection, classic law and economics analysis often points in the direction of ramping up penalties instead of increasing the risk of apprehension. *See* A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 78 (2d ed. 1989); Bruce L. Hay, *Fee Awards and Optimal Deterrence*, 71 CHI.-KENT. L. REV. 505, 507 (1995). But where we have a vibrant insurance market in place whose premium-setting strategies piggyback on information generated by criminal enforcement actions, society should prefer law enforcement strategies that raise the likelihood of detection. Rare but severe state punishments will leave insurers in the dark about most of their customers' driving attributes and may wipe out those whose misdeeds are detected by law enforcement, rendering unlucky wrongdoers indifferent to the marginal effects of increased insurance premiums. Frequent but measured sanctions for misconduct, by contrast, will allow insurers to sort among safe and unsafe citizens more effectively. In those areas, like traffic enforcement, where a robust insurance market exists and where the state relies on sporadic enforcement and high penalties, the case for creating a supplemental source of information about citizen misconduct, such as HMDFE, becomes powerful.

In recent years, economists have begun exploring the value of happiness. Experimental work by Daniel Kahneman and coauthors has prompted research subjects to assess their state of well-being when performing various daily life tasks.[127] The researchers used a large sample of working women and a day reconstruction method, whereby the subjects would record diaries at the end of each day detailing their activities and how they felt while doing them.[128] The study separated out sixteen major life activities and ranked them in order of how happy people felt doing them. Commuting to work ranked dead last, noticeably below the two next least popular activities of housework and working.[129] On average, subjects spent 1.6 unhappy hours per day commuting.[130] We know from other research that the vast majority of this time was spent alone, in their cars.[131]

Commuters, then, are a rather miserable lot. Why so glum? This is not a question that Kahneman and his coauthors asked, but transportation scholars who have studied the question blame rudeness and aggressive driving. When Porter and Berry surveyed frustrated drivers for a 2001 paper and asked them to identify the most important cause of their frustration, driver rudeness won in a landslide. Fully 43.5% of respondents stated that "Discourteous drivers" were the greatest source of frustration, versus 20.8% who identified "Congestion," 12.7% who identified "Drivers not following the law," 4% who stated "Too many stop lights," and 1% who complained most about the length of their commute.[132] This data echoed findings by other researchers,[133] and there is psychological literature connecting

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127 Kahneman et al., *supra* note 9, at 1776.

128 For a discussion of some of the methodological challenges in well-being research, see Carol Graham, *The Economics of Happiness*, *in* THE NEW PALGRAVE DICTIONARY OF ECONOMICS (Steven Durlauf & Larry Blume eds., 2d ed. forthcoming), *available at* http://www.brookings.edu/views/papers/graham/2005graham_dict.pdf.

129 Kahneman et al., *supra* note 9, at 1777 tbl.1. "Intimate relations" easily ranked first on the happiness score, followed by socializing, relaxing, praying, and eating. *Id.*

130 *Id.*

131 Lorna Aldrich, *Commuting and the Economic Functions of Small Towns and Places*, 12 RURAL DEV. PERSP. 26, 26 (1998); Craig N. Oren, *Getting Commuters out of Their Cars: What Went Wrong?*, 17 STAN. ENVTL. L.J. 141, 163–64 (1998); Lior Jacob Strahilevitz, *How Changes in Property Regimes Influence Social Norms: Commodifying California's Carpool Lanes*, 75 IND. L.J. 1231, 1235–36 (2000).

132 Porter & Berry, *supra* note 95, at 738 tbl.2. An additional 18.1% identified "Other" primary concerns. *Id.* The data suggests this unhappiness results from a "few bad apples" problem, as polls indicate that drivers find that most of their fellow motorists "behave with graciousness and courtesy." Robert F. Blomquist, *American "Road Rage": A Scary and Tangled Cultural-Legal Pastiche*, 80 NEB. L. REV. 17, 24 (2001).

133 *See, e.g.*, Deffenbacker et al., *supra* note 18, at 85 tbl.1 (finding that illegal driving behavior annoys research subjects much less than various hostile gestures and discourtesy on roadway); Lajunen et al., *supra* note 96, at 110 tbl.1 (finding that among 33 driving situations, 8 out of 10 most frustrating situations to U.K. motorists were in "Discourtesy"

road rage and vehicular collisions to clinical depression and post-traumatic stress disorder.[134] If we put together the Kahneman research with the transportation survey research, we very quickly arrive at the conclusion that aggressive driving is the source of substantial disutility that Americans encounter in their day-to-day lives. Aggressive driving does cause collisions,[135] but the happiness research shows that even if aggressive driving did not cause any additional accidents, it would still be a substantial social ill worth addressing through public policy interventions.

2. *Expressive Benefits*

Standard approaches to criminal law assume that enforcing the law is an undesirable activity that the state's agents (police officers) must be paid to do. The limited data available from HMD programs, along with the data from governmental pilot programs designed to elicit information about aggressive driving, suggests that there is a substantial portion of the civilian population that is willing to "tattle" on unsafe and discourteous drivers, even if doing so entails some financial costs and produces no financial benefits.

The current approach to traffic regulation ignores the "consumer surplus" that could result if we let lay people express their opinions about fellow drivers, punishing the bad drivers and rewarding the good ones. These expressive benefits ought to be an important part of the calculus, and not only because expressing these opinions might alleviate the frustration that sometimes engenders aggressive driving or road rage. Such expression seems to produce genuine welfare gains for the drivers who currently feel impotent and stifled under the status quo and whose complaints finally would be taken seriously under an HMDFE regime.[136] The effects of law enforcement on the enforcers, in short, can be just as important as the effects on enforcees.

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or "Hostile gestures" categories, including "Someone cuts in and takes the parking spot you have been waiting for," "Someone is driving very close to your rear bumper," "Someone cuts in right in front of you on the motorway," "Someone backs out right in front of you without looking," "At night someone is driving right behind you with bright lights on," "Someone makes an obscene gesture toward you about your driving," and "Someone speeds up when you try to pass them"); Shinar & Compton, *supra* note 17, at 429 (noting survey results in which category including road rage, aggressive driving, and other drivers was rated as single greatest safety concern by 39% of poll respondents, versus 11% who said drunk driving).

134 Smart & Mann, *supra* note 6, at 187 (summarizing research finding that connection).

135 *See, e.g.*, Deffenbacker et al., *supra* note 18, at 84.

136 *Cf.* Christine Jolls et al., *A Behavioral Approach to Law and Economics*, *in* BEHAVIORAL LAW & ECONOMICS 13, 25–26 (Cass R. Sunstein ed., 2000) (describing benefits obtained by people who sacrifice their own economic well-being to punish someone who has behaved "unfairly" in ultimatum game experiment). Frustrated drivers often express

III
OBJECTIONS TO "HOW'S MY DRIVING?" FOR EVERYONE

Having made out what I believe to be a rather strong affirmative case for HMDFE, I shall now discuss some of the serious objections that no doubt have occurred to readers. While several of these objections have merit, I shall suggest that, even in combination, they do not offset the advantages detailed above. Moreover, a few of the arguments that at first glance look like objections ultimately may strengthen the case for implementing HMDFE.

A. Inaccurate and Malicious Feedback

Because an HMDFE system is only as good as the feedback it receives, we must examine whether we can expect such feedback to be accurate. We can identify two quite different problems here: First, deliberately inaccurate (positive or negative) feedback, and second, feedback provided in good faith that turns out to be mistaken. The former issue presents greater challenges, and should be treated at length.

It is rather easy to imagine scenarios whereby HMDFE systems could be abused. Let us bring the most troublesome scenarios to the forefront: Suppose a racist driver cruises around town, assigning negative feedback to African-American or Asian-American motorists who are driving in an acceptable manner. Or imagine that HMDFE feedback is used to harass an unpopular individual for reasons having nothing to do with her driving performance. There is no doubt that HMDFE might invite this type of distasteful conduct, along with occasional inaccurate positive feedback. That said, there are reasons to believe that such misconduct will be rare, that technology can ameliorate such problems when they do arise, and that the problems associated with biased drivers would be no worse than the problems created by biased cops in the current police-based traffic enforcement regime.

Commercial fleet drivers sometimes object to HMD programs based on a fear that callers will phone in false reports.[137] Yet it turns out that inaccurate reporting for commercial fleet drivers is relatively uncommon in HMD programs. Anonymous reports to HMD call centers generally are not permitted, although the identity of callers is

their frustration and anger by honking their horns. This is an unsatisfying response, in that it imposes few costs on the source of the driver's frustration, and it also engenders substantial noise pollution externalities.

[137] Banstetter, *supra* note 26.

never reported to the offending drivers.[138] A small minority of drivers prompt the majority of calls, and after these drivers are identified for retraining or discharge, fleet accident rates drop sharply.[139] This evidence cannot be reconciled easily with the hypothesis that many HMD calls are motivated by racial animus, harassment, or pranks. To be sure, drivers of passenger vehicles might be more susceptible to malicious reports thanks to the greater proximity of the driver to his or her rear bumper, and women and minorities may be underrepresented in the ranks of commercial drivers. Still, while one might expect to see more prejudiced feedback in HMDFE than HMD for commercial vehicles, there is little reason to expect a plethora of false reports in the HMDFE context.

False feedback is also a concern in online reputation regimes, and software developers, as well as economists, have developed algorithms to detect deliberately false feedback. Essentially, the idea is that the system discounts outlier scores—instances in which a buyer gives negative feedback on an overwhelmingly well-rated merchant or vice versa.[140] There is a cost to eliminating these outliers, in that a good merchant sometimes behaves badly, just as a good driver sometimes makes mistakes.[141] That said, in an environment like eBay, where most users are behaving honestly, algorithms designed to weed out likely false reports are welfare enhancing.[142] As long as reputation systems elicit a lot of user feedback, isolating and ignoring problematic feedback is reasonably straightforward.[143] Moreover, it is worth

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138 *See* Driver's Alert, *supra* note 31; Safety Alert, Frequently Asked Questions, http://www.safetyalert.com/faq.asp#serviceswork (last visited June 25, 2006) (claiming that more than 99% of all calls logged by HMD monitoring company represent valid complaints).

139 KNIPLING ET AL., *supra* note 25, § 3.12; Emerson, *supra* note 27.

140 Chrysanthos Dellarocas, *Immunizing Online Reputation Reporting Systems Against Unfair Ratings and Discriminatory Behavior*, 2000 PROC. 2ND ACM CONF. ON ELECTRONIC COM. 150, 153.

141 *Id.* at 155; *cf.* Bin Yu & Munindar P. Singh, *A Social Mechanism in Reputation Management in Electronic Communities*, *in* COOPERATION INFORMATION AGENTS IV: THE FUTURE OF INFORMATION AGENTS IN CYBERSPACE 154, 164 (Matthias Klusch & Larry Kerschberg eds., 2000) (justifying reliance on assumption of mostly honest graders of electronic ratings model that does not discount all outlying scoring as being no worse than "democratic rule in human societies").

142 Sonja Buchegger & Jean-Yves Le Boudec, The Effect of Rumor Spreading in Reputation Systems for Multiple Ad-Hoc Networks § 7 (March 2003) (unpublished manuscript, available at http://icapeople.epfl.ch/sbuchegg/bucheggerL03A.pdf).

143 The dynamic at play here is connected to the Condorcet Jury Theorem:

> [S]uppose that people are answering the same question with two possible answers, one false and one true, and that the average probability that each voter will answer correctly exceeds 50%. The Jury Theorem holds that the probability of a correct answer, by a majority of the group, increases toward certainty as the size of the group increases.

Sunstein, *supra* note 2, at 972–73.

emphasizing that online reputation-tracking technologies are still in their infancy, and dramatic improvements to the eBay system for identifying false feedback can be expected in the years ahead.[144]

These algorithms could be adapted to the HMDFE regime quite readily. Indeed, by gaining more information about drivers than eBay has about buyers and sellers, the system could police racist and other forms of problematic feedback quite effectively. For example, if an HMDFE system knows the race of various drivers, it can discount or even ignore the ratings of white drivers who routinely assign suspiciously high levels of negative feedback to African-American drivers. Similarly, if the system knows where people work, study, and live, it can discount or ignore feedback among people who live in the same household, attend the same high school, or who work for the same company.[145] Moreover, the system can discount repeat evaluations among the same drivers. In an urban environment, if one driver or a small group of drivers are repeatedly giving positive or negative feedback to a particular driver, there is probably something fishy going on, and the system can ignore these suspicious rankings.[146] In other words, so long as we are willing to seed an HMDFE system with information about characteristics that might form the basis for inaccurate feedback, we can develop algorithms to help address the problems associated with deliberate inaccuracy.

In some respects, HMDFE would be better equipped to deal with malicious feedback than the online reputation sites. Online reputation sites suffer somewhat because users with poor reputations can always "flush" their existing identities and start over with a blank slate.[147] HMDFE would use each participant's unique identifier (vehicle VIN numbers and/or driver's license numbers) to prevent these sorts of evasions. Since the state already tracks vehicle ownership, even acquiring a new vehicle would not be a viable "flushing"

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144 Miller et al., *supra* note 57, at 27.

145 Collusive ratings are a problem for online feedback systems generally, though eBay has been able to keep this problem at tolerable (albeit nonzero) levels to date. Chrysanthos Dellarocas, *The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms*, 49 MGMT. SCI. 1407, 1419 (2003).

146 Scholars who study reputation networks have identified this "ganging up" problem and shown how it can be solved if participants use unique identifier numbers. Jay Schneider et al., *Disseminating Trust Information in Wearable Communities*, 4 PERS. TECHS. 245, 247 (2000). In an urban environment, unique identifiers are present in the form of vehicle identification numbers; one driver should not expect to encounter another driver repeatedly, so the system can ignore a second, third, or fourth instance of feedback by driver *A* about driver *B*.

147 Cynthia G. McDonald & V. Carlos Slawson, Jr., *Reputation in an Internet Auction Market*, 40 ECON. INQUIRY 633, 640 (2002).

strategy.[148] A well-designed HMDFE system, in short, ought to be able to ameliorate the problems with malicious feedback. Like Wikipedia, eBay, and open source projects, it will not be able to eliminate malicious information entirely. But algorithms that take advantage of driver information from motorist reports, preexisting government records, and third-party databases should be able to meet, if not exceed, the accuracy and usefulness of Wikipedia's voting system, eBay's fraud patrols, and open source filtering mechanisms.[149]

One additional point is worth emphasizing on this score: An HMDFE regime with occasional inaccurate reporting should not be compared to an ideal system of police traffic enforcement. Police enforcement in the real world is hardly first best. Police officers are prone to the same biases as other people,[150] and training to correct for those biases is imperfect. Delegating traffic enforcement to drivers

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[148] The system would not distinguish between multiple household members who share the same vehicle. *See supra* note 84 (noting that households already pay for family automobile insurance policies). Indeed, household-level reputational tracking might optimally constrain bad driving behavior. The aggressive driving husband might be marginally deterred if he can secretly pay HMD-related civil fines based on his own behavior, but substantially deterred if he knows his wife will be informed of, and be required to pay for, his discourteous driving. Similarly, the careless-driving teenager might fear that too many negative driving reports triggered during the evenings when she borrowed the family car will cause her parents to revoke her driving privileges. In short, household-level peer pressure to alter driving habits can enhance roadway safety.

[149] The solid performance of various "peer assessment" metrics, such as "360 degree" feedback, in business and education settings provides further support for the proposition that drivers' feedback about fellow motorists' behavior will be informative. *See, e.g.*, Peter A. Bamberger et al., *Peer Assessment, Individual Performance, and Contribution to Group Processes: The Impact of Rater Anonymity*, 30 GROUP & ORG. MGMT. 344, 367–68 (2005) (finding evidence that peer assessment improved group performance in manufacturing facility); Phil Davies, *Computerized Peer Assessment*, 37 INNOVATIONS EDUC. & TRAINING INT'L 346, 353–54 (2000) (noting benefits of peer assessment of student reports and essays).

[150] *See, e.g.*, Matthew Petrocelli et al., *Conflict Theory and Racial Profiling: An Empirical Analysis of Police Traffic Stop Data*, 31 J. CRIM. JUST. 1, 8 (2003) (finding that police officers are much more likely to conduct searches of African-American motorists than other motorists, and that success rates of searches of African-Americans are therefore disproportionately low); Jeff Rojek et al., *The Influence of Driver's Race on Traffic Stops in Missouri*, 7 POLICE Q. 126, 143–44 (2004) (concluding that African-Americans and Hispanics "attract more attention on the nation's roadways than do Whites"). A widely cited paper by Knowles, Persico, and Todd argued against the existence of widespread racial bias in police searches of motorists in Maryland. *See* John Knowles, Nicola Persico & Petra Todd, *Racial Bias in Motor Vehicle Searches: Theory and Evidence*, 109 J. POL. ECON. 203 (2001). But more recent work by Knowles has backed away from that claim after analyzing Missouri data that suggests the existence of racial bias, especially against Hispanics, in traffic stop–based searches. *See* Rubén Hernández-Murillo & John Knowles, *Racial Profiling or Racist Policing? Bounds Tests in Aggregate Data*, 45 INT'L ECON. REV. 959, 981–84 (2004).

themselves is a nice way of ensuring that traffic enforcers reflect the demographics of the surrounding communities.[151]

What about feedback that the caller believes to be true, but that turns out to be inaccurate? On the whole, the experience of companies using HMD programs and the experimental research on driving attitudes suggests that the signal-to-noise ratio from HMDFE would be comfortingly high. Again, the more feedback is generated, the less difference an occasional good-faith mistake will make, and the more reliably outlier reports can be identified.

That said, there is some evidence to suggest that individuals may rely on stereotypes to generate their opinions of what contributed to a particular collision. After presenting research subjects with written descriptions of accidents and asking them to assign blame, a study by Lawrence and Richardson found that gender and car type significantly affected these judgments.[152] More specifically, male drivers were judged to be more aggressive (a stereotype that is consistent with other data),[153] and female drivers were judged to be more careless (a stereotype that is not supported by other data).[154] Similarly, BMW drivers were judged more likely to have behaved aggressively than drivers of tiny Smartcars (a stereotype that is consistent with some, but not all, of the other data).[155] In laboratory settings, then, people are influenced by external factors in designating other drivers as blameworthy.

In real-world settings, where aggressive driving often provokes visceral responses, these biases tend to fade into the background. For example, the intensity of driver reactions and the length of their verbal response did not differ when they were confronted by honking

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[151] Elizabeth Joh recognizes the same problem of suboptimal or biased police enforcement of traffic laws, and she suggests a different remedy—greater automation and less human judgment in traffic law enforcement. Elizabeth E. Joh, *Discretionless Policing: Technology and the Fourth Amendment*, 95 CAL. L. REV. (forthcoming 2007) (on file with the *New York University Law Review*).

[152] Claire Lawrence & Jane Richardson, *Gender-Based Judgments of Traffic Violations: The Moderating Influence of Car Type*, 35 J. APPLIED SOC. PSYCHOL. 1755, 1768–69 (2005).

[153] *Id.* at 1771; Shinar & Compton, *supra* note 17, at 432.

[154] Lawrence & Richardson, *supra* note 152, at 1771.

[155] *Id.* at 1769. On the accuracy of vehicle-based stereotypes, compare Barbara Krahé & Ilka Fenske, *Predicting Aggressive Driving Behavior: The Role of Macho Personality, Age, and Power of Car*, 28 AGGRESSIVE BEHAV. 21, 26–27 (2002), finding that drivers of high-performance cars rated higher on aggressive driving scale, and Reginald G. Smart et al., *Road Rage Experience and Behavior: Vehicle, Exposure, and Driver Factors*, 5 TRAFFIC INJ. PREVENTION 343, 345 (2004), finding that drivers of high-performance vehicles were more likely to report having engaged in road rage than drivers of other vehicles, but finding no significant differences between SUVs, minivans, trucks, and cars, with Shinar & Compton, *supra* note 17, at 433, which finds no correlation between vehicle status and propensity to drive aggressively.

low-status or high-status vehicles on the roadway, although research subjects did accelerate more quickly to get away from honking drivers of low-status vehicles.[156] This suggests that HMDFE data will not perfectly reflect what actually happens on the roadways, but it should reflect it closely enough for the system to operate reasonably well. Indeed, other feedback systems, such as eBay's, should be susceptible to some of the same biases, based on sellers' existing feedback profiles,[157] yet those feedback systems are generally hailed as major successes. Moreover, keeping in mind the relevant comparison is again useful here. Police officers will hold many of the same subconscious biases,[158] and these biases may be more problematic in the officer context because resource constraints require high levels of selective enforcement on the roadways.

B. Distracted Driving

By enabling drivers to complain about others' misconduct, an HMDFE regime might distract them from their first priority, which is to operate a motor vehicle safely.[159] In the last few years, as cell phones have proliferated, policymakers and researchers have devoted increased attention to the risks associated with driver distraction. Some of these concerns have prompted state legislatures to require drivers to use hands-free cell phone devices, although no U.S. jurisdiction has banned calling while driving altogether.[160] The best available evidence suggests that conversing on a cell phone increases collision risk marginally, but perhaps not enough to warrant regulation in light

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156 McGarva & Steiner, *supra* note 68, at 176. This response may well be rational, as the driver of a low-status vehicle is more likely to be uninsured, so drivers should expect that the out-of-pocket costs associated with a collision with a low-status vehicle would be higher. A much earlier study found that people honk more quickly at the driver who has failed to proceed after a red light turns to green when they are behind a low-status vehicle than when they are behind a high-status vehicle. Anthony N. Doob & Alan E. Gross, *Status of Frustrator As an Inhibitor of Horn-Honking Responses*, 76 J. SOC. PSYCHOL. 213, 215–16 (1968).

157 Scholars studying eBay reputation ratings have discussed a rich-get-richer phenomenon, whereby a vendor's existing strong reputation "anchors" subsequent feedback about that vendor, rendering this subsequent feedback marginally more positive than it would otherwise be. Resnick & Zeckhauser, *supra* note 4, at 12–15; *see also* Alex Geisinger, *Nothing but Fear Itself: A Social-Psychological Model of Stigma Harm and Its Legal Implications*, 76 NEB. L. REV. 452, 482 (1997) (noting that stigmatization can result in anchoring effects, causing people to overestimate risks posed by stigmatized actor).

158 *See supra* note 150.

159 *Cf.* Smart et al., *supra* note 18, at 49 (arguing that increasing drivers' ability to use communications devices may distract drivers from safe driving).

160 SAVAGE ET AL., *supra* note 67, at 10.

of the productivity gained from in-vehicle use of communications devices.[161]

An impressive study by Wilson, Fang, Wiggins and Cooper combined observation of cell phone use on public roadways with research into the driving records and collision histories of those seen using cell phones versus those seen not using cell phones. Their study found that drivers "observed using a cell phone had a risk of an at-fault crash 1.16 times greater than did drivers not using cell phones."[162] The relationship between observed cell phone use and collisions was not statistically significant for males, though it was significant for females.[163] By contrast, having previously incurred a citation for aggressive driving multiplied the likelihood of collision involvement by 1.84 for all drivers and by 1.76 for males.[164] The driver's age also played an important role. Compared to being 45 or older, being 16–24 enhanced the likelihood of collision involvement by factors of 1.74 for all drivers and 1.99 for males, and being 25–34 multiplied the likelihood of collision involvement by factors of 1.53 for all drivers and 1.6 for males.[165] For all drivers, the increased risk associated with being a cell phone user was essentially equal to the increased risk associated with being between the ages of 35 and 44.[166] Wilson and coauthors did note that cell phone use was associated with other high-risk behaviors that enhanced collision risk, but a multivariate regression analysis revealed that the role of cell phone use in enhancing collision risk was "relatively minor."[167] Equally important, the very high collision risk associated with aggressive driving violations makes it plausible that any increased collision risk associated with encouraging HMD cell phone reports would be dwarfed by the decreased collision risk associated with detecting and deterring aggressive driving.[168]

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161 For a cost-benefit analysis, see Joshua T. Cohen & John D. Graham, *A Revised Economic Analysis of Restrictions on the Use of Cell Phones While Driving*, 23 RISK ANALYSIS 5 (2003):

> [T]he central estimate for the net benefits of a ban on cell phone use while driving was close to zero and hence . . . the value of preventing crashes caused by cell phone use while driving is approximately equal to the value of the calls that would be eliminated by a ban.

Id. at 14.

162 Jean Wilson et al., *Collision and Violation Involvement of Drivers Who Use Cellular Telephones*, 4 TRAFFIC INJ. PREVENTION 45, 49 (2003).

163 *Id.*

164 *Id.* at 49 tbls.3 & 4.

165 *Id.*

166 *Id.* at 49 tbl.3.

167 *Id.* at 51.

168 It is plausible that the correlation between crashes and aggressive driving violations is so high, at least in part, because aggressive driving violations are so rarely detected. That is to say, we can expect that the drivers who have received citations will tend to be the most

Another comprehensive study, this one of Virginia traffic accidents, analyzed the various causes of crash-related driver distraction.[169] The researchers found that cell phone use did contribute to some traffic accidents, but that it ranked well below looking at scenery, rubbernecking, and eating or drinking.[170] Cell phone use ranked slightly above adjusting vehicle controls as a contributor to traffic accidents.[171] On the whole, the research findings suggested that cell phone use does cause some accidents, but far fewer accidents than other manifestations of driver distraction that currently go unregulated. Moreover, if it is true that HMDFE would decrease collisions by deterring aggressive driving and helping to remove the worst drivers from the roads, then this would generate substantial benefits from a driver distraction perspective, since rubbernecking is such a significant contributor to crashes: Fewer accidents leads to less distraction, which results in fewer accidents, and so on.

There are studies that reach very different conclusions about the risks of cell phone use while driving. These studies suggest that cell phone usage may result in moderate, or even major, increases in collision risk. If these studies are accurate, even quick calls to HMD centers could result in measurable increases in collisions nationwide. Though some of these studies do not control for the observed correlation between cell phone use and other risky driving behaviors,[172] a real note of caution is appropriate here in light of the mixed evidence.

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aggressive drivers, as opposed to the moderately aggressive drivers. This underreporting problem therefore could result in an overestimation of the risks associated with garden-variety aggressive driving.

169 ANDREA L. GLAZE & JAMES M. ELLIS, VA. COMMONWEALTH UNIV., PILOT STUDY OF DISTRACTED DRIVERS (2003).

170 *Id.* at 13–14.

171 *Id.* at 14.

172 John Violanti's study is widely invoked for its claim that cell phone use is associated with substantial increases in traffic fatalities, but his study did not control for the aforementioned correlation. *See* John M. Violanti, *Cellular Phones and Fatal Traffic Collisions*, 30 ACCIDENT ANALYSIS & PREVENTION 519, 519, 523 (1998); *see also* Goodman et al., *supra* note 94, at 24–25 (showing increased risk of collision when drivers use cellular phones but acknowledging that results may differ in real-world situations). A better and more recent study found that cell phone use impaired response times when drivers had to stop suddenly to avoid running a red light. P.A. Hancock et al., *The Distraction Effects of Phone Use During a Crucial Driving Maneuver*, 35 ACCIDENT ANALYSIS & PREVENTION 501, 510 (2003). And an even more recent simulation study found similar impairments from conversing on cell phones. *See* David L. Strayer et al., *A Comparison of the Cell Phone Driver and the Drunk Driver* 6 (AEI-Brookings Joint Ctr. for Regulatory Studies, Working Paper No. 04-13, 2004), *available at* http://ssrn.com/abstract=570222. There is reason to be cautious about the results from simulation studies. In the real world, drivers often slow down when talking on the cell phone as a means of compensating for the division of their attention. Goodman et al., *supra* note 94, at 22. Furthermore, participants in a simulator exercise know that in the event of a "crash" or other negative outcome, they

Given the conflicting evidence concerning the risks of cell phone use in vehicles, three points are worth making. The first point is that voice recognition and other technologies stand poised to decrease the impairments associated with cell phone use while driving.[173] Research has suggested that two aspects of cell phone use are particularly dangerous while driving: manipulating a phone (e.g., dialing numbers while driving); and engaging in intense conversations that demand a great deal of attention, focus, and computational brainpower.[174] These risk factors can be reduced through the use of one-touch dialing, speakerphones, and automated verbal templates for leaving feedback.

The second point is that even if cell phone use does increase accident risk, the incremental increase in cell phone use resulting from the implementation of an HMDFE program would be rather small. After all, motorists will spend far more time talking to friends, relatives, clients, and service providers than they will spend talking to HMD operators, even in a 1-800–based HMDFE system. Moreover, reports called into an HMD system can be used to identify those callers whose use of in-vehicle communications adversely affects their driving performance.

The third point is the key: As the studies referenced above make plain, cell phone use is hardly the most significant source of driver distraction. Indeed, other research suggests that the frustration associated with seeing other drivers behave rudely or aggressively is very substantial and that this frustration is itself a source of distraction.[175]

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will not be injured, nor will there be serious financial repercussions. One way to reconcile the findings of the simulation studies with the observational studies is to suggest that people are able to multitask more effectively when the stakes are very high. *Id.* at 25. For further discussion of some of the conflicting evidence and methodological challenges, see *id.* at 25–38, and D. Haigney & S.J. Westerman, *Mobile (Cellular) Phone Use and Driving: A Critical Review of Research Methodology*, 44 ERGONOMICS 132 (2001).

[173] *See* Mike Schneider & Sara Kiesler, *Calling While Driving: Effects of Providing Remote Traffic Context*, *in* CHI 2005: PAPERS 561, 567–68 (2005) (arguing that providing telephone users who call drivers with real-time information about traffic conditions faced by driver reduces accident risk); Washburn, *supra* note 83, at 481 (examining speech recognition as method for collecting data from drivers).

[174] David L. Strayer & William A. Johnston, *Driven to Distraction: Dual-Task Studies of Simulated Driving and Conversing on a Cellular Telephone*, 12 PSYCHOL. SCI. 462, 462–66 (2001).

[175] *See* Deffenbacher et al., *supra* note 18, at 84 (noting connection between driver anger and collisions); Clifford Nass et al., *Improving Automotive Safety by Pairing Driver Emotion and Car Voice Emotion*, *in* CHI 2005: LATE BREAKING RESULTS 1973, 1974–76 (2005) (presenting interesting experimental data that examines how drivers' emotional state influences their attention to road); Paul C. Rosenblatt, *Grieving While Driving*, 28 DEATH STUD. 679, 684–85 (2004) (expressing concern about potential for grieving drivers to be distracted by their grief, thereby exposing them to enhanced risk of accidents); *supra* notes 22–24 and accompanying text.

So while an HMDFE system would increase the distraction associated with reporting others' misconduct, it promises to alleviate the distraction that arises from fuming about another's driving and either feeling powerless to do anything about it or contemplating some means of retaliating against the offending driver.[176] And, of course, when retaliation does occur, via light flashing, honking, gesturing, and the like, further distraction may ensue, affecting the initial offender, the frustrated retaliator, and anyone nearby on the road.

In short, to determine the net driver distraction effects of HMDFE, we must balance the incremental danger of distraction caused by calling against the incremental danger of frustration caused by the inability to report bad driving. Seen in that light, it may be that the net effect of an HMDFE system would actually be a decrease in driver distraction, notwithstanding the increased use of telecommunications devices required to log complaints.

C. *Why Not Fully Automated Enforcement?*

In recent years, traffic planners have become increasingly enamored with automated means for improving traffic flow and safety. Car manufacturers and engineering faculties are researching and developing various technologies to those ends. For example, cars are being developed that will use radar to detect when a driver is tailgating another vehicle too closely;[177] intersections are being fitted with cameras to catch motorists who drive through red lights;[178] and insurance companies, as well as rental car companies and commercial fleets, are testing the use of GPS to monitor speeding by individual drivers.[179] Many of these approaches hold promise, and research into these programs can proceed alongside the rollout of HMDFE.[180] Indeed, because automated systems might provide an objective means of corroborating some of the information reported to HMD centers, these systems could enable researchers to spot-check the accuracy of the information aggregated via HMDFE.

The case for HMDFE over automated enforcement is the case for human judgment and context sensitivity. Driving in excess of the speed limit is efficient in some contexts, whereas in other contexts

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[176] *Cf.* Brewer, *supra* note 13, at 55 (noting that in some cases, distracting frustrated drivers can be advantageous because it lowers their propensity to retaliate aggressively).

[177] Smart et al., *supra* note 18, at 48.

[178] SAVAGE ET AL., *supra* note 67, at 22.

[179] Sheryl Jean, *Checking Your Driving: Progressive Insurance Testing Chip that Tracks Speed, Distance*, ST. PAUL PIONEER-PRESS, Aug. 10, 2004, at C3.

[180] *See* SAVAGE ET AL., *supra* note 67, at 22 (finding that use of automated red-light cameras at intersections resulted in reductions in injury crashes of between 7% and 29% at those intersections).

(such as on an icy road), driving at the speed limit exposes other drivers to substantial risks.[181] Indeed, on a clear and sunny day, when most people are driving seventy miles per hour in a fifty-five miles per hour zone, driving at the speed limit is more dangerous than driving seventy miles per hour.[182] Running a red light at three o'clock in the morning at an obviously deserted intersection is sensible; ticketing a driver for engaging in such conduct serves little purpose other than to prompt exasperation with the traffic laws. Some forms of bad driving, such as excessive lane changing or a refusal to let another motorist merge, are difficult to detect via automated enforcement. Other harmful driving habits, like excessive braking or darting into a parking spot that another motorist is plainly waiting for, are not generally unlawful. Finally, automated enforcement offers none of the expressive benefits associated with HMDFE, whereby the regime encourages measured and anonymous retaliation for driver misconduct, thereby diverting frustrated motorists from more excessive and provocative retaliation.

One comparative advantage of HMDFE over automated traffic enforcement tracks the advantages of distributed enforcement over enforcement by traffic police. It is based on a preference for standards and norms over rules and laws. There is a standard-like exception to virtually every "rule" of the road. Americans drive on the right, except when the right lane is obstructed, in which case they try to move into the left lane when it is safe to do so. Americans must not run red lights, except when it is necessary to do so in order to avoid an accident or to get out of the way of an emergency vehicle. HMDFE is, in short, like a jury system for traffic regulation, where existing laws and rules are modified by social expectations and aspirations to form a body of law that is used to reward the cooperators and punish the deviants.[183]

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181 Cramton, *supra* note 87, at 436.

182 David Navon, *The Paradox of Driving Speed: Two Adverse Effects on Highway Accident Rate*, 35 ACCIDENT ANALYSIS & PREVENTION 361, 366 (2003).

183 None of this means that a world of HMDFE is a world where all traffic laws get repealed. Many traffic laws, such as the convention that motorists in the United States drive on the right and pass on the left, establish efficient focal points in coordination and mixed-motive games. These laws should remain on the books to serve as a backstop for driving norms. Other traffic laws will be useful in determining liability ex post where a traffic collision has occurred, particularly if there were not many motorists nearby to witness the collision, or if there is strong reason to expect that the witnesses who happened to be nearby were biased in a systematic way.

D. *Information Privacy Interests*

Information privacy advocates occasionally sound the alarm about existing automated enforcement regimes, where rental car or insurance companies monitor individual drivers' behavior through the use of GPS or other surveillance technologies.[184] Especially when discussions turn to sharing this information with the government, these same privacy advocates are quick to invoke George Orwell's *1984*.[185]

I teach and write about information privacy law,[186] but I have difficulty understanding the appeal of these kinds of claims. I can comprehend the individual privacy interest in travel destinations and why twenty-four-hour GPS monitoring of a vehicle might intrude on a legitimate privacy interest. After all, twenty-four-hour monitoring of that sort would allow the monitor to infer a great deal about the driver's intimate associations, medical information, and political activities. But we can and should remedy these concerns by forbidding monitoring entities from piecing together information about drivers' travel patterns and by protecting vigilantly the HMDFE databases that would contain information that reveals these patterns. As long as appropriate data security and data transfer protections are implemented, crucial privacy interests can be vindicated without compromising the objectives of the HMDFE program.[187]

The information privacy interests that motorists would assert to prevent governments or insurers from discovering, say, their speed or braking distance, are not weighty. There is nothing private about road speed: It can be discerned with substantial accuracy by a police officer, a bystander holding a radar gun, or a motorist driving behind the car being monitored. There is no connection between road speed, or propensity to tailgate, and intimate conduct of any kind.[188] Nor do

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184 Bob Gritzinger, *Under the Hood, with Big Brother*, AUTOWEEK, Nov. 8, 2004, at 30; Jean, *supra* note 179.

185 *E.g.*, Gritzinger, *supra* note 184, at 30.

186 Sometimes sensibly. *See, e.g.*, Lior Jacob Strahilevitz, *A Social Networks Theory of Privacy*, 72 U. CHI. L. REV. 919 (2005) [hereinafter Strahilevitz, *Social Networks*]. Sometimes less sensibly. *See, e.g.*, Lior Jacob Strahilevitz, *Consent, Aesthetics, and the Boundaries of Sexual Privacy After* Lawrence v. Texas, 54 DEPAUL L. REV. 671 (2005).

187 A helpful signpost here is *Whalen v. Roe*, 429 U.S. 589 (1977), in which the Supreme Court held that New York's creation of a vast database to track individual patients' use of prescription drugs did not violate the constitutional right to information privacy absent a showing "that the security provisions of the statute will be administered improperly." *Id.* at 601.

188 I have argued elsewhere that as a general rule, those bits of information that relate to intimate conduct present the strongest case for privacy protection. Strahilevitz, *Social Networks*, *supra* note 186, at 923–24, 930–31; *cf.* Joh, *supra* note 151 (manuscript at 32–35) (concluding that enhanced use of vehicle-based data recorders for traffic enforcement purposes would not violate constitutional or statutory privacy rights).

these bits of information implicate our interests in facilitating the development of personalities, affect sensitive medical information, or undermine valuable confidential relationships. Privacy is a means, not an end.[189] We should protect privacy if, and only if, doing so promotes social welfare. It is difficult to identify any benefit of roadway anonymity with respect to information about drivers' road speed or tendencies to weave through traffic and cut off other motorists.

Driving usually takes place in very public places. As a result, it is appropriate that the courts have not been receptive to arguments that drivers maintain reasonable expectations of privacy with respect to where their vehicles are traveling.[190] Almost everything that could be learned through the implementation of an HMDFE regime could be learned through multiplying the present number of traffic police by a factor of ten. Yet virtually no one contends that increasing the number of police officers patrolling the streets would violate individual privacy rights.[191] HMDFE makes drivers accountable for conduct that is public but that remains obscure solely because of resource constraints. The only time an individual has a reasonable expectation of privacy with respect to her driving is when no one else is around. In those settings, HMDFE protects the privacy of her conduct, because there would be no motorists, bystanders, or law enforcement officials to report any good or bad driving.

Existing privacy norms might foreclose HMDFE implementation, but the foregoing analysis suggests that privacy advocates should avoid a knee-jerk response and ask themselves: "How does motorist obscurity promote social welfare?" There are plenty of privacy causes worth defending in contemporary society. In my view, motorist obscurity is simply not one of them.

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189 *See* Richard A. Posner, *The Right of Privacy*, 12 GA. L. REV. 393, 394 (1978) (suggesting that privacy is intermediate good, i.e. input in "the production of . . . utility or welfare").

190 *See, e.g.*, United States v. Knotts, 460 U.S. 276, 281 (1983) ("A person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another.").

191 One paper that comes close to taking this position is Marc Jonathan Blitz, *Video Surveillance and the Constitution of Public Space: Fitting the Fourth Amendment to a World that Tracks Image and Identity*, 82 TEX. L. REV. 1349 (2004). Blitz suggests that while sporadic police surveillance of public streets would not violate the Fourth Amendment, complete surveillance of these same streets would. *Id.* at 1374–77, 1443–47. Blitz's argument is admirably ambitious, but in the end I do not believe it persuades. The Fourth Amendment has not been read to impose a resource constraint on society's expenditures on law enforcement, nor should the Constitution dictate a maximum level of law enforcement resources that can be devoted to policing conduct in public spaces. The possibility of retreating onto private or communal property provides adequate protection for intimate conduct and association, as well as the possibility of chance encounters among strangers.

E. Due Process

There is, of course, a final doctrinal issue to be considered: the Due Process Clause. Because the federal government would be deputizing its motorists and enabling any of them to sanction fellow motorists, the program would be unprecedented. The state often encourages private citizens to blow the whistle about others' misconduct, via qui tam statutes, whistleblower protections, and signs encouraging motorists to "Be an HOV Hero: Report Carpool Cheats." But these complaints typically trigger government investigations where the accused is entitled to a presumption of innocence.

At the same time, there are numerous settings in which the government delegates significant responsibility to the community in making high-stakes decisions about individuals. Does an advertising campaign infringe a registered trademark? It depends on the extent of associated consumer confusion. Will vice laws be enforced? The answer often depends on whether citizens of the affected neighborhoods demand enforcement. Will an individual be convicted of a crime in the absence of forensic evidence linking him to the crime scene? The testimony of eye witnesses probably will prove decisive. The interesting question raised by HMDFE is: What happens when the stakes of a sanction are much lower and the costs of permitting each motorist to challenge any sanction in court or administrative proceedings would be prohibitive? The stakes associated with ordinary HMDFE reports might be low enough to warrant a relaxation of the procedural hurdles that are quite sensibly required in the context of criminal prosecutions and civil trials.

To answer the due process question, courts would most likely employ the general balancing approach set forth in *Mathews v. Eldridge*.[192] *Mathews* suggests that bare-bones procedures may be constitutionally sufficient if they result in reasonably reliable decisions about sufficiently low-stakes matters.[193] Applying this framework, the Seventh Circuit has rejected a due process challenge to municipal regimes in which motorists were penalized with civil parking fines and the city had a policy of not requiring parking officers to attend civil hearings on the grounds that "the benefits of requiring the police officer to appear at every hearing [were] unlikely to exceed the costs."[194] In the court's view, the right to cross-examine officers or attack their credibility surely could increase the accuracy of the civil fines system, but not by nearly enough to warrant the added

[192] 424 U.S. 319, 334–35 (1976).
[193] *Id.* at 341–49.
[194] Van Harken v. City of Chicago, 103 F.3d 1346, 1351–53 (7th Cir. 1997).

expense.[195] This analysis suggests that a great deal will turn on the magnitude of the inaccurate feedback problem identified above.[196] If feedback is abundant and unreliable feedback can be effectively filtered out, then the lack of any opportunity to challenge the feedback should not doom HMDFE.

Indeed, an HMDFE regime offers safeguards currently absent in most law enforcement contexts. With HMDFE it would be easy to track whether a particular feedback provider's information has a racially disparate impact or often diverges from the feedback provided by motorists who witnessed the same events. Such irregularities could be identified at the moment dubious feedback is provided, rather than festering until lawyers think to scrutinize them in plea-bargain negotiations or trial cross-examinations. Moreover, HMDFE feedback usually would be provided in real time, before memories fade, and before police investigators have the opportunity to pressure or coach complaining witnesses.

There is little reason to require lawyers, cross-examination, or post-deprivation hearings under the *Mathews* due process framework, and plenty of reason to be intrigued by the potential for HMDFE-style technologies to correct injustices at the lowest possible cost. Of course, it is lawyers who will apply the *Mathews* framework, and they might well regard their absence as a cause for concern, even were they convinced that HMDFE was reliable and that civil fines would not be severe for most drivers.

Supposing due process concerns persist, they could be addressed in at least two ways. The first would be to alter the nature of the system so that the government is merely collecting the data and not imposing any fines; instead it would merely provide the information to insurance providers, who could use it or ignore it as they saw fit. Such a regime would ameliorate due process concerns because the government itself would not be depriving anyone of a liberty or property interest. Rather, the government would be acting in a publisher's capacity, which it already does when it gathers information about indi-

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[195] The D.C. Circuit has embraced similar reasoning:

> Absent an explicit provision in the statute that requires individualized claims adjudications for overpayment assessments against providers, the private interest at stake is easily outweighed by the government interest in minimizing administrative burdens; in light of the fairly low risk of error so long as the extrapolation is made from a representative sample and is statistically significant, the government interest predominates [under the *Mathews v. Eldridge* framework].

Chaves County Home Health Serv., Inc. v. Sullivan, 931 F.2d 914, 922 (D.C. Cir. 1991).

[196] *See supra* text accompanying notes 137–58.

viduals and responds to Freedom of Information Act requests for that information.[197]

A second response would be to expand procedural safeguards in an HMDFE regime. We could build in technologies that would help spot-check the accuracy of driver-provided feedback and provide for streamlined post-deprivation hearings where physical evidence could be introduced to assess feedback veracity. Of course, permitting these opportunities to challenge inaccurate feedback would make the system more expensive and cumbersome. Instructively, however, online reputation-tracking sites have adopted divergent policies on this score, with some providing more "due process" for aggrieved members and others providing no avenues for challenging inaccurate feedback.[198] HMDFE similarly could provide motorists with lots of process or very little. Although the version I propose here would not entitle motorists to a hearing at which they could challenge purportedly inaccurate feedback, Part IV of this Article discusses sensible variations that would offer aggrieved motorists far more procedural protections.

F. Shouldn't We Let the Market Implement HMD on Its Own?

In order to justify a mandatory regulatory intervention, it is usually appropriate to identify a market failure that needs fixing. At the outset, it is worth recalling that the absence of an effective market on the roadway is the source of the aggressive driving problem in the first place. We need not develop a comprehensive reputation-tracking system in instances where vendors who behave poorly suffer the repercussions. If a Starbucks barista is rude, customers can complain to the shop manager, and since the manager has an incentive to keep

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[197] Suppose the food inspectors of a municipality track the number of times citizens call in to complain about food poisoning after eating at particular restaurants. If the city then distributed this raw data to a local newspaper that disseminated the information to the public at large, a restaurant owner who saw his or her business dry up would have no due process claim against the city. Nor would he have a defamation claim, as long as the city accurately reported the calls that citizens had phoned in. By publishing the data, the city would not be affirming the veracity of any particular complaint.

[198] For example, eBay is resistant to policing the accuracy of feedback. *See* eBay, Resolving Feedback Disputes, http://pages.ebay.com/help/feedback/feedback-disputes.html (last visited Aug. 16, 2006) ("eBay will remove individual feedback comments only in very exceptional circumstances, when they violate specific policies."). Amazon.com, by contrast, provides next to every user review a link that appears to facilitate greater scrutiny of its content by Amazon, stating: "If you find this content inappropriate and think it should be removed from the Amazon.com site, let us know by clicking the button below. This information will be sent to Amazon.com and we will take appropriate action." Amazon.com, Report Tags As Inappropriate, http://www.amazon.com/gp/tagging/report-this.html?ie=UTF8&tag=1 (last visited Sept. 1, 2006).

his customers happy, he will train the employee to behave better or fire her if training seems futile. In the driving context, there is no market that binds one driver to another, and this absence justifies governmental involvement, both through the traffic police and tort system and through an HMDFE system using distributed enforcement.

That said, there are major players in the driving market who in some respects resemble our Starbucks managers. Automobile insurance firms, in theory, could discipline poor drivers whose policies they underwrite, but at present there is no institution that allows a frustrated motorist to identify which insurance company to call in order to complain about the pickup truck driver who nearly rear-ended her. Insurance companies are certainly free to make it worth their customers' while to participate in an HMD scheme, and given the mandate in all fifty states that every motorist carry liability insurance, one might expect to see high levels of participation in a purely voluntary HMD scheme based on incentives provided by insurance companies. Indeed, if participation in a voluntary HMD system were widespread, then an insurance company might sensibly "assume the worst" about a customer who refused to participate, raising a red flag that would warrant a denial of coverage or sharply increased premiums. So why is government intervention appropriate here?

The first answer is that there are millions of drivers who do not have automobile insurance,[199] and a voluntary HMD regime would not incorporate these drivers into the system. HMDFE, by contrast, would apply to all drivers. Furthermore, it could address the general problem of uninsured motorists. Normally, it is costly for the government to determine which uninsured motorists have stopped driving and which of them flout the law. HMDFE would give the government reliable information about which cars are on the roads, thereby substantially reducing the marginal costs of identifying and targeting uninsured motorists.[200] Police could quickly identify and target those vehicles that were reportedly being driven, but which did not show up as carrying liability insurance in a centralized HMD database.[201]

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[199] Dan Walters, *Legislators Spent a Lot of Time Deciding Who Can Legally Drive*, SACRAMENTO BEE, Oct. 31, 2005, at A3 (noting that in California alone, 15% of motorists, representing 3.5 million drivers, lack automobile insurance).

[200] This advantage may dissipate in the coming years as the government obtains more complete information about individual drivers through E-ZPass data or similar sources.

[201] The United Kingdom has experimented successfully with real-time accessible databases of insured motorists that can be accessed by specially equipped patrol vehicles to identify and impound uninsured vehicles based on their license plate numbers. Stephen Womack, *Flash! Now Cameras Snare the Uninsured: Police Step Up the Fight to Force 1.2 Million Motorists off the Road for Driving Without Cover*, MAIL ON SUNDAY (U.K.), Aug.

The second answer is that a nonuniversal system would mitigate the expressive benefits associated with HMDFE. More precisely, HMDFE taps into norms of reciprocity: Motorist *A* tolerates the possibility that other drivers may punish his own poor driving by virtue of his own ability to punish others' poor driving in exchange.[202] Given the strong possibility that the least considerate drivers will be most likely to opt out of a voluntary HMD program, these expressive benefits will be lost, and these holes in system coverage might invite road rage and aggressive retaliation against those who have opted out, while simultaneously undermining support for the system as a whole.

The third answer is that there are negative externalities associated with aggressive or inappropriate driving that are not borne by individual insurance companies or individual drivers. Automobile insurance companies do internalize many of the harms of increased collisions, but they do not internalize the health and psychological costs associated with frustrated and angry drivers, the rising vehicle and fossil fuel costs associated with increased expenditures on bigger and safer cars, and the law enforcement costs associated with policing traffic violations. These are costs borne by the public at large and by the state, and they may explain the failure of insurance companies to encourage the expansion of HMD beyond commercial fleets. Moreover, while individual insurance companies would benefit from having feedback about their own customers, they would not benefit (much) from enabling their customers to leave feedback about other insurance companies' customers. Hence, the provision of feedback-enabling technologies in vehicles would be plagued by a minor tragedy of the commons, which might well prevent insurers from encouraging the installation of these devices in vehicles driven by their customers.

Finally, although the case for mandatory HMDFE rests on externalities-related arguments, paternalistic rationales may provide further support. HMDFE may help individuals drive in ways that better reflect their own aspirations, though not their own practices. When it comes to driving, commercial and noncommercial drivers alike deviate rather substantially from what a rational actor model would predict, with cognitive errors and emotional responses adversely

28, 2005, at 18. Texas is developing a similar system. Ty Meighan, *System a Real-Time Check of Insurance: Nearly a Quarter of Texas Drivers Don't Have It, DPS Reports*, CORPUS CHRISTI CALLER-TIMES, Sept. 22, 2005, at B4.

202 On reciprocity, see Dan M. Kahan, *The Logic of Reciprocity: Trust, Collective Action, and Law*, 102 MICH. L. REV. 71, 74 (2003) (noting that "the willingness of individuals to make costly contributions to collective goods is highly conditional on their perception that others are willing to do so").

affecting driver performance.[203] The predominant government attitude toward seat belts in the 1970s was that individuals could decide for themselves whether they wished to use these safety devices. Most consumers did buckle up, but thousands refused to do so and died as a consequence. If studies of HMD in the commercial fleet context translate into the passenger vehicle context, then the argument for HMDFE would look a lot like the argument for "click it or ticket" laws. Forcing the universal use of a safety device saves enough lives to warrant the associated restrictions on individual liberty.

On balance, then, it seems that HMD would be most effective if implemented universally, and the government's ability to mandate participation makes it the obvious vessel for implementing HMDFE. That said, a voluntary HMD program may be worth implementing if political obstacles prevent the enactment of HMDFE.

G. Cost-Benefit Analysis

The ultimate test will be whether HMDFE withstands cost-benefit analysis. The preceding sections have identified the relative costs and benefits, but it will be helpful to recount them briefly here. Of course, with a new and admittedly radical proposal like this one, it will be impossible to generate reliable estimates of the actual dollar figures of either the costs or benefits.

With respect to benefits, we would be aggregating the value of collisions avoided, including lives saved, injuries prevented, work interruptions avoided, litigation and insurance administration costs eliminated, and property damage averted. Data on HMD for commercial vehicles suggests that collision reductions could range from 20% to 50%.[204] A recent economic analysis found that the mean social cost of a fatal traffic accident in the developed world was approximately $1.5 million in 1999.[205] Other recent estimates suggest

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[203] *See* Otto Anker Nielsen, *Behavioral Responses to Road Pricing Schemes: Description of the Danish AKTA Experiment*, 8 INTELLIGENT TRANSP. SYS. 233, 250 (2004) (noting that motorists have poor sense of average and marginal costs of driving); Sivak, *supra* note 6, at 263–68 (giving examples of various instances in which driving behavior reflects bounded rationality); Ehud Guttel & Alon Harel, *Probability Matching and the Law: A New Behavioral Challenge to Law and Economics* 11–16 (Am. Law & Econ. Ass'n Annual Meetings, Paper No. 39, 2004) (reporting results from parking experiment in which subjects chose whether to park illegally, not on basis of welfare maximization, but on basis of probability matching); Annich Maincent et al., Truck Driver's Behaviour and Rational Driving Assistance 10–12 (unpublished manuscript, available at http://www.psychology.nottingham.ac.uk/IAAPdiv13/ICTTP2004papers2/ITS/Maincent.pdf) (finding that many commercial truck drivers fail to optimize combination of speed and fuel consumption).

[204] *See supra* text accompanying notes 27–34.

[205] Anna Trawén et al., *International Comparison of Costs of a Fatal Casualty of Road Accidents in 1990 and 1999*, 34 ACCIDENT ANALYSIS & PREVENTION 323, 330 (2002).

that fatal traffic accidents alone cost the United States 2.2% of its gross domestic product (GDP).[206] Using the Bureau of Economic Analysis's 2005 estimate of $12.76 trillion for GDP,[207] the cost of such accidents in the United States equaled $280.73 billion. A 20% reduction in fatal crashes therefore would save society upwards of $56 billion per year, based on these conservative, back-of-the-envelope calculations. Other benefits identified in this Article would include cost savings on law enforcement, enhanced efficiencies from reduced information asymmetries in the insurance market, substantial improvements in everyday driver happiness, and significant expressive benefits from enabling drivers to sanction those who endanger or frustrate fellow motorists.

On the costs side, we should include the costs associated with establishing an HMDFE system, the costs of malicious and inaccurate feedback, and the costs incurred by those motorists who would suffer disutility from having their driver behavior adversely evaluated by peers. There would also be some driver distraction costs associated with HMDFE. However, these distraction costs would be offset (perhaps fully) by a reduction in two forms of driver distraction: distraction caused by an inability to sanction an aggressive driver in a measured way, and distraction caused by rubbernecking.

In short, the costs and benefits of HMDFE are presently indeterminate and will remain so until a pilot program is implemented or further experimental studies are conducted. That said, it seems entirely plausible that the benefits associated with HMDFE will outweigh the associated costs, perhaps by a wide margin.

IV
VARIATIONS

My goal in this Article has been to construct a conceptual case for distributed enforcement of traffic norms. I have no intention of hashing out all the details of what the ideal HMDFE system would look like. After all, for the reasons identified above, implementing any HMDFE regime would induce a great many changes in the way we think about traffic regulation, and different portfolios of changes are likely to appeal to different readers. Along the same lines, any HMDFE regime necessarily confronts some basic trade-offs, and the ways in which policymakers weigh those trade-offs should affect the

206 Kevin M. McDonald, *Judicial Review of NHTSA-Ordered Recalls*, 47 WAYNE L. REV. 1301, 1309 (2002).

207 *See* Press Release, Bureau of Econ. Analysis, Gross Domestic Product: Fourth Quarter 2005 (Final) (Mar. 30, 2006), *available at* http://www.bea.gov/bea/newsrelarchives/2006/gdp405f.pdf.

parameters of such a system. For example, there will be a clear trade-off between the costs of an HMDFE system and its accuracy. So policymakers in jurisdictions facing major resource constraints might opt for a less accurate system, and policymakers in jurisdictions where collisions impose particularly serious costs on society may be willing to stomach a higher-tech version of HMDFE. This Part identifies the more important trade-offs and evaluates possible variations on the HMDFE regime.

A. High-Tech Reporting

The rudimentary version of HMDFE relies on technologies that already exist and have proven themselves in the context of voluntary HMD programs for commercial fleets: stickers or placards on the backs of vehicles encouraging motorists to report misconduct via their cell phones. But placards and cell phones should strike us as stone-age technologies in 2006. Requiring motorists to see a placard or license plate clearly, pay for cell phone calls, and report good or bad behavior to an operator will surely deter reporting and thereby make the system less effective. Therefore, technologies that can reduce reporting costs seem particularly valuable in an HMDFE regime.

A slightly higher-tech version of the system would lower the cost of reporting by installing dedicated communications technologies within vehicles for the sole purpose of contacting HMD call centers. Motorists could contact these call centers by pressing a button on their steering wheels and by commenting on others' driving using a built-in microphone. We can dub this version the "OnStar" approach.[208]

However, with a little bit of ambition, we can imagine a much more effective HMDFE system, using technologies that already exist but that have not been adapted for driver feedback monitoring purposes. For example, we could mandate the installation of GPS trackers in every vehicle or use cell phone tower triangulation to identify the locations of particular motorists. Such positional data would allow drivers to make reports even if they could not see a placard. Hence, a driver might contact the call center to report, "Blue convertible behind me, add three points, kindly let me merge." Relying on voice recognition software to instantaneously digitize the report,[209] the HMD call center would then use GPS to discover the location of the caller's vehicle as well as the unique identifier belonging to the vehicle immediately behind it. Once the center verified that the

[208] *See generally* OnStar, http://www.onstar.com (last visited June 19, 2006).

[209] *See* Washburn, *supra* note 83, at 481 (discussing real-time speech recognition technology).

vehicle was a blue convertible, it would assign the vehicle three driving points. If the vehicle behind the driver at that moment was no longer a blue convertible, the automated call center could locate any blue convertible within a few car lengths of the caller's vehicle and assign that car the points in question. If there was no bluish convertible anywhere near the caller's vehicle, the system could flag the report as probably inaccurate.

In principle, such a system also could be designed to facilitate reporting by pedestrians, bicyclists, and bus passengers, particularly as GPS-enabled handheld devices become increasingly common in the coming years. Analyzing the various engineering challenges inherent in developing such a system is well outside my zone of expertise. I will instead refer interested readers to some of the more illuminating papers in the burgeoning literatures on the use of GPS devices in driving,[210] wireless communications systems in vehicles,[211] and voice recognition devices in automobiles.[212]

A different type of high-tech reporting can address the aforementioned inaccurate feedback problem as well. It would be relatively easy to mount digital video cameras on the front and rear of all participating vehicles, and in-car computers could upload the buffered video footage from the time period immediately preceding a call to an HMDFE call center. The images captured by these cameras could provide verification of negative or positive feedback reported to the HMDFE call centers.[213] It would be inefficient for the state to ana-

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[210] *See, e.g.*, Youjing Cui & Shuzhi Sam Ge, *Autonomous Vehicle Positioning with GPS in Urban Canyon Environments*, 19 IEEE TRANSACTIONS ON ROBOTICS & AUTOMATION 15 (2003); Jean-Pierre Hubaux et al., *The Security and Privacy of Smart Vehicles*, IEEE SECURITY & PRIVACY, May–June 2004, at 49; Nielsen, *supra* note 203, at 237; Yonglong Xu, *Development of Transport Telematics in Europe*, 4 GEOINFORMATICA 179, 186–90 (2000).

[211] *See, e.g.*, Michel Frenkiel et al., *Clip Card: Smart Card Based Traffic Tickets*, *in* ELECTRONIC GOVERNMENT 313 (Roland Traunmüller & Klaus Lenk eds., 2002); Sojen Pradhan, *Mobile Commerce in the Automobile Industry*, 2003 INT'L CONF. ON INFO. TECH.: COMPUTERS & COMM. 276; Xu, *supra* note 210, at 190–95.

[212] *See, e.g.*, John H.L. Hansen et al., *Robust Speech Processing for In-Vehicle Voice Navigation Systems*, 4 INT'L CONGRESS ON ACOUSTICS 2603 (2004); Marvin C. McCallum et al., *Speech Recognition and In-Vehicle Telematics Devices: Potential Reductions in Driver Distraction*, 7 INT'L J. SPEECH TECH. 25 (2004); Washburn, *supra* note 83. McCallum and coauthors found that the use of voice recognition technologies to control a PDA did not affect driver performance in speed maintenance or lane tracking tasks. It did lower response times in emergency situations, although in these settings voice activated systems outperformed systems requiring manual manipulation. McCallum et al., *supra*, at 30–31.

[213] *Cf.* Gregory M. Lipper, *Racial Profiling*, 38 HARV. J. ON LEGIS. 551, 560 (2001) ("[New Jersey] has instituted a campaign to install video cameras on all patrol cars so that traffic stops can be recorded and monitored."). Such audits of HMD reports could then be used to weight the feedback provided by individual callers. For example, if a motorist's complaints were routinely substantiated by data from cameras, then the HMD system

lyze each reported incident independently to see if it was supported by what the cameras picked up. But spot checks to ensure the accuracy of feedback reports could be accomplished quite easily, and in cases involving high stakes (i.e., where one driver assigns a large number of positive or negative points), evidence from these cameras would go a long way toward ensuring system accuracy. And if due process concerns require that drivers be afforded opportunities for post-deprivation hearings under an HMDFE regime,[214] then data from these cameras could substantially lower the costs and improve the reliability of such hearings.

A high-tech version of HMDFE will be more costly than a low-tech version, but the savings associated with a higher-tech version could warrant the added expenditures, particularly since automobile industry analysts expect the proliferation of vehicle-based speech recognition and GPS tracking technologies in years to come anyway.

B. Decreased Anonymity for Reporters

At first glance it may seem strange that an article that began by bemoaning the ills associated with anonymous driving has proposed a system of semianonymous feedback. A system where call centers know the identity of a caller but drivers who spark a complaint do not seems to strike the best balance among several objectives that are at times in tension with one another. Caller anonymity will incentivize people to report others' misconduct, discourage retaliation, and promote accurate feedback (to the extent that a fear of retaliation would discourage people from providing feedback). On the other hand, caller anonymity would decrease transparency for the subjects of complaints and make it more difficult to correct maliciously false negative reports, which will diminish the accuracy of feedback somewhat.

What underlies my tentative conclusion that complete anonymity vis-à-vis targets of driving feedback is optimal? In part, it is a judgment that nonanonymous feedback on eBay has manifested a Pollyanna effect, in that participants have an incentive to provide positive feedback about transaction partners in order to increase the likelihood that their transaction partners will in turn provide favorable feedback about them.[215] Because of this concern about retaliation, some participants who are not entirely satisfied with the performance of a transaction partner leave unduly positive feedback, and this mar-

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could weight that motorist's future feedback more heavily. If, by contrast, a motorist's complaints were routinely unsubstantiated, then the system could discount that motorist's subsequent feedback. For elaboration, see *infra* Part IV.D.

214 *See supra* Part III.E.

215 Resnick & Zeckhauser, *supra* note 4, at 4–5.

ginally erodes the system's ability to distinguish good vendors from excellent ones.

In the driving context, we can expect to see a similar effect if anonymity is not protected. Namely, *A* may forego providing negative feedback about *B*'s driving based on a concern that *B* will retaliate against him by providing negative feedback about *A*. This concern could be mitigated, somewhat, by a time lag in revelation, such that *A* would be long gone by the time *B* learned of *A*'s feedback. But this feature would not ameliorate the concern entirely in a low-tech version of HMDFE, since *B* might have made note of *A*'s unique identifier if he thought there was some risk that *B*'s driving would provoke a negative response from *A*. Because of these concerns about retaliation, too few people might supply the public good that driving feedback represents.

This concern is even more pronounced in the aggressive driving context than in the eBay context for two reasons: First, the likelihood of violent retaliation is higher in the driving context. Second, with aggressive drivers, we are talking about a population that is prone to aggressive and retaliatory acts in many other facets of their lives.[216] Many aggressive drivers, in short, will tend to behave vindictively in an environment where negative feedback hits them in their pocketbooks, and for that reason protecting anonymity to some degree seems essential.

Of course, callers should not be entitled to remain anonymous with respect to HMD call centers, even though this lack of anonymity will no doubt deter some callers from providing feedback. If callers are permitted to leave completely anonymous reports, then HMD centers can do nothing to ensure that a few drivers are not providing too much feedback, that some drivers are not targeting other drivers with repeated negative or positive feedback, and that racial or other biases are not prompting particular callers to leave inaccurate feedback.[217] System integrity, in short, demands that callers be accountable to the government, although not directly to the targets of their reports.

C. Points Only, or Comments as Well?

One appealing aspect of an HMD system is its potential to educate drivers who are oblivious of their shortcomings.[218] Experimental

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[216] Lowenstein, *supra* note 15, at 268.

[217] *Cf.* Bamberger et al., *supra* note 149, at 369–70 (concluding that nonanonymous peer assessment may outperform anonymous peer assessment in workplace setting).

[218] Many drivers fall into this category. *Cf.* Ola Svenson, *Are We All Less Risky and More Skillful Than Our Fellow Drivers?*, 47 ACTA PSYCHOLOGICA 143, 146 (1981) (finding

interventions in the driving context suggest that when drivers are provided with feedback regarding safety performance from passengers in the vehicle, they are responsive to this feedback and drive more safely in the future.[219] In the commercial fleet setting, fleet operators obtain the details of incident reports and use these details to train drivers in how to avoid repeating the same mistakes in the future.

This raises the design question of whether HMDFE feedback should include substantive comments about driving, or whether the system should just report final results like "add two points" or "subtract one point" for a particular incident. There is no obvious answer to this question. Comments can educate or inflame. Some comments will be perceived by the targets of these complaints to be so unfounded that they may erode support for the HMDFE scheme. On the other hand, some motorists may be frustrated by the absence of substantive feedback, especially if they routinely receive low marks from fellow drivers but cannot discern the basis for that pattern. Indeed, substantive feedback on eBay seems successful, and helps interested participants identify the reasoning behind negative or positive vendor reviews.

In the driving context, some feedback is particularly valued and valuable. Drivers seem receptive toward feedback about their driving received from people with perceived expertise. More precisely, commercial fleet drivers surveyed were quite welcoming of performance feedback from their company's safety managers and supervisors, as well as feedback from fellow drivers of commercial fleet vehicles.[220] They were not receptive, by contrast, to feedback from drivers of passenger vehicles.[221] Let us assume this principal finding is broadly generalizable. Is there a way to raise the quality of substantive feedback in an HMDFE system by identifying the relevant experts?

The ideal HMDFE system would collect substantive feedback from all drivers, but only report that feedback from those drivers with the most favorable HMD scores. In other words, the drivers who received a relatively large number of positive points and a relatively small number of negative points from fellow motorists would be free to transmit substantive feedback (e.g., "changes lanes too frequently")

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that 88% of Americans and 77% of Swedes surveyed believed themselves to be safer than median driver in their countries, and that 93% of Americans and 69% of Swedes believed they were more skillful than median driver).

219 Karl A. Hutton et al., *Modifying Driver Behaviour with Passenger Feedback*, 4 TRANSP. RES. PART F 257, 266–68 (2002).

220 Yueng-Hsiang Huang et al., *Feedback by Technology: Attitudes and Opinions of Truck Drivers*, 8 TRANSP. RES. PART F 277, 291 (2005).

221 *Id.*

to other drivers, whereas average and below-average drivers would only have the outcomes of their feedback (e.g., "add one point"; "subtract two points") reported to others. Under such a system, those drivers ranking in the top quartile of feedback rankings would be entitled to leave substantive feedback that other drivers could hear; all other drivers would be muzzled. As a result, when drivers did receive substantive feedback about their driving, it would be from drivers whom the system identified as possessing some expertise about how to drive skillfully and safely.

There are additional benefits associated with such a regime. For example, it is likely that the drivers ranked in the top quartile will be relatively courteous in their interactions with fellow motorists. Courteous drivers seem likely to provide relatively constructive feedback to other motorists, so limiting this substantive feedback should help ensure that motorists rarely hear inflammatory, expletive-laced feedback.[222] Moreover, it is possible that motorists will value the expressive benefits associated with being a highly-ranked driver. If so, enabling the top-ranked drivers to leave verbal feedback will create greater incentives for motorists to drive in a manner that pleases their anonymous peers.

Finally, collecting substantive comments in addition to points could serve an important educational function for all drivers. Once all the HMDFE feedback is collected, it would be relatively easy for the state to publish data on which driving behaviors sparked the most compliments and complaints. Motorists might be surprised to see, say, that tailgating annoyed many drivers and that rolling stops did not, or that stealing parking spots prompted very intense reactions, whereas moderate speeding prompted only mild annoyance. Motorists who perused this data could adjust their own driving behaviors accordingly in subsequent periods. The publication of such data might alleviate some due-process-oriented concerns about citizen notice of the rules of the road. Moreover, it would enable jurisdictions and insurers to monitor changes in driving norms over time.

The primary benefit, however, of using information aggregation technologies in this context would be the creation of a parallel traffic code, one that approximated actual motorists' preferences as closely as possible. HMDFE thus emerges as a system that is capable not only of enforcing existing norms, but also of articulating emerging social norms. These norms can then be publicized to members of the

[222] GREY ET AL., *supra* note 18, at 49 (describing drivers with fewest lifetime accidents as being unusually relaxed and coolheaded when confronted by others' rude driving).

public, perhaps hastening the process by which they become efficient focal points for human behavior.[223]

Having described the trees, a few words about the forest are in order. The foregoing analysis suggests the potential for HMDFE to produce, as a by-product, a universal and comprehensive driving code that closely reflects the preferences of American drivers and is capable of rapidly changing in response to preference shifts. We might conceptualize such a code as the product of hyperdemocratic decisionmaking. It certainly makes other forms of direct democracy, like the initiative process, look republican and clunky in comparison. Unlike any other law on the books, such a law would provide citizens with precise notice of the rules of the road *as enforced*. That is something no other sort of law presently does.

D. One Car, One Vote?

Up to this point, the analysis has assumed that the feedback structure would permit something like cumulative voting. Under such a scheme, each driver might be allotted fifteen positive points and fifteen negative points each month, which could be assigned to thirty different vehicles or two different vehicles, depending on the intensity of the driver's reaction to another drivers' conduct. All along, the discussion has presupposed something along the lines of one car, one vote.

Alternative feedback weighting systems might well be preferable. For example, the system probably should allot more points to motorists who spend more of their time on the roadways, and miles driven would be an adequate proxy for time spent driving. Similarly, motorists who receive very positive marks from their peers could be allotted extra points each month, or they could have their points weighted more heavily than those who receive middling or poor feedback.[224] Indeed, the system might well ignore the feedback provided by the worst drivers, since those drivers could be penalizing driving behavior that the vast majority of motorists regard as safe and cooperative.[225]

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223 On the effect of focal points and the law's expressive effects, see Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649 (2000), and Richard H. McAdams & Janice Nadler, *Testing the Focal Point Theory of Legal Compliance: The Effect of Third-Party Expression in an Experimental Hawk/Dove Game*, 2 J. EMPIRICAL LEGAL STUD. 87 (2005).

224 *Cf.* Yu & Singh, *supra* note 141, at 158 (advocating implementation of this system for online reputation-tracking systems).

225 There is, of course, some circularity built into a system that allots extra votes to the top-ranked drivers and fewer votes to the bottom-ranked drivers. This circularity is easily avoided, however, if rankings at a fixed point (say, the beginning of each month or year) are used to weight votes. Alternatively, the system can rely on raw scores (i.e., the results

Even if the HMDFE system adhered to a one car, one vote principle, individual insurance companies could be more flexible in deviating from that formula. If the raw data from HMDFE is shared with insurers, then insurance companies could test various voting models and try to better predict risks. Actuaries thus could function as lab technicians, constantly tinkering with new models for weighing feedback, and the government eventually could piggyback on this work, adopting the weighting algorithms that proved most successful in the private insurance market.

This Part has discussed some of the variations on HMDFE and some of the design issues that would arise during implementation. The analysis reveals how much the regime can accomplish and how much depends on the details. Many details of the program, such as the optimal voting scheme or the optimal level of technology, seem open to reasoned debate. Many other variations could be imagined as well, but I will spare the reader extended discussions because of space considerations.[226]

V
"How's My Driving?" for Everything?

In a standard thought piece, a concluding section discusses the various ways in which the model proposed might be extended to other settings. There is some awkwardness in writing that section of this Article; after all, my proposal itself extends two related ideas—commercial fleet HMD programs and eBay-style electronic reputation tracking—to a much larger arena. Nevertheless, we can conceptualize this Article's proposal as a new paradigm for the enforcement of societal rules: In public spaces where social norms are reasonably well-developed and universal, and where policing by government agents is

of a one car, one vote system) to rank for the purposes of determining how many votes each driver is allotted, and adjusted scores thereafter.

226 For example, I will not consider whether cumulative feedback scores should be visible on the exterior of vehicles (a point about which I am agnostic); whether HMDFE should replace voluntary feedback with a market regime, whereby motorists would obtain financial bonuses for providing negative feedback about a motorist who was subsequently involved in an accident or for providing positive feedback about a motorist who maintained a clean driving record during the next year (a variation that could improve accuracy but that I would still regard as undesirable on balance); or whether citizens ought to be able to go "double or nothing" when negative feedback about them is logged, permitting them to avoid penalties for negative feedback if they receive no similar negative feedback during the next year or two, but applying a multiplier to the fine if they receive similar feedback in the near future (a variation that seems appealing). Nor will I address the many mundane implementation and transitional issues that would inevitably arise, such as the questions of how older vehicles might be retrofitted with advanced HMDFE technologies, or issues concerning how, exactly, driver-created positive and negative feedback would be converted into monetary fines and rewards.

inherently problematic, we can rely heavily on citizens themselves to police misconduct.

As suggested earlier,[227] work by social norms scholars has postulated that efficient citizen enforcement can occur naturally in close-knit groups, where repeat player interactions are common, information pertinent to social control flows easily, and relations among actors are somewhat multiplex and not too hierarchical.[228] But in environments where those conditions do not hold (i.e., among loose-knit groups) social order sometimes breaks down, necessitating a substantial police presence. The idea behind this Article is to use technology to transform loose-knit environments into close-knit environments, so that the police presence can be curtailed substantially without compromising safety. These schemes therefore replace state policing with citizen policing, laws with norms, and, to some extent, rules with standards. In thinking about extensions of the approach, then, it makes sense to think about other loose-knit environments where social disorder sometimes occurs.

There certainly will be social settings in which technologically-aided norm enforcement is undesirable. I am thinking, in particular, of those settings in which conformity is bad and majoritarian norms are invasive. For example, we would recoil at the thought of "How's My Speech?" being used to sanction political dissidents. When political dissent is at issue, society has long recognized the value in letting unpopular or unfashionable arguments be voiced. More broadly, majoritarian sentiment may be too quick to condemn intellectual, political, or artistic innovation. As a result, insecure geniuses whose ideas might have ultimately prevailed if protected by anonymity will be too discouraged by the high costs of nonconformism. For that reason, using "How's My Art?" to award, say, National Endowment for the Arts grants could inappropriately reward those artists whose work is not artistically excellent but coincides with the aesthetic preferences of the median voter. Similarly, majoritarian norms may unduly reflect stubborn biases, like racial, gender, or religious animus, and society should resist relying heavily on "How's My Driving?" for Everything approaches in these settings.

In a different vein, we must recognize the problems that would arise if we applied a "How's My Driving?" approach to matters about which preferences are very idiosyncratic. For example, such technologies could take some of the risk out of blind dates,[229] but romantic

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227 *See supra* text accompanying notes 101–03.

228 ELLICKSON, *supra* note 101, at 180–82.

229 "How's My Kissing?"

tastes are certainly variable enough to warrant skepticism about the approach, and hurt feelings may prompt people to leave inaccurate feedback following instances of unreciprocated attraction.[230] Indeed, when the very high emotional stakes associated with dating are combined with highly individualized preferences, the false feedback problem becomes quite daunting. In other settings, there is simply no consensus about what the existing social norms are. Here, feedback will be noisy and unhelpful, at least until preferences crystallize and converge.

There will be other settings in which conformity is relatively uncontroversial and median voter instincts are sensible, but where the costs of using HMD technologies to police misconduct exceed the benefits. Take pedestrian activity in public spaces. Interactions among pedestrians on a sidewalk, at a block party, or outside a concert venue are usually reasonably orderly for a variety of reasons: People interact with others face-to-face, people may be accompanied by a few acquaintances amidst the crowd, people may fear police intervention or mob justice if they act boorishly, and many people have internalized norms that cause them to behave in a considerate fashion. In a science fiction world, we can imagine a nongovernmental "How's My Walking?" system that eliminates anonymity in public spaces.[231] Were we to hand people remote controls and let them play a reputational version of laser tag, where their point totals would be posted on the Internet for employers, parents, blind dates, and parole officers to see, public misconduct would be deterred substantially. This regime would be one in which obscurity in public spaces disappeared entirely, but at what cost?

It may well be that in many "How's My Walking?" settings, people would resent the disappearance of practical anonymity in public spaces. Many people take such obscurity for granted, but its loss is something new celebrities frequently bemoan. Obscurity in public permits adolescents and adults to experiment with their identi-

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[230] *See* Anna Jane Grossman, *Honestly Online: Internet Dating Becomes Less of a Crapshoot When You Can Pre-Screen Your Potential Date*, CHI. SUN-TIMES, July 4, 2005, at 32 (describing some Internet dating sites that incorporate reviews).

[231] This is no longer science fiction. Science nonfiction is more like it. As you read these words, engineers are developing wearable computers that will facilitate face-to-face interactions when proximate strangers' devices reveal mutual interests, acquaintances, or social aspirations. Scholars have already begun thinking about how these "wearable communities" can incorporate reputation and feedback. The end result would be an offline combination of eBay's feedback scores with MySpace.com's social networking capabilities. *See* Gerd Kortuem & Zary Segall, *Wearable Communities: Augmenting Social Networks with Wearable Computers*, IEEE PERVASIVE COMPUTING, Jan.–Mar. 2003, at 71, 77; Schneider et al., *supra* note 146, at 245–47.

ties in a way that enables them to discover who they are and what they enjoy doing.[232] It also allows people to forego having to look and act their best, and to avoid the tension associated with constantly being judged and rated by their peers. When people are operating potentially deadly motor vehicles, this loss of obscurity seems justified, but if individuals are just walking to the corner store for a gallon of milk or sipping a cup of coffee at Starbucks, an omnipresent regime of anonymous feedback might begin to resemble a prison. In short, government efforts to encourage a "How's My Walking?" regime only seem appropriate in those environments where public misconduct has reached crisis levels. We might even imagine situations in which it would be appropriate for the government to prevent a privately run "How's My Walking?" regime from coming into existence, based on some of the concerns identified above.

In looking for successful applications for the "How's My Driving?" approach, then, we should seek out contexts in which conformity is unproblematic, median voter judgments are informative, a broad social consensus exists regarding appropriate behavior, and the benefits of reputation tracking exceed the costs. We are, in short, looking for environments in which the prevalent social norms are universal and efficient.

For illustrative purposes, we can begin with a context where anonymity is not particularly problematic, but where implementing a reputation-tracking system would be easy enough that an intervention is plausibly worthwhile. The vast majority of hotel guests are perfectly cooperative, desiring little more than a clean room and a good night's sleep. But most readers probably have had the misfortune to be assigned a room adjacent to an inconsiderate outlier. Many people, being essentially nonconfrontational, simply endure the noise. Others bang on walls or ask the front desk employees to intervene, sometimes with minimal success. The problem, of course, is that hotels cannot identify the noisy patrons in advance, and customers are given no opportunities to choose their neighbors. It would be easy to imagine a straightforward "How's My Neighboring?" program for hotel guests, which would enable hotels to exclude the noisy (or confine them to a particularly well-insulated portion of the hotel) and allow everyone else to enjoy a decent night's sleep. The idea is to make reputations for noisiness transportable across hotels.[233]

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232 Julie E. Cohen, *Examined Lives: Informational Privacy and the Subject As Object*, 52 STAN. L. REV. 1373, 1425–28 (2000).

233 This approach might work in other parts of the hotel, too. For example, the hotel bartender might learn that the patron approaching the bar has just been ejected from

Other, relatively uncontroversial, extensions of the approach would include creating multijurisdictional feedback platforms for vendors at flea markets or farmers' markets, or the "ticket scalpers" who stand outside sports stadiums. Indeed, these kinds of programs might be useful inside stadiums as well. Shortly before this Article went to press, the Cincinnati Bengals football team announced the launch of "513-381-JERK," a telephone number that spectators could call to report unruly fan behavior.[234] Security officials could use the stadium's thirty-eight video cameras to conduct surveillance of spectators whose misconduct was reported to the hotline, removing or even arresting fans whose behavior crossed the line.[235] Given the problems associated with soccer hooliganism around the globe, the innovation deserves serious attention.

More controversially, we can imagine the application of HMDFE variations to public policy issues large (facilitating the accurate reporting of parental abuse and neglect of their children) and small (permitting the sanctioning of neighbors who leave their trash cans at the curbside for too long after pickup day). Without exploring all these variations, we should turn our attention to three settings in which these reputation systems seem particularly promising.

The first is military operations. Increasingly, members of the military are called upon to engage in peacekeeping operations where aggravating the local population is detrimental to mission objectives. Law-abiding Iraqis are constantly witnessing some American soldiers behaving well and a few behaving quite badly. Yet there is no systematic effort to harness this information in a way that might improve military training and conduct. Now, there is an obvious challenge here. We do not want insurgents rating GIs, because they will probably phone in complaints about the most competent soldiers. But if the peaceful population sufficiently outnumbers the insurgent population, and if reporting is made easy enough, this problem can be solved. And creating such a visible form of accountability may well create extraordinary goodwill among the occupied.

The same arguments hold true in the context of police officers; therefore, "How's My Policing?" programs might be promising.[236]

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another bar for accosting other patrons, or that a conventioneer routinely becomes violent when he has had one too many drinks.

234 Barrett J. Brunsman, *Bengals Get Tough on Boorish Fans*, CINCINNATI ENQUIRER, Aug. 8, 2006, at A1.

235 *Id.*

236 *See* Terence C. Gill, Note, *Regulating the Police in Investigatory Stops: A Practical Alternative to Bright Line Rules*, 59 S. CAL. L. REV. 183, 200 (1985) (mentioning similar regime).

Again, we do not want criminals rating the police, but if we could encourage law-abiding citizens to lodge compliments or complaints about particular officers, the benefits would be substantial. Opportunities to report misconduct exist in the present system: A citizen can jot down a badge number and call a precinct or write a letter to a police commissioner. Some jurisdictions, like New York City, have developed Civilian Complaint Review Boards (CCRBs) that investigate each such complaint and take action where appropriate.[237] These institutions are useful, but the costs of using these formal channels are rather high. A complaining citizen often must be interviewed and divulge his or her identity to the officer in question. Cities that are interested in genuine officer accountability might consider supplementing CCRBs with "How's My Policing?" programs that generate more citizen feedback but ascribe far less significance to any particular piece of feedback. With "How's My Policing?" programs, police supervisors would be looking for trends in the feedback data, rather than waiting for one aggrieved citizen to spend significant time and energy establishing the veracity of an officer misconduct claim.

There is a third type of environment in which reputation-tracking and feedback systems may be particularly advantageous; it is an environment that is hard to describe, however, because it does not yet exist. As discussed above, "How's My Driving?" for Everything may prove successful when a well-developed set of norms already exists. But recall the preceding discussion of how HMD programs might also permit us to create a "traffic code" that can be updated to reflect real-time changes in drivers' preferences and behaviors.[238]

On this model, we can use "How's My Driving?" for Everything to create hyperdemocratic rules in new environments characterized by loose-knit interactions. Surveying the past decade or so, scores of new environments like this have sprouted up, mostly in cyberspace: Internet chat rooms, online poker tournaments, peer-to-peer file swapping networks, massive multiuser online games, craigslist.org, "comments" sections on blogs, and many more. The designers of these new environments often have to guess about what types of rules to impose on their users, and mistakes will be inevitable.

Technologies that allow anonymous users to rate each other's behavior and explain the basis for their high or low ratings will often be a highly beneficial means of giving users the types of rules they want and galvanizing user opinion around desirable innovations.

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[237] For a description of the results obtained in New York, see New York City Civilian Complaint Review Board, CCRB Performance, http://www.nyc.gov/html/ccrb/html/about.html (last visited June 15, 2006).

[238] *See supra* text accompanying note 223.

Nobody knows what new loose-knit environments will emerge in the coming decades. But we have enough information to suspect that in the new environments that do emerge, "How's My Driving?" for Everything stands poised to help create and enforce the norms that will regulate behavior therein.

CONCLUSION

The regime advanced in this Article represents a rethinking of the way that we currently regulate traffic. Anonymous driving results in aggressive and unsafe behavior that kills thousands of Americans each year and makes tens of millions of commuters miserable. Although anonymous driving has become a fundamental fact of urban, suburban, and exurban driving environments, this anonymity can be curtailed. Indeed, in many ways, driver anonymity seems like a relic from a bygone era, out of place in the information age. Just as eBay's reputation-tracking system tamed e-commerce fraud rather effectively, "How's My Driving?" for Everyone might rein in aggressive, inconsiderate, and unsafe driving.

"How's My Driving?" programs appear to improve commercial fleet accident rates substantially, although more research on this front is certainly warranted. Assuming that further study confirms the very promising initial industry data, the state should strongly consider extending these programs to passenger vehicles, and there are strong reasons to favor mandatory participation within a given jurisdiction.

At any given moment, there are millions of American drivers who are watching their fellow motorists behave badly. Many of these drivers mutter to themselves about their peers' misconduct, growing increasingly frustrated with their driving experience. At times, this frustration boils over into extreme acts of road rage. These opinions are formed, the information exists, and it is being vocalized to passengers or to no one in particular.

All the government needs to do is harness this information. In so doing, the government would be delegating substantial traffic regulation duties to its drivers, in one fell swoop eliminating the need for vast numbers of traffic police, enabling insurers to price automobile premiums in a more individualized, less discriminatory manner, and, quite possibly, making urban driving fun again.