Aggressivity and Vehicle Compatibility – Three Decades of Research: Growing Knowledge Requires Government Action

The dangerous design of SUVs and pickups has been responsible for thousands of unnecessary deaths on American highways.

June 1974	National Highway Traffic Safety Administration (NHTSA) researcher Jerome Kossar presents "Big and Little Car Compatibility"[1] calling for safer bumpers for heavy cars.
March 1978	NHTSA begins evaluating structural parameters that contribute to vehicle aggressiveness in frontal crashes in its "Five Year Plan."[2]
1979	The American Automobile Association (AAA) commissions a University of Michigan study on aggressivity.
1982	The University of Michigan analysis is completed and highlights the growing violence of crashes involving cars, pickups and vans (SUVs are not yet numerous enough to warrant analysis).[3]
1984	The Motor Vehicle Manufacturer's Association (an industry trade association now called the Alliance of Automobile Manufacturers) presents findings of a report on the impact of the weight of light trucks in fatal crashes at the American Association of Automotive Medicine conference, showing that both weight and design are determining factors of aggressivity.[4]
Jan. 1986	NHTSA examines incompatibility and aggressivity during its Volkswagen Rabbit testing and finds that increasing the design compatibility of a crash barrier reduces injuries and deaths better than reinforcing the side of the Rabbit.[5]
1996 - 2000	Numerous papers are published by researchers through the Society of Automotive Engineers and various scientific journals that analyze the contribution of specific aspects of vehicle performance to aggressivity. The consensus is that light truck design and mass pose profound risks to occupants in collisions, and that an aggressivity "metric" is achievable.[6]
May 1996	A vehicle compatibility working group of regulators and researchers formed at the Fifteenth International Conference on the Enhanced Safety of Vehicles in Melbourne, Australia to explore methodologies to assess aggressivity.

Feb. 1998	Prompted by the growth in trucks, vans and SUVs (collectively Light Truck Vehicles – LTVs) on the highway, NHTSA publishes an overview of the considerable body of research regarding vehicle compatibility and LTV issues.
January 12, 1998	NHTSA Administrator Dr. Ricardo Martinez infuriates Detroit automakers by mentioning publicly that they should address the problem of compatibility. One of Detroit's CEO's responded to Martinez, "My God, don't touch my cash cow."[7]
June 1998	Martinez announces at the International Technical Conference on the Enhanced Safety of Vehicles, a gathering every two years of the world's top safety regulators and researchers, that NHTSA research and crash tests show that vehicle mismatch between cars and lights trucks is causing as many as 2,000 extra deaths each year on American roads.[8] Ford Explorers are tested and found to inflict twice the risk of chest and head injury to the other driver as a car. In response, the auto industry, including Ford Motor Company, promises Dr. Martinez that it will make modifications to achieve safer designs, mainly by adjusting vehicle suspension, but refuses to provide any details of their plans. It is unclear whether any design changes were made to any vehicles.
April 1998	Insurance Institute for Highway Safety publishes a report on vehicle compatibility research, and its president urges that the "principal focus for incompatibility improvements needs to be on pickups and utility vehicles and the sides of passenger cars."[9]
Oct. 1999	Insurance Institute for Highway Safety finds that for every million registered vehicles weighing between 3,500 and 3,900 pounds, 45 deaths occur in vehicles struck by these cars while 76 deaths occur in vehicles struck by SUVs in the same weight class. While occupants of a car hit in the side by another car are seven times more likely to die than people inside the striking car, the fatality rate of car occupants is *twenty-six* times higher when the car is broadsided by an SUV or pickup truck.[10] IIHS concludes that changing vehicle geometry and design can improve compatibility.
April 2000	In a NHTSA report, researcher Hans Joksch examines federal crash data on collisions from 1991-97 and formulates an aggressivity ratio capable of measuring the aggressivity of different vehicle types in crashes.

June 2001	NHTSA researchers Stephen Summers, Aloke Prasad, William T. Hollowell, Alexandra C. Kuchar present a series of papers at the Seventeenth International Conference on Enhanced Safety of Vehicles, Paper No. 354, Amsterdam, Netherlands, concluding that the steady increase in light trucks is leading to a steady increase in fatalities in cars struck by light trucks, even as overall fatalities are in decline. Other findings were that SUVs inflict twice the number the of fatalities as large cars and that pickup trucks *weighing the same as large cars* still inflict nearly twice the level of fatalities that the large cars do.
March 2002	Aggressivity research done by Marc Ross, of the University of Michigan, and Tom Wenzel, of Lawrence Berkeley National Laboratory, for the Department of Energy, shows that vehicle design plays an enormous role in the amount of risk a vehicle imposes on other vehicles on the road and charts make/model differences using real-world crash data.[11]
April 2002	NHTSA research contractor Hans Joksch publishes a report, *Vehicle Design versus Aggressivity*, showing that aggressive design kills: more than 445 people died in 1996 alone in collisions with light trucks who would not have died if the other vehicle in the collision was a car *of the same weight*.[12]
August 2002	NHTSA publishes rulemaking priority plan stating the agency's intent to address vehicle incompatibility through testing, analysis and potentially rulemaking.
Fall 2002	NHTSA renews a bilateral agreement with Canada and signs a bilateral agreement with Japan to exchange data and research on vehicle compatibility.
Feb. 13, 2003	Alliance of Auto Manufacturers sends letter to NHTSA Administrator Jeffrey Runge pledging "a strong commitment to move forward expeditiously" to reduce aggressivity and incompatibility dangers.[13]
Feb. 26, 2003	Senate Commerce Committee holds a well-publicized hearing on SUV safety where Senators, the administrator of NHTSA, auto industry representatives and spokespeople from consumer safety groups speak about the incompatibility of SUVs and cars.
June 2003	NHTSA releases its report, "Initiatives to Address Vehicle Compatibility,"[14] outlining the strategies NHTSA plans to pursue to improve vehicle compatibility. Contrary to the recommendations of the Insurance Institute for Highway Safety, the agency focuses upon improvements in side impact protection, and does not address any consideration of changes in the design of light trucks to reduce their aggressiveness in multiple-vehicle crashes.

July 17, 2003	NHTSA releases its "2002 Annual Assessment of Motor Vehicle Crashes"[15] and notes that between 2001 and 2002, the number of car occupants who died in two-vehicle crashes with a light truck (SUV, van or pickup) increased 1.4 percent (from 4,405 to 4,465) while the number of occupant fatalities in the light trucks decreased 3 percent (from 1,160 to 1,125). NHTSA also found that in two-vehicle crashes between cars and light trucks the car occupants were 3.3 times more likely to be killed in a head-on collision and 20.8 times more likely to die in a side impact (with the LTV hitting the side of the car).
Fall 2003	The Insurance Services Office recalculated its adjustment factors, used voluntarily by hundreds of auto insurers, to account for the growing mismatch on the road. Owners of vehicles that produce the greatest liability claims will pay up to an additional 25 percent and owners of least aggressive vehicles will be discounted up to 25 percent.
Dec. 2003	Alliance of Automobile Manufacturers announces a "voluntary program" to address SUV aggressivity issues. The program proposes to phase in side air bags that shield the head and torso by 2007, as well as phasing in lower light truck bumper heights and perhaps lower frame-rail heights for the tallest pickups and sport-utility vehicles. The plan, however, fails to address crucial light truck design problems, such as the steel bars and frame-on-rail construction, which make these vehicles so aggressive. It does not require that all vehicles become compliant with the plan, and no outside body will verify vehicle compliance. Moreover, the plan offers no procedural or judicial oversight, no mechanisms for accountability, and no baseline for safety, and no opportunity for public participation or review.
Feb. 2004	Nissan begins nine-city tour of its first full-size SUV, the Armada, passing on traditional billboard advertisement because, according to Jon Cooper, Nissan's senior manager of youth and urban communications, "This truck is so aggressive, we didn't want to show it in a traditional setting."[16]
Feb. 12, 2004	Senate passes S.1072, the Safe, Accountable, Flexible, and Efficient Transportation Equity Act of 2003 (SAFETEA 2003), which includes provisions addressing aggressivity and incompatibility that would: - A standard that would reduce vehicle incompatibility and aggressivity for vehicles under 10,000 lbs that addresses bumper height, weight and additional design characteristics (Notice of Proposed Rulemaking (NPRM) 1-31-07, Final Rule not later than 18 months following NPRM); and - Development of a standard rating metric to evaluate compatibility and aggressivity and make it public (NPRM 1-31-07, Final Rule not later than 18 months following NPRM).

	The bill stalls in conference committee negotiations until the end of the congressional session and is not passed.
July 29, 2005	Congress passes H.R. 3, the Transportation Equity Act: A Legacy for Users (TEA-LU), which is signed into law by President Bush on August 10, 2005. Left out of the bill are the SAFETEA 2003 provisions to address aggressivity and incompatibility.
Oct. 2005	Ford seeks to disband industry voluntary program to address vehicle compatibility, arguing to an industry work group that reducing the risks light trucks pose to cars is too expensive. Insurance Institute for Highway Safety President Brian O'Neill, who co-chairs the committee overseeing the industry group's effort, states that the industry "promised that they could be trusted to solve this problem on a voluntary basis. Ford is dragging its feet, and I'm trying to change that."[17]

Endnotes

[1]Kossar, Jerome M., "Big and Little Car Compatibility," Report on the Fifth International Technical Conference on Experimental Safety Vehicles, London, June 1974

[2] Five Year Plan for Motor Vehicle Safety and Fuel Economy and Invitation for Applications for Financial Assistance, National Highway Traffic Safety Administration, Docket No. 78-07, Notice 1, March 1978.

[3] Wolfe, Aurthur C., and Oliver M. Carsten, "Study of Car/Truck Crashes in the United States," Highway Safety Research Institute, University of Michigan, 1982.

[4] Terhune, Kenneth W., and Thomas A. Ranney, "Components of Vehicle Aggressiveness," 28th Annual Proceedings of the American Association for Automotive Medicine, 1984.

[5] Monk, Michael W., and Donald T. Willke, "Striking Vehicle Aggressiveness Factors for Side Impact," National Highway Traffic Safety Administration, 1986.

[6] *See, e.g.*, Hollowell Gabler, "NHTSA's Vehicle Aggressivity and Compatibility Research Program," 16th International ESV Conference, Paper No. 98-S#-O-01 (1996); Hollowell Gabler "The Aggressivity of Light Trucks and Vans in Traffic Crashes," SAE Paper No. 980908 (1998); K. Digges, A. Eigen and J. Harrison, "Application of Load Cell Barrier Data to Assess Vehicle Crash Performance and Compatibility," SAE paper no. 1999-01-0720, 1999; K. Digges and A. Eigen, "Analysis of Load Cell Barrier Data to Assess Vehicle Compatibility," SAE paper no. 2000-01-0051 (March 2000); Gabler, Hampton C. and Hollowell, William T., "The Crash Compatibility of Cars and Light Trucks," Journal of Crash Protections and Injury Control, Volume 2, Issue 1, pp. 19-31, March 2000; K. H. Digges and A.M.Eigen, " Load Cell Barrier Measurements of Geometric Compatibility," Vehicle Safety 2000, I Mech E, London, June 2000; K. Digges and A. Eigen "Measurements of Stiffness and Geometric Compatibility in front-to-side crashes," ESV Conference, Amsterdam, Holland, Paper Number 349, 2001.

[7] Bradsher, Keith, "High and Mighty: The Dangerous Rise of the SUV," Public Affairs, New York 2002 at 1989.

[8] *See* Bradsher, Keith. "Light Trucks Will Get Designs That Are Safer, Official Says," *New York Times*, June 2, 1998, (quoting then-NHTSA Administrator Dr. Ricardo Martinez).

[9] IIHS Status Report: Crash Compatibility, How Vehicle Type, Weight Affect Outcomes, Feb. 14, 1998, at 10-11.

[10] Insurance Institute for Highway Safety *Status Report*, Vol. 34, No.9, Oct 30, 1999 p. 3.

[11] Marc Ross and Tom Wenzel, "An Analysis of Traffic Deaths by Vehicle Type and Model," U.S. Department of Energy LBNL-49675, Washington, DC Mar. 2002.

[12] *See* Joksch, Hans C., "Vehicle Design versus Aggressivity," April 2002 at 41. Further calculations by Hans Joksch state that: "In 1996, 890 car occupants died in collisions with SUVs. If the risk in collisions with cars of the same weight had been half as high, as estimated at that time, 445 deaths would not have occurred if SUVs had been replaced by cars of the same weight." Email from Hans Joksch on February 24, 2003 (on file at Public Citizen).

[13] Letter from the Alliance of Automobile Manufacturers and the Insurance Institute for Highway Safety to National Highway Traffic Safety Administration Administrator Jeffrey Runge, February 13, 2003, http://www.autoalliance.org/archives/commitletter2.pdf.

[14] "Initiatives to Address Vehicle Compatibility," June 2003, 68 FR 36534, and Docket NHTSA-2003-14622.

[15] National Center for Statistics and Analysis, National Highway Traffic Safety Administration. 2002 Annual assessment of motor vehicle crashes. Motor vehicle traffic crash fatality and injury estimates for 2002. Washington, DC: NCSA, 2003

[16] Haliday, Jean "Marketing: Nissan 'cube' touts Armada," *Automotive News*, March 1, 2004.

[17] O'Donnell, Jayne "Ford Questions Truck-Car Impact Standards," *USA Today*, October 5, 2005.