

## CHAPTER 13

# Narrative Self-Identity and Societal Goals: Automotive Fuel Economy and Global Warming Policy

Kenneth S. Kurani, Thomas S. Turrentine, and Reid R. Heffner

*“As simple as it may seem, in the face of prevalent discourses and dominant knowledges, simply listening to the story someone tells us constitutes a revolutionary act.”*

—Freedman and Combs, 1996

The “rational actor” model from economics has served as nearly the sole model of human behavior in transportation energy analysis and policy in the United States. Research by Kurani and Turrentine (2004) indicated that the behavior of automotive consumers is unlikely to conform to this model in either their vehicle purchase or use, at least as regards fuel economy. This disconnect between theory and behavior causes those working in the “rational analytic” framework to struggle to explain, for example, the growing popularity of high-fuel economy hybrid electric vehicles (HEVs). Unable to explain such behavior, policy recommendations in this framework to limit emissions of greenhouse gases (GHG) and reduce petroleum consumption fail to account for the full value that consumer/citizens may place on automotive fuel economy and other strategies. Arguing over cost-effectiveness, policymakers and politicians miss the full variety of policies and the full extent of changes that citizen/consumers will support.

From the perspective of rational economic choice, people are assumed to move through life making a series of utility-maximizing or satisficing or

bounded rational choices. As developed later in this chapter, these choices are assumed to be based on preferences. However, preferences are generally taken as given; their origins and changes over time are rarely discussed. Even developments such as random utility theory are more concerned with the distribution of preferences at a point in time than in processes over time (see, for example, McFadden, 1986). Therefore transportation and energy analysis and policy have been blind to the development of new values and tastes that occur during rapid technology, market, and policy change. The reliance on the rational economic perspective in transport appears to stem more from a desire to quantify behavior for mathematical models, and less from an interest in how people behave.

Solutions to these problems may be found by enriching the behavioral approaches applied to transportation energy analysis and policymaking. In this chapter, such an alternative approach is developed and an example of its analytical and policy implications is presented. The alternative is more cultural, psychological, and process oriented. It focuses on the transforming influence of markets and mobility on ways of life. In particular, personal construction and communication of an authentic identity narrative gains importance in market-oriented, highly mobile societies. Moreover, identity increasingly is constructed and expressed through buying, owning, and using products. Thus, consumer products, especially automobiles and homes, acquire symbolic meanings of considerable importance.

Even seemingly functional and financial attributes of products, such as automotive fuel economy, may be evaluated symbolically for what they mean rather than algorithmically for what they cost or contribute to "utility." For example, a household that buys a high fuel economy HEV may apply the meaning "lower resource consumption/living lighter" to the HEV and never calculate the fuel savings due to its higher fuel economy. Lowering their resource consumption becomes an important subplot in a narrative self identity, first symbolized then made real by the availability, purchase, and use of a high fuel economy HEV.

The symbolic value of automobiles within identity narratives is a crucial perspective for policymaking regarding societal problems such as global warming. Social policies may be enhanced if consumers are offered products and policies that facilitate more interesting, compelling, and meaningful stories about themselves, rather than policy, legislative, and industry elites arguing over cost effectiveness. Rationality is less of a primary analytical framework for research and more a normative discourse for households and individuals. If some households strive to achieve this norm, others act on example, faith, impulse, intuition, or the advice of a stranger. Both groups share a desire to construct and represent meaningful lives.

In support of an approach based on narrative identities, the results of two series of household interviews conducted by researchers at ITS-Davis are presented. One focused on the role of fuel economy in household vehicle

purchase and use (Kurani and Turrentine, 2004; Turrentine and Kurani, 2005). This research was based on in-home interviews with 57 households in northern California in 2003 and 2004. All interviewees had purchased a new or used automobile within the preceding year; eight had purchased HEVs. Prior to their interviews, households constructed complete vehicle ownership histories. These histories deepened the context for examining the recent vehicle purchase and provided additional vehicle purchases to discuss. The other series was conducted during the fall of 2004 and winter of 2005 and focused on vehicle purchase and use by buyers of the early “economy-tuned” HEVs: the Honda Insight and Civic Hybrid and the Toyota Prius (Heffner, Kurani, and Turrentine, 2005). Twenty-five additional HEV-owning households in northern California were interviewed. This study focused on carefully eliciting from households a range of functional and financial attributes and symbolic meanings and their roles in vehicle purchase, use, and postpurchase evaluation of their HEVs.

### **What Is a “Rational” Consumer and Does This Idea Dominate Transportation Energy Analysis?**

The term *rational* is used here to refer to the model of consumer behavior from neoclassical microeconomics. In the words of J. P. Quirk, “Each individual is motivated by self interest and acts in response to it.” Next, “decision makers’ choices are consistent with their evaluations of their self-interest.” And finally, for purposes of this discussion, “these choices could be predicted simply from a knowledge of their preferences and the relevant features of their alternatives” (Quirk, 1982).

Policymaking and analysis regarding consumers, automobiles, energy, and GHG emissions are waged largely within a “rational analytic” framework based on the rational consumer model just presented. For example, California’s Health and Safety Code Section 43018.5 requires that “maximum feasible and cost-effective” measures be adopted to limit GHG emissions from passenger vehicles, light-duty trucks, and other vehicles the state determines to be used primarily for noncommercial, personal use. The explicit requirement that reductions be “cost effective” means that any citizen/consumer values not captured by the price of automobiles and fuels—for example, more meaningful and fulfilling identity narratives—won’t count toward how much GHG emissions must be reduced.

Examples of analyses conducted within a rational analytic framework include studies of the effects of fuel economy standards on consumers (see, for example, Sennauer, Kinsey, and Roe, 1984; Greene and Liu, 1988; Goldberg, 1998; and Yun, 2002). Such analyses often identify particular “problems” for, or of, consumers. Discount rates for investments in energy conserving technologies are widely inferred and a rebound effect on travel from higher fuel economy is believed to be revealed (see, for example,

Greene, 1983; Train, 1985; Goldberg, 1998; Verboven, 1999; Greening, Greene, and Difiglio, 2000; Espy and Nair, 2005). The National Research Council's (2002) report on Corporate Average Fuel Economy (CAFE) standards explicitly assumes that consumers compare an upfront investment in higher fuel economy against a discounted future stream of fuel savings and used vehicle prices.

Further analytical examples from the record of this conference series include Miles-McLean, Haltmaier, and Shelby (1993), who address both consumer discount rates and rebound effects. Cameron (1995) employed a consumer surplus approach to estimate societal benefits of travel demand management policies—in particular a fee on vehicle miles traveled. In their analysis of the potential for pricing to reduce gasoline consumption over the near term and implicitly over the long term, DeCicco and Gordon (1995) invoke the rational actor model and point out that “if consumers were rational, cost minimizing, utility maximizers, the cost advantage of choosing higher fuel economy is relatively small in the context of the total cost of owning and operating a car.”

DeCicco and Gordon's qualifier, “if consumers were rational,” is crucial. Analyses such as those just cited are seldom conducted in settings that allow observation of whether or not consumers are behaving according to the rational actor model. Rather, payback periods, attribute tradeoffs, interest rates, and elasticities are inferred based on the assumption consumers are behaving rationally. Efforts to manage systemic, societal effects such as global warming depend on pulling back this “as if” veil of assumed economic rationality to reach an understanding of how people act.

Despite the near universality of the rational actor model in transportation energy policy analysis and policymaking, research by the authors (Kurani and Turrentine, 2004; Turrentine and Kurani, 2005) finds that few, if any, consumers actually treat their transportation energy expenditures, or any other vehicle expenditures, in accordance with this model. Based on detailed examinations of 120 household vehicle purchases by the 57 households, the authors concluded that households in the sample were not “rational.” They found no instances in which fuel or travel expenditures were incorporated into payback period or net present value calculations or cost minimization or utility maximization algorithms. This does not mean households did not respond to changes in prices or other factors. Their responses, however, were not typically evaluated for their actual impact on household budgets, nor compared to other aspects of household spending. Rather, the households treated gasoline prices, the cost of a tank of gasoline, fuel economy ratings, or a particular trip as symbols of a good or bad decision or action. The results of the second set of interviews with HEV buyers also suggested the purchases of HEVs were better explained by something other than the rational actor model.

Economic rationality is apparently too scarce to serve as the sole behavioral model. The sample of 57 households in the fuel economy study

is small, but the authors contend its design overrepresents subpopulations who have the knowledge and skills to implement rational analyses. More than one-third of the households contained at least one member who was a financial services professional, had some collegiate coursework on the topics of payback periods and net present value calculations, or ran a small business or farm. Also, at the time of the interviews gasoline prices on average were higher in California than nationally.

The research design and context were biased towards finding rational consumers, yet none were found. Even those respondents who do possess economic skills have not applied them to an automobile purchase. One of the financial service sector respondents replied to the question about how long to wait to be paid back by fuel cost savings by saying, "Oh, the payback period. I never thought of it that way." A few respondents track fuel use and expenses, but did so for maintenance purposes, and none could recall details or summaries of the costs or fuel amounts.

Hypothetically, sustained increases in gasoline prices could encourage more rational calculations by more automotive consumers as over time people could learn and apply rational analytic tools and methods. The interviews suggest however, that such change is unlikely. Further, such a hypothesis would still overlook the more compelling behavioral approach presented next.

## **An Alternative Behavioral Approach**

The alternative approach presented in this chapter draws on several theoretical perspectives. First, social constructionist approaches "argue that people perceive the world the way they do because they participate in socially shared practices and interact with the world in terms of meaning systems which are simultaneously transmitted, reproduced and transformed in direct and symbolic social interchanges" (Dittmar, 1992). Further, a social constructionist perspective "views material possessions as socially shared symbols for identity" (Dittmar, 1992). When consumer goods serve as symbols, function and meaning coexist. For example, sport utility vehicles (SUVs) may signify "independence" because high ground clearance and four-wheel drive give them the capability to drive off-road. Heffner, Turrentine, and Kurani (2006) provide a more extensive review of social constructionist approaches and markets for automobiles.

Second, Nobel Prize-winning economist Gary Becker (1992) proposed that a household should be treated as a collective of individuals that acts to produce consumption from inputs such as income, time, goods, services, skills, and knowledge. Combined with social constructionist ideas, households can be seen to be creating novel value and new elements of their narratives through the purchase and use of goods and services.

Third, another Nobel Prize winner in economics, Daniel Kahneman, argues that intuition based on accessible information is the more common

TABLE 13-1. Two Behavioral Approaches

<i>Rational Analytical</i>	<i>“Social Constructionist”</i>
1. Decisions	Actions
2. Individual	Social creation and exchange of symbols
3. Self-interest	Self-identity
4. (Preexisting) preferences	Investment in consumption outputs
5. Relevant attributes of alternatives	Symbols and accessible attributes of perceived alternatives

basis for judgments than is reason, which includes such things as rational calculations (Kahneman, 2002; Kahneman and Frederick, 2002).

Last, the approach presented here draws on Anthony Giddens’s structuration approach (1984, 1991), which defines and elaborates how the forces driving modernization link with social constructionist approaches to personal identity. Giddens identifies the conditions under which a person’s identity has been transformed from a socially defined role into a personal project. Specifically, he defines “the reflexive project of the self” as “the process whereby self-identity is constituted by the reflexive ordering of self-narratives” (Giddens, 1991). Only under such conditions does it make sense to discuss the role of consumer products in self-constructed narratives of identity. Table 13-1 provides a contrast between the major points of the rational actor model just presented and the alternative approach to be developed in the remainder of this section.

### Decisions and Actions

The first point of departure from the rational analytic framework is that not all behaviors are preceded by a decision. Therefore, a theory of decision making will omit from analysis some relevant actions. “Action” refers to a broader set of behavioral outcomes than “decisions,” such that actions are roughly categorized into the subset of actions taken because of decisions to act and the subset of actions taken in the absence of decisions to act. Olshavsky and Granbois (1979) distilled “decision processes” into four components:

1. Two or more alternative actions exist, and, therefore, choice must occur.
2. Evaluative criteria facilitate the forecasting of each alternative’s consequences for the consumer’s goals or objectives.
3. The chosen alternative is determined by a decision rule or evaluative procedure.
4. Information sought from external sources and/or retrieved from memory is processed in the application of the decision rule or evaluation procedure.

They concluded that “a synthesis of research on consumers’ prepurchase behavior suggests that a substantial proportion of purchases do not involve decision making, not even on the first purchase.” One can fairly ask, do people buy automobiles without deciding to do so?

When symbol attribution and exchange substitute for rational algorithm, vehicle transactions may be made without decision making or with sharply attenuated decision making. What could be more linked to a rational decision about an automotive purchase than prices? Yet, changing vehicle and gasoline prices create emotional states—anticipation, excitement, anxiety, or anger, for example—that reveal symbolic meaning attached to products through their prices.

Such symbols can shift not only which alternatives are being considered, but can change, attenuate, or substitute for a decision-making process. Zero percent financing can be a symbol of a “good deal” but a misleading one. Take the case from the fuel economy interviews of a young household looking to replace a Honda Civic their family was outgrowing. They knew about the Civic Hybrid, but it was not bigger than the Civic they already owned. Sitting in a restaurant one morning, they noticed the Toyota dealer across the street. They walked over after breakfast, with no intention of buying. Toyota was offering zero percent financing on the 4Runner SUV. The couple became excited. When they got home, the husband—an accountant—made some quick calculations. The financed price of the 4Runner seemed so reasonable compared to the midsize sedans they had been considering. They bought the 4Runner.

The couple regretted their action within weeks. In his excitement, the husband had only considered the purchase price. Compared to their Civic, the increased cost per tank of gasoline and the increased frequency of refueling now serve as constant reminders that they acted impulsively under the guise of a calculated decision.

In other cases, the nonfinancial symbolism of prices moved respondents into more fuel economical vehicles. One of the HEV-owning households interviewed had initially been shopping for a new SUV to displace an old one. They had been involved in what Kahneman (2002) would call “reasoned judgment” and what Olshavsky and Granbois (1979) would recognize as decision making—a deliberative, slow, serial process involving evaluation of alternatives and exploration of future uses for the new vehicle. Together the male and female heads of the household developed evaluative criteria and rules: Their old SUV was too small, and its fuel economy was low and getting lower; they wanted more room and fuel economy of 20 miles per gallon, and they still wanted four-wheel drive. They gathered information, visited dealerships, and initially decided on a new Toyota Sequoia.

Before they made a down payment, however, the price of gasoline rose past \$2.00 per gallon. The male head of household “flipped out,” in his words. He came home and made a unilateral announcement that they would

be buying a Prius. He said, "This is going to be my car. It is the car I have to drive every day. I'm buying a hybrid."

The prepurchase behavior switched from calculated decision making to noncalculated, emotion-driven action. He did not deliberately award a new higher value for a fuel economy evaluative criterion. He did not seek more information. He did not investigate if there were variants of the Sequoia or other SUVs with higher fuel economy. He did not seek any new information about the Prius. He did not calculate fuel cost savings. His action was about his anger at oil companies and oil-producing regimes in the Middle East. His Prius purchase was based on the symbolic meaning of readily accessible information—rising gasoline prices posted at every gasoline station—and associative emotion. His judgment was made quickly, even if he had to wait months for the vehicle. It was intellectually easy, if emotionally charged.

These examples show that emotion can give symbols great power. Bagozzi et al. (1999) define emotion as "a mental state of readiness that arises from cognitive appraisals of events or thoughts . . . [that] may result in specific actions to affirm or cope with the emotion." It is this "readiness to act" we heard preceding many HEV purchases. The HEV symbolizes a desired goal. The goal has an emotional component creating readiness to act. The readiness to act helps to prompt the act of buying the HEV in order to affirm that emotion, perhaps hope, or to cope with it, in the case of anger.

In the rational analytic framework, a properly constructed evaluation by a household considering the purchase of an HEV would compare a "with HEV" and a "without HEV" cost and benefit stream. Many households related that their HEV prompted its own transaction—that is, without the HEV, no transaction for a vehicle would have occurred. In such cases, rational analysts might think they should choose a preexisting vehicle in the household fleet for the "without HEV" case, on the argument the HEV displaced an existing vehicle—leaving aside for the moment those households in which the HEV both prompted a transaction and was an addition to the household fleet. If this preexisting vehicle is already fully paid for, and if the only positive differential value of the HEV is private gasoline cost savings, the HEV looks very expensive.

However, households in which the HEV prompted its own transaction tell a different story. First, no households talked about their HEVs only in terms of fuel cost savings. Few said that fuel cost savings were most important. Even the ones who did mention fuel savings tended to speak of low fuel cost or high fuel economy as symbols of smart consumerism. These households did not calculate fuel cost savings and factor these into a car buying decision. To them, "hybrid" meant "low fuel use achieved through high technology." There were two things about HEVs that allowed for this symbolism—a distinct technology and a nonincremental increase in fuel economy compared to the vehicles they were already driving. With this meaning, an HEV was seen as something a smart consumer would buy in

a period of high and rising gasoline prices. In addition to “smart consumerism,” the early fuel-economical, low-polluting HEVs symbolized “living lighter,” “lower resource consumption,” “clean air,” “concern for others,” “civic mindedness,” and “high-technology.” Of some concern for global warming policy, few households said HEVs symbolized “reduced risk of climate change.”

Even when the HEV displaced a preexisting vehicle, keeping the former vehicle is not considered by its owners to be an alternative to the HEV. The HEV becomes a new symbol in the narrative identity of at least one member of the household and thus the narrative of the whole household. Interpreted this way, these households did not acquire an HEV as the result of a comparison to an existing household vehicle, but because the HEV uniquely symbolized a new narrative, a new story about whom the owner wanted to be. Since few vehicles prior to HEVs allowed for the incorporation of an automobile into a narrative of, for example, a high-tech nerd who wants to save the planet, few if any previous vehicles are regarded as alternatives.

A subset of prompted transactions are those households whose “choice set” consisted of only one vehicle. These households did not even compare across HEVs. Efforts by salespeople to steer these consumers to other vehicles were sometimes resented. One young woman went to a dealership to shop for a Honda Civic Hybrid, and, according to her, the salesman’s efforts to sell her a nonhybrid variant—because it was a better buy—nearly cost him a sale. She was not at the dealership just to get a good deal on a car but to enrich and extend her narrative of her identity. The salesperson made the mistake of thinking she needed more and better choices, and perhaps of thinking he knew what choices were better for her.

### Individuals in a Social Context

In the rational analytic framework, social exchanges may be used to gather information to support an individual’s algorithmic decision. In the alternative approach developed here, the role of symbol creation and social exchange of symbols is more central to creating and expressing narrative identities. Such narratives develop in a specific cultural context. In this case, it is our consumer society.

Exchange is a fundamental social activity and has been the focus of cultural anthropology. Whether between kin, nations, kings and subjects, humans and supernatural beings, or marriage partners, social exchange initiates, sustains, and signifies relationships, which are real or imagined, economic, political, or spiritual. Social exchange—fundamentally symbolic—takes the form of gifts, songs, labor, meals, and even revenge. Even the self is sustained by exchange: a worker puts in eight hours of hard work and rewards himself with a beer.

Modern market exchange is often regarded as “nonsocial” or even “antisocial” in that exchange is immediate, so the relationship ends at the moment of exchange. However, many companies and buyers develop a relationship. Further, identity becomes entangled in not just the buying of goods but in their use over time. The focus here will be on personal exchange—that is, personal communication, the networks in which it occurs, and its role in narrative identity.

One example of the creation and exchange of symbols at the personal level is imitation. This imitation is not mere mimicry. The action being imitated may symbolize values and goals important to the group, thereby sustaining or initiating membership in that group. Several households that bought HEVs either imitated or were imitated by others in their social networks. The imitator often imagined that the people they imitated made a “good decision.” Imagined decision making by someone else substitutes for some or all of the imitator’s prepurchase process. Imitators are quite clear about this, and they talk unselfconsciously about following the lead of someone they know and trust. Comments included “She can buy anything she wants, and she bought this car” and “They are the sorts of people who would have investigated this carefully. Her husband is an engineer.”

The clearest cases of imitation of HEV purchases were observed in pre-existing groups in which members knew each other, bonds were strong, and social exchange was frequent. And while imitative acts and their opposite—a desire to not emulate some group of “others”—occurred most often among groups known to each other, it also occurred among impersonal groups. One buyer of a Honda Civic Hybrid claimed he could visually distinguish his vehicle from the nonhybrid Civics owned by a group of young men for whom he had low respect.

Imitation is far from the sole form of personal social exchange. For one HEV buyer in our survey—who was unhappy with her experience shopping for an HEV at one dealership—a conversation at a cocktail party provided her information about a neighbor’s son selling hybrids of a different make at a different dealership. The importance of this example is not the specific information but (1) that the information was conveyed at a neighborhood party from the owner of an HEV to the respondent, who (2) had been thinking about HEVs since the introduction of the Honda Insight. Regarding the first point, HEVs, fuel economy, international oil politics, and environmental impacts of automobility have risen to the level of casual conversation. Regarding the second, the respondent had been enacting a narrative of “a person who would like to own an HEV” for a few years. The information from her neighbor allowed her to change her narrative to one of “a person who owns an HEV.” More than simply informing a utility-maximizing decision, the information she received facilitated a narrative that she had been looking to enact.

## Self-Interest and Self-Identity

Dittmar (1992) explains the social constructionist “view that, among the wide-ranging symbolic significances of material possessions, it is their relation to our sense of identity, and to the identity of others, that is particularly important.” In several instances recorded in the two interview-based studies, the stories people told about themselves and their automobiles were clearly about their use of automobiles to create and project part of their identity. While rational people act in ways that are consistent with their self-interest, self-interest is better defined as a process of creating and expressing identity through a narrative rather than maximizing utility.

This is easily seen by contrasting two households interviewed in our survey. First, take the case of a household and personal narrative told during one of the fuel economy interviews. Their narratives are conservative in the general sense of being resistant to change, and certainly in the sense of not seeking change for its own sake. The interviewees were a farming couple living in the same area in which they were born and raised. For several years, they have bought the same type of vehicles, although different models for each of them, from the same dealership.

The couple was interviewed because they had recently purchased her another Ford Mustang, her fourth in 12 years. She had wrecked two of the previous three in single-vehicle accidents on country roads. At each purchase, the only “decision” made was whether they could afford a new Mustang with whatever high-power engine was offered that model year. Throughout the interview, she spoke about her fast driving with nonchalance and disdain about the consequences for her and others. “People in this neighborhood hear me coming and they know to get out of the way,” she said. The repeated purchase of a type of vehicle she had admired when she was young, the absence of alternatives during each purchase, the repetition of dangerous driving practices, and the lack of reflection on consequences all indicate a person who has settled into a specific idea of who she is and a specific representation of that person.

In contrast, one of the HEV buyers had throughout his life experimented with many types of automobiles. In a vehicle purchase history spanning 50 years and more than 20 vehicles, he rarely made consecutive purchases of similar types. He switched from big cars built in the United States to small, economical, Japanese cars in the 1970s. A stint in the U.S. Navy as a young man allowed him to see something of the world. Until recently, a pilot’s license and a small plane allowed him to see the world from a different perspective. His life story also includes a religious conversion.

His purchase of an HEV fit his lifelong pattern of experimentation and exploration. He was intrigued by hybrid electric technology and admired the technical accomplishment of increased efficiency. Furthermore, the space

around the driver reminded him of the cockpit of his last small airplane—a pleasant reminder of flying. The HEV also renewed his desire to explore the world around him. He said he drives more now, traveling the region to discover what it holds. His increased driving is not a product of an economic “rebound” effect because of higher fuel economy. Rather, he feels he can drive his HEV without polluting.

Several other interviews provide examples of what are often taken in rational analyses to be functional attributes of vehicles serving instead as elements of personal or household narratives. SUVs commonly provide symbolic rather than functional benefit. Several households interviewed had bought four-wheel drive SUVs, believing these would be good vehicles to drive to winter skiing. Unfortunately for many of these would-be skiers, children were born into the family, shifting expenditure and activity patterns for years—such that these households rarely or never ski. Even so, some continue to buy SUVs, using them mostly to commute to work in distinctly nonsnowy suburban and urban settings, all the while maintaining the image of themselves as people who ski. Towing capability is another vehicle attribute that appears to serve a purely symbolic role in some individual and household narratives. In these cases, the narrative is that “we are people who tow, and someday, we’ll own something to tow.” Years later, many interviewees who bought expensive towing packages for a truck or SUV still own nothing to tow.

These examples all show people buying particular automobiles that supported their narrative identities. The construction of a narrative identity can also explain why people won’t buy a particular vehicle. This is relevant to the discussion of the types of vehicles that rational analysts typically use for purposes of comparison when arguing that HEVs don’t make economic sense at current or historical gasoline prices. Such analyses typically assume that consumers should compare the closest functionally equivalent vehicle to the HEV—for example, the Civic Hybrid to the Civic, the generation one Prius to the Corolla, or the generation two Prius to the Camry (see, for example, Edmunds.com, 2005).

Despite similar performance, handling, size, and passenger and payload capabilities in these vehicle pairings, few households interviewed made such comparisons. Despite their generally favorable past experiences with Corollas, for example, few households who bought a first generation Toyota Prius compared it to a Toyota Corolla. When asked why, most dismissed the comparison as irrelevant.

The purchase of a small, economical, inexpensive vehicle often symbolized a time in the household’s history when they were struggling financially—a chapter in their story they don’t wish to repeat. As one buyer of a first generation Prius said, “After my divorce, I was so broke I had to beg two different car dealers to sell me a used Corolla. I vowed I’d never be that poor again.” She recalled the Corolla had worked well, and recently she helped her daughter buy an “economy car,” but rejected such a car for

herself. Her HEV represents her years of political activism, an homage to her daughter's ongoing environmental activism, and a better world for her new grandson; a Corolla represents a time she'd rather forget.

### Preexisting Preferences and Investment in Consumption Outputs

Kurani, Turrentine, and Sperling (1996) discuss preference formation prior to purchase of a novel vehicle and during vehicle use. Kurani (1992) and Turrentine (1994) discussed distinctions between search attributes that can be evaluated during a prepurchase process and experience attributes that can only be evaluated with experience of the goods or services. Here, the discussion of preference formation is extended using Becker's (1992) argument that households be treated as producers of consumption and reinterpreted within Giddens' (1991) discussion of the increasingly "precise time-space zoning of personal life." Specifically, these zones are important as settings for narratives and as elements of the narratives themselves.

One interviewed HEV buyer had purchased a first generation Prius to replace a conventional Honda Accord. This is a household of two retired persons. The female head of household drives the Prius. She plays an active role in the day-to-day care of her grandchildren, picking them up from school most days. She started her story by saying, "You know the thing I like best about my car? That it shuts off completely at a stop and only uses the electric motor to creep along." The engine shutoff at first seemed strange when she test drove the vehicle. Now, it is her favorite feature, particularly when she waits in the line of cars and trucks at her grandchildren's school. She and her husband have taken their resources and roles to create one consumption output, her Prius. She has taken her Prius and its strange new capability, combined them with her role as caregiver for her grandchildren and a specific time and place in which she fulfills that role, and has created a new consumption output—lower pollution at her grandchildren's school. Now, she sits in that line of cars and trucks and wonders why everyone else doesn't buy an HEV.

Other examples of new consumption outputs include surprises and contradictions to predictions from rational analytic approaches. As discussed earlier, inferences from within a rational analytic approach include estimates of a "rebound effect" from increased fuel economy, or more accurately, reduced cost of travel. In several households interviewed, the symbolic value of "reduced resource consumption" attached to their HEVs led to reinforcing rather than rebounding behaviors. For example, since acquiring her HEV, one respondent is now looking for other ways she can "live lighter," including driving her HEV less than the midsize sedan it displaced. She is walking to more nearby destinations and investigating transit for her commute between home and work. Other HEV owners reported that the comprehensive energy use instrumentation in their HEVs allowed them to learn to drive more economically. They now apply these lessons to driving

TABLE 13-2. Selected Vehicle Transitions in Household Buying Hybrid Vehicles

<i>With Hybrid</i>	<i>Without Hybrid</i>
'01 Prius displaces Jaguar XJ6	No transaction. Keep Jaguar XJ6.
'01 Prius displaces Isuzu Trooper	Chrysler PT Cruiser to displace Isuzu Trooper
'01 Prius displaces Toyota Camry	Toyota RAV4 to displace Toyota Camry
'02 Prius (used) displaces Toyota Camry	Toyota Camry (used) to replace Toyota Camry
'03 Prius displaces Honda Accord	No transaction. Keep Honda Accord.
'03 Civic Hybrid displaces Ford Ranger	VW Jetta (used) to displace Ford Ranger
'04 Prius displaces Toyota Avalon and Chevrolet Astrovan	Keep Toyota Avalon, sell Chevrolet Astrovan; or Toyota Sienna displaces both Avalon and Astrovan.
'04 Prius displaces Honda Accord	No transaction. Keep Honda Accord.
'04 Prius added to household fleet	Toyota Sequoia to displace Toyota 4Runner
'04 Civic Hybrid displaces Civic	No transaction. Keep Honda Civic.

other vehicles as well. In both these situations, the new “consumption output” these households are producing with their HEV is further reduced energy use for their daily travel.

#### Relevant Attributes of Alternatives and Symbols, and Accessible Attributes of Perceived Attributes

One strength of the methodological approach taken in both sets of interviews is it reveals otherwise unobserved decisions and actions that people take on their way to observed vehicle transactions. For example, it can uncover the types of vehicles people did not buy in addition to the one they did. In doing so, it uncovers additional reasons why common assumptions by rational analysts regarding buyers of HEVs are not satisfied in many households. As discussed above, numerous analysts compare the estimated cost-benefit streams of buying HEVs to the estimated streams of some “equivalent” vehicles that buyers should have considered when buying their HEVs. Table 13-2 lists some examples from interviews with HEV buyers of observed “with hybrid” and stated or conjectured “without hybrid” transitions.

The discovery of HEVs by a household can affect their consideration of vehicle alternatives in many ways that lie outside typical rational analyses. In some households, HEVs prompted vehicle purchases that otherwise would not have occurred. In others, HEVs were purchased with little or no comparison to other vehicles. In still other cases, HEVs displaced vehicles entirely dissimilar to themselves, including multiple vehicles in a house-

hold that reached retirement age and reduced the number of vehicles they own from two to one.

It might seem that the rational analytic approach could simply be enriched by a subtler accounting of the types of actions households take when they buy vehicles. For example, a population-level study could be conducted based on the comparison of HEV models to a broader sample of vehicle types.

However, the problems with the rational analytic approach are more fundamental than such an adjustment suggests. First, a comparison of an HEV to another vehicle is one indication that a decision process is being enacted, but, as just discussed, decision processes do not precede all vehicle transactions.

Second, as also just discussed, several households had no “without hybrid” vehicle. Here, the HEV prompted a transaction that would not otherwise have occurred. Picking a prior vehicle in the household misses what many of these households were really doing. Once some people became aware of HEVs, keeping their prior vehicles was not an option because those vehicles were no longer part of narratives those people wanted to tell and enact.

Third, the HEV may be incorporated into an ongoing narrative but in a novel way that could not be predicted from an analytical perspective that does not allow for the substitution of one attribute for another in a narrative structure. That is, the presumptive comparisons of HEVs to “similar” vehicles obscures, rather than reveals, why some people buy HEVs. The first example in Table 13-2 is a household that displaced a Jaguar XJ6 with a first generation Prius. When driving the Jaguar, the male head of household imagined both he and the car projected power and mastery over the road and other drivers and vehicles. Unable to compete for road position as aggressively in the Prius, he now glowers at drivers of large SUVs and pickup trucks, still imagining himself the victor—only now in a battle for the planet’s resources. He maintains a narrative of road warrior, but through his Prius he has recast himself as a high-tech, über-conserver.

Such substitution is possible because the HEV is rich in symbols, including the hybrid drivetrain system, a particularly low-polluting emission rating, and high fuel economy. This is a new combination of symbols. Kurani and Turrentine (2004) discuss that prior to the introduction of HEVs, “fuel economy” was a phrase largely reserved by the public for small, inexpensive, low-powered cars. HEVs, on the other hand, were seen by both buyers and nonbuyers of HEVs to be “high-efficiency” vehicles. The term “high-efficiency” carried connotations of advanced engineering and technology and high-quality manufacturing. Thus, the high fuel economy of HEVs is associated with a new set of meanings not previously available in the marketplace—even if previously there have been cars with high miles per gallon.

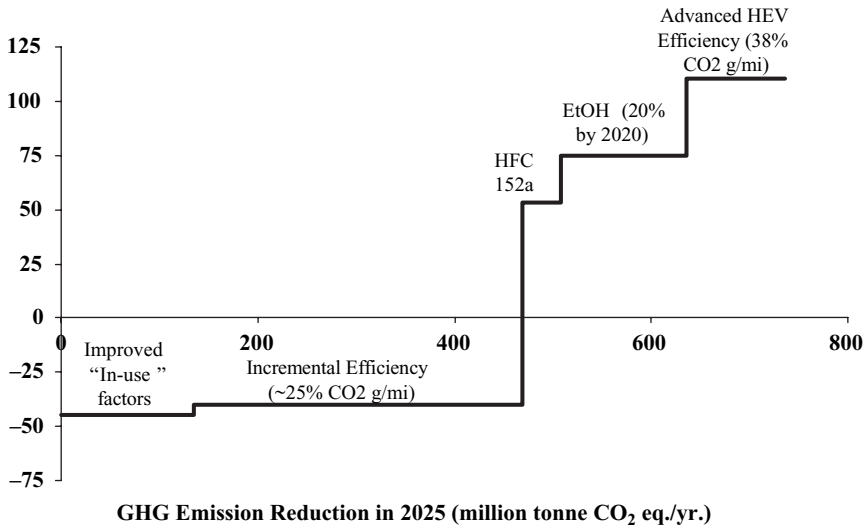


FIGURE 13-1. Cost-effectiveness of CO<sub>2</sub> emission reductions in light-duty vehicles. Source: Lutsey, 2005.

### An Application of the Alternative Approach

Some implications for analysis and policymaking of the alternative approach developed here can be illustrated by Figure 13-1. The figure shows Lutsey's (2005) midlevel estimates of the cost effectiveness of deploying a variety of technologies across the light-duty vehicle fleet in a manner to reduce GHG emissions. "Improved 'in-use' factors" are primarily vehicle and tire maintenance programs. "Incremental efficiency" gains are based on technologies currently available in at least some vehicles. These include variable valve timing, variable valve lift, six-speed automatic transmissions, and others. However, it does not include hybridization beyond integrated starter-generators. Next are a change of air conditioning refrigerant to HFC152a, increased use of cellulosic ethanol (EtOH) for fuel, and finally deployment of advanced hybrids at least conceptually similar to the economy-tuned HEVs offered to date.

The negative cost effectiveness for improved in-use factors and incremental efficiency gains mean these would pay society back in monetary terms, in addition to reducing GHG emissions. Because his analysis is cumulative up to the year 2025, Lutsey's midlevel results indicate that improving in-use factors and making incremental improvements in fuel

economy could reduce GHG emissions by 9 billion metric tons of carbon dioxide equivalent and yield almost \$400 billion in net benefits.

The existence of such large potential GHG reductions and monetary payoffs demonstrates the extent to which markets and rational analytic policy are failing. Despite three decades attempting to shape markets through analysis and policy based on a rational analytic framework, several maintenance practices and known technologies that would increase efficiency, reduce GHG emissions, and pay society net benefits remain under-deployed. Why?

There is no explicit time dimension in Figure 13-1, but the rational analytic framework implies time runs from left to right. To the left are actions that provide GHG reductions and monetary benefits—these should be done first. Moving to the right, actions to reduce GHG emissions are more costly and should be done only after the measures to the left. In a rational analytic world, the failure to make the incremental changes that actually pay financial benefits means there is little hope of making big changes, such as deployment of advanced HEVs, that cost money to implement. Thus, the rational analytic framework also fails to explain why some consumers are buying these advanced HEVs now.

A solution arises if a “social constructionist” time dimension is assumed to run in the opposite direction, from right to left in Figure 13-1. In a world where fuel economy and nonincremental increases in fuel economy are valued for far more than their effects on private fuel costs, at least some consumers will pay more now for advanced HEVs, even though rational analysis indicates this is the last thing they and society should consider. If people are assumed to tell stories of and about themselves and are looking for symbols to incorporate into those stories, then large costly changes are possible because such changes symbolize broader goals and better stories. It may be true now that few consumers will pay hundreds of dollars extra for an automobile to save a few dollars a week on gasoline. However, in a world where actions are based on symbols, emotions, and narratives of identity, some people will pay disproportionately more for larger increases in fuel economy.

If time runs from right to left in Figure 13-1, then large changes capable of symbolizing transformative life stories may make the world safe for making the incremental changes. By introducing peace, climate change, clean air, ecosystem protection, and reduced resource consumption into a public conversation about fuel economy and automobile purchases, people who act to acquire expensive, nonincremental increases in fuel economy may empower other people to act, too. These other people may not all be able or willing to go so far as to buy the expensive advanced HEVs, but because they start to value fuel economy more and for a broader set of reasons, they may choose to act to acquire other means and symbols to achieve and represent those values.

## Conclusions

Transportation energy analysis and policymaking are overly reliant on the “rational actor” model of human behavior, a model that fails to fully explain household vehicle purchase and use, in particular those aspects that are socially and culturally transforming. This chapter presents an alternative behavioral approach in which individuals and households acquire and apply symbolic meanings of automobiles, as well as other consumer goods and services, to construct narrative identities. While people’s budgets and competing wants affect their decisions, the symbolic approach opens research to other important determinants of behavior in the automotive market and particularly an automotive market in a period of rapid change.

The rising and volatile price of gasoline is not just an economic issue but a social one as well; that is, people are talking about it. Gasoline prices, petroleum geopolitics, and automotive technologies like hybrid electric drivetrains are in the news most days, books about oil politics are on best-seller lists, and editorials regularly focus on petroleum and gasoline supplies and prices. As this conversation continues, the type of automobile each person drives increasingly will come to symbolize a position on such issues.

The symbolic meaning of fuel economy in vehicle purchase decision making demonstrates that nonincremental alternatives allow and may foster nonincremental thinking and behavior. In the case of HEVs, fuel economy is valued, in 2005 at least, as more than fuel cost savings. Early HEV buyers didn’t buy just lower private fuel cost when they bought their cars. They bought, instead, a piece of a much broader future, including a less-consumptive lifestyle, smart consumer choices, clean air, lower oil consumption, and less terrorism.

Individual lifestyle choices intersect with world politics, forming a “reflexive” zone of choice that Giddens (1991) has called “life politics.” Characterizing consumers solely as economically rational actors will not only be technically incorrect but will also ignore these life politics. When experts measure fuel economy only as miles per gallon and value it only as cents per mile, they confound what they can measure for the totality of what matters. A social constructionist perspective and the technical variants discussed here offer rich research opportunities to discuss life politics and lifestyle choices with automobile buyers, to explore alternative policy and technology futures that appear increasingly essential and important.

Life politics involves exchange and mutual effect between societal and institutional goals and the day-to-day lived behaviors of individuals’ narratives. The narratives of individuals and households are connected to societal policy through discourses. Hare-Mustin (1994) defines discourses as systems “of statements, practices, and institutional structures that share common values.” Social discourses are subject to change through the telling of new narratives that challenge prevailing discourses. Weingarten (1991)

states, "Changes of discourse occur when the collective conversations people have about their lives transform culturally available dominant narratives about people's lives."

To date, buyers of the fuel efficient HEVs are telling stories about their lives in which they have connected their choices about automobiles to local, regional, and global concerns. Telling those stories more broadly, to more people, gives strength to a discourse about consumer choices being made to address these concerns. These stories are instigated and facilitated by a new technological choice that has become a symbol capable of incorporation into their narratives.

It is not only from the telling of individual and household narratives that a prevailing discourse can be changed or dislodged. A complementary strategy would be for leaders to tell better stories. In the United States, federal energy and climate change policies are currently conflicted, at best. Leaders at intermediate levels of governance, such as mayors and governors, are beginning to tell civic narratives linking their choices to swap full-size SUVs for HEVs to civic and fiscal responsibility, reduced resource consumption, and lower GHG emissions. Telling such stories can be vital to initiating and sustaining a national conversation, a new discourse about energy, energy efficiency, carbon-free energy, global warming, future transportation, and the possibilities for positive societal changes.

Few narratives and symbols are shared by "the American people" simply because Americans are so diverse. Still, there are discourses—for example, protecting the family or land, progress, and prosperity—that are broadly appealing. Discourses and symbols can, and should, be directed to different groups. For example, all automobile drivers may need to value fuel economy more highly if increased fuel economy is to be a successful policy to address global warming. But automobile drivers are diverse people who may need to be addressed by different discourses through different media. Glossing over differences in Americans' narratives is precisely how opponents of fuel economy standards diffuse arguments for higher standards. They charge, for example, that higher fuel economy standards will force "Americans" to buy vehicles they don't want.

Altering existing symbolic meanings is likely to create some turmoil. Different interest groups can be expected to contest the meaning of symbols, especially if they have strong interest in an existing symbol. This will most certainly be the case if proposed new symbols and meanings conflict with the interests of industry, which is a strong source of symbols and images through advertising. Attempting to link negative ideas to certain vehicles may spur countermeasures from the automakers that attempt to reinforce links between those vehicles and favorable ideas, even the ideas that other interest groups are using to devalue the vehicles. For example, what is the best way to "protect your family": ensconce them in the perceived safety of a full-size SUV or reduce petroleum consumption and emissions of GHGs by driving something with higher fuel economy?

On the other hand, the initial experience with high fuel economy HEVs shows how corporations can participate profitably to advance societal goals. Manufacturers' participation depends on their belief in the transformative power of new narratives. Policy initiatives built around symbols, narratives, and discourse will need to be supported by some measure of protection for the link between societal goals and specific symbols. Until now, "hybrid" has stood for a high-technology approach to fuel economy, a lighter way to live, a cleaner car. That meaning is likely to shift as performance-tuned HEVs and hybrid electric SUVs enter the marketplace.

The point is not that symbols can replace standards but that by helping citizen/consumers link broad social goals and values to their day-to-day lives through new societal discourses and personal narratives, people as citizens will support policies that shape markets to provide products that they as consumers will buy. Unfortunately, the past symbols around automobiles for many Americans are about power and prestige. This history is not an optimal source of symbols to support climate change policy. However, there are other symbols from past and present U.S. culture to draw on to steer toward the future, including innovativeness, thrift, fairness, and hard work.

Increasing automotive fuel economy can effect immediate reductions in GHG emissions. The size and pace of changes in fuel economy have been debated solely in terms of private financial returns to rational consumers. The alternative behavioral approach and supporting data presented in this chapter show that it may be easier to sell higher fuel economy to a larger number of people by addressing the symbolic meanings of large improvements in fuel economy than by arguing over the cost effectiveness of small ones. More generally, any policy intended to address global warming is more likely to succeed if it addresses peoples' desires to tell better stories about themselves.

## **Acknowledgment**

The U.S. Department of Energy and the Energy Foundation supported research into the role of fuel economy in household vehicle purchase and use. Our thanks to David Greene at Oak Ridge National Laboratory for his intellectual impetus. Research into the vehicle purchase and use behavior of early buyers of HEVs was supported by Toyota Motor Sales, USA Inc. We would like to thank the 82 households from both studies for opening their homes to us for an evening. The statements and conclusions offered here are solely those of the authors; nothing here should be construed as a statement of policy or opinion by any supporting agency or organization or by the University of California.

## **References**

Bagozzi, R. P., M. Gopinath, and P. U. Nyer. "The Role of Emotions in Marketing." *Journal of the Academy of Marketing Science*, v. 27, n. 2, 1999.

- Becker, G. S. The Economic Way of Looking at Life. 1992. Available at <http://nobelprize.org/economics/laureates/1992/becker-lecture.pdf>.
- Cameron, M. "A Consumer Surplus Analysis of Market-Based Demand Management Policies for Southern California." In D. Sperling and S. A. Shaheen, eds., *Transportation and Energy: Strategies for a Sustainable Transportation System*. Washington, D.C.: American Council for an Energy Efficient Economy, 1995.
- DeCicco, J. M., and D. Gordon. "Steering with Prices: Fuel and Vehicle Taxation as Market Incentives for Higher Fuel Economy." In D. Sperling and S. A. Shaheen, eds., *Transportation and Energy: Strategies for a Sustainable Transportation System*. Washington, D.C.: American Council for an Energy Efficient Economy, 1995.
- Dittmar, H. *The Social Psychology of Material Possessions: To Have Is to Be*. New York: St. Martin's Press, 1992.
- Edmunds.com. Most Hybrid Vehicles Not as Cost-Effective as They Seem, Reports Edmunds.com. 2005. Available at [www.edmunds.com/help/about/press/105827/article.html?tid=edmunds.h.pressrelease..1.\\*](http://www.edmunds.com/help/about/press/105827/article.html?tid=edmunds.h.pressrelease..1.*)
- Espy, M., and S. Nair. "Automobile Fuel Economy: What Is It Worth?" *Contemporary Economic Policy* 23, 2005. pp. 317–323.
- Freedman, J., and G. Combs. *Narrative Therapy: The Social Construction of Preferred Realities*. New York: W.W. Norton & Co., 1996.
- Giddens, A. *The Constitution of Society*. Berkeley, CA: University of California Press, 1984.
- . *Modernity and Self-Identity*. Stanford, CA: Stanford University Press, 1991.
- Goldberg, P. K. "The Effects of the Corporate Average Fuel Efficiency Standards in the US." *The Journal of Industrial Economics* 46:1, 1998. pp. 1–33.
- Greene, D. L. "A Note on Implicit Consumer Discounting of Automobile Fuel Economy: Reviewing the Available Evidence." *Transportation Research* 17B:6, 1983. pp. 491–499.
- Greene, D. L., and J. Liu. "Automotive Fuel Economy Improvements and Consumer Surplus." *Transportation Research A* 22A:3, 1988. pp. 203–218.
- Greening, L. A., D. L. Greene, and C. Difiglio. "Energy Efficiency and Consumption—The Rebound Effect—A Survey." *Energy Policy* 28, 2000. pp. 389–401.
- Hare-Mustin, R. "Discourses in the Mirrored Room: A Postmodern Analysis of Therapy." *Family Process* 33, 1994. pp. 19–35.
- Heffner, R. R., K. S. Kurani, and T. S. Turrentine. "Vehicle Image in Hybrid Electric Vehicles." Proceedings of the 21st Electric and Hybrid Vehicle Symposium. Monaco, 2005.
- Heffner, R. R., T. S. Turrentine, and K. S. Kurani. *A Primer on Automobile Semiotics*. UCD-ITS-RR-06-01. Davis, CA: Institute of Transportation Studies, University of California, 2006.
- Kahneman, D. Maps of Bounded Rationality: A Perspective on Intuitive Judgement and Choice. 2002. Available at <http://nobelprize.org/economics/laureates/2002/kahnemann-lecture.pdf>.
- Kahneman, D., and S. Frederick. "Representativeness Revisited: Attribute Substitution in Intuitive Judgment." In Gilovich, T., D. Griffin, and D. Kahneman, eds., *Heuristics and Biases* (pp. 49–81). New York: Cambridge University Press, 2002.
- Kurani, K. S. "Application of a Behavioral Market Segmentation Theory to New Transportation Fuels in New Zealand." Ph.D. Dissertation. ITS-RR-92-05. Davis, CA: University of California, Institute of Transportation Studies, 1992.
- Kurani, K. S., and T. S. Turrentine. *Automobile Buyer Decisions about Fuel Economy and Fuel Efficiency*. Final Report to United States Department of Energy and Energy Foundation. Research Report ITS-RR-04-31. Davis, CA: University of California, Institute of Transportation Studies, 2004.
- Kurani, K. S., T. Turrentine, and D. Sperling. "Testing Electric Vehicle Demand in 'Hybrid Households' Using a Reflexive Survey." *Transportation Research D*. 1: 2, 1996.
- Lutsey, N. Personal communication, Institute of Transportation Studies, University of California, Davis. 2005.
- McFadden, D. "The Choice Theory Approach to Market Research." *Marketing Science* 5:4, 1986. pp. 275–297.

- Miles-McLean, R., S. M. Haltmaier, and M. G. Shelby. "Designing Incentive-Based Approaches to Limit Carbon Dioxide Emissions from the Light-Duty Vehicle Fleet." In D. L. Greene and D. J. Santini, eds., *Transportation and Global Climate Change*. Washington, D.C.: American Council on an Energy Efficient Economy, 1993.
- National Research Council. Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards. Washington, D.C.: National Academy Press, 2002.
- Olshavsky, R. W., and D. H. Granbois. "Consumer Decision Making—Fact or Fiction?" *Journal of Consumer Research* 6:2, 1979. pp. 93–100.
- Quirk, J. P. *Intermediate Microeconomics*, 2nd ed. Chicago, IL: Science Research Associates, 1982.
- Senauer, B., J. Kinsey, and T. Roe. "The Cost of Inaccurate Consumer Information: The Case of the EPA Mileage Figures." *The Journal of Consumer Affairs* 18:2, 1984. pp. 193–212.
- Train, K. "Discount Rates in Consumers' Energy-related Decisions: A Review of the Literature." *Energy* 10:12, 1985. pp. 1243–1253.
- Turrentine, T. S. "Lifestyle and Life Politics: Towards a Green Car Market." Ph.D. dissertation, UCD-ITS-RR-94-30. Davis, CA: Institute of Transportation Studies, University of California, 1994.
- Turrentine, T. S., and K. S. Kurani. "Car Buyers and Fuel Economy." *Energy Policy*, 2005.
- Verboven, F. "Implicit Interest Rates in Consumer Durables Purchasing Decisions: Evidence from Automobiles." Antwerp, Belgium: Center for Economic Research, University of Antwerp, 1999.
- Weingarten, K. "The Discourses of Intimacy: Adding a social constructionist and feminist view." *Family Process* 31, 1991. pp. 45–59.
- Yun, J. M. "Offsetting Behavior Effect of the Corporate Average Fuel Economy Standards." *Economic Inquiry* 40:2, 2002. pp. 260–270.