

UC Davis

Recent Work

Title

Symbolism in California's Early Market for Hybrid Electric Vehicles

Permalink

<https://escholarship.org/uc/item/9zt4g01t>

Authors

Heffner, Reid R.
Kurani, Kenneth S
Turrentine, Tom

Publication Date

2008-03-01

Peer reviewed

Symbolism in California's early market for hybrid electric vehicles

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

Institute of Transportation Studies, University of California, Davis, CA, USA

Abstract

This study explores the symbolic meanings being created, appropriated, and communicated by the owners of hybrid electric vehicles. As symbolic meanings are shown to be important to hybrid electric vehicle purchase and use, understanding the meanings, as well as their construction and communication, is essential for policy makers and others hoping to promote these new types of vehicles. Hybrid electric vehicles embody combinations of meanings that were previously unavailable from automobiles. Market observers who fail to recognize this struggle to explain why some people buy hybrid electric vehicles. They may characterize buyers as naïve about calculating payback on fuel economy, or dismiss owners as image-seeking environmentalists. This research belies such simplistic explanations. Through the telling and analysis of buyers' own stories, this study takes a robust approach to understanding the creation and spread of new symbolic meanings in the automotive market. Data were collected in ethnographic interviews with hybrid electric vehicle owners in the California, and analyzed using methods based on semiotic theory. In particular, the study explores how widely recognized social meanings (denotations) are connected to more personal meanings (connotations) and the effect that both types of meanings have on vehicle purchase and use.

© 2007 Elsevier Ltd. All rights reserved.

Keywords: Consumer; Hybrid electric vehicle; Market; Narrative; Semiotics; Symbols

“...the time-honoured distinction is between the cognitive (knowing), the affective (feeling) and the conative (acting) aspects of behavior. . . . These concepts are inferences drawn from the same, holistic, observable behavior; such constructs exist in the eye of the beholder only...”

(Derbaix and Vanden Abeele, 1985)

1. Why would anyone buy a hybrid electric vehicle?

First introduced to the US in 1999, hybrid electric vehicles (HEVs) are a radical change in motor vehicle technology. Currently-available HEV models achieve fuel economy increases of 10–40% (US Department

* Corresponding author.

E-mail address: rrheffner@ucdavis.edu (R.R. Heffner).

of Energy, 2007) compared to similar-sized vehicles, with commensurate reductions in greenhouse gas emissions. Many HEVs also meet the State of California's (and thus the nation's) most stringent standards for motor vehicle emissions of criteria pollutants. As a result, HEVs are the first widely-marketed "green" vehicles and have received a large amount of attention from the media and analysts. In 2006, consumers in the US purchased over 250,000 new HEVs (Polk, 2007). While this represented just 1.5% of total US light-duty vehicle sales that year, HEVs constitute one of the fastest-growing vehicle segments, and hybrid-electric models are now offered by five major automotive manufacturers.

Some of the HEV's benefits are collective. Millions of people buying less-polluting and more fuel-economical cars can produce cleaner air and reduce the risk of climate change, but no single HEV buyer can have much impact on these problems. Further, the private benefits of HEVs are unclear; reduced expenditures on fuel are routinely shown to be less than the vehicle purchase price premium of the hybrid vehicle over an assumed non-hybrid alternative (for example, White, 2005). If private financial benefits are illusory and if collective benefits are not achievable by individual consumers, why would anyone buy an HEV? Hopes that HEVs (or any new technology that promises collective benefits) can be successfully mass-marketed depend on answers to such a question.

Derbaix and Vanden Abeele (1985) encourage us to seek answers to this question in the "holistic, observable behavior" of consumers. Using ethnographic interviews, this study conducts detailed assessments of 25 HEV purchases. Rather than beginning with assumptions about HEV owners' motivations, the study allows HEV buyers to explain their own behavior and motivations through their telling of personal narratives. McAdams (1996) states that people organize and express memory, experience, plans, a unified sense of self, and some decision-making in narrative form. This narrative form—fundamentally, storytelling—reveals elements that are ignored by other research approaches. One of these elements is symbolic meaning and its effects on vehicle purchase and use.

This study examines how HEVs symbolize ideas such as environmental preservation, financial responsibility, and independence from petroleum producers. These ideas, in turn, link to other concepts that are relevant to self-identity, such as ethics, intelligence, independence, and uniqueness. In purchasing HEVs, many of the households interviewed in this study acquired more than transportation; owners also gained access to symbols that they used to define and express who they are. This study outlines the results from interviews with 25 households in Northern California who purchased an HEV between 2001 and 2005. While this small sample may not represent all early buyers of hybrids, we observe behaviors and beliefs across our sample that would lead us to hypothesize such behaviors are probably common to most early HEV buyers in the US. We further observe that some behaviors are missing entirely from our sample that transport and energy researchers typically assume are widespread.

1.1. An approach to understanding symbols

Exploring product purchase and use behavior through understanding what products mean—or, symbolize—is common in consumer research, but less developed in transportation research. The paradigmatic approach in transportation regarding consumer response to new energy and environmental technology is statistical modeling of large-scale data sets based on the assumptions of the rational actor model from economics, e.g., discrete choice modeling. Examples across three decades include Beggs and Cardell (1980), Calfee (1985), Bunch et al. (1993) and Santini and Vyas (2005). In such an approach, a rational actor is assumed to choose options that maximize utility subject to the actor's preferences, knowledge of alternatives, and budget. This approach is amenable to quantitative analysis and provides a framework for statistical modeling and extrapolation.

The acknowledgment of symbolism as a central aspect of automobile ownership seems obvious when reviewing the content of automotive marketing. However, transportation researchers have given less attention to the symbolism of automobiles in their studies of drivers and buyers, and none appear to have undertaken a serious study of the structure of automotive symbols and causality in behavior. Authors such as Flink (1988) and Marsh and Collett (1986) acknowledge that automobiles are symbols, but do not offer empirical evidence for their claims, nor do they conduct a rigorous assessment of automobiles' meanings. Other researchers, often using conceptual frameworks from psychology, focus on whether symbolic meaning exists in automobiles. Grubb and Hupp (1968), Grubb and Stern (1971) and Malhotra (1981) confirm the existence of "image

attributes” or symbolic meaning in motor vehicles. Sirgy (1985) and Ericksen (1996) extend these findings, linking symbolic meaning to consumers’ purchase intentions, and Steg et al. (2001) demonstrate that symbolic meaning influences vehicle use. Yet none of these researchers conduct a thorough examination of the symbolic meanings themselves. Rather than working with subjects to uncover what a particular vehicle symbolized, these studies instead tested for sets of predetermined meanings.

There is risk in assuming we know what a new product symbolizes to consumers or what an existing product means to new buyers. In fact, the work reported here is, in small part, a remedy to a prior study in which Turrentine and Kurani (2007) erroneously assumed that early buyers of HEVs were primarily interested in higher fuel economy. New products are problematic since symbolic meanings take time to become associated with them and then communicated to consumers. At the time of this study, HEVs were still relatively new in the automobile market, and therefore were still being given new meanings. Therefore, this study does not rely on a predetermined set of symbolic meanings whose relevance is tested on HEV buyers. Instead, this study begins only with the assumption that HEVs serve as symbols, and gives participants significant freedom to define and elucidate the symbolic meanings of their vehicles.

This study is grounded in semiotics: the study of symbols. In their review of semiotics and automobiles, Heffner et al. (2006) make two main observations. First, motor vehicles can symbolize ideas other than mobility. Second, many of these ideas relate to self-identity. By selecting a particular vehicle, people define and communicate who they are, expressing interests, beliefs, values, and social status. While any automobile can serve as a symbol, past research indicates that symbolism is particularly strong in vehicles that use new types of technology. Symbolic meanings were important to early buyers of battery electric vehicles (BEVs) in Norway and Austria (Gjøen and Hård, 2002) as well as American HEV owners in Oregon and California (Oregon Environmental Council, 2003; Turrentine and Kurani, 2007). Current buyers of HEVs in the US also acknowledge the role of their vehicles in self-identity. According to CNW Market Research (2006), 31% of current HEV owners say they purchased an HEV because the vehicle “makes a statement” about who they are.

Symbols are used by consumers in the construction of personal identity. Giddens (1991) argues that in the absence of the guidance provided by traditional culture, individuals in the modern world are left to develop a “narrative of the self:” a biography that connects past experience and actions with present circumstances, and outlines a path to the future. Development and maintenance of the self-narrative permeates the individual’s life, affecting everything from day-to-day behaviors to long-term life plans. Thus, decisions such as which vehicle to purchase are influenced not only by practical concerns, but also by the need to construct and express one’s self-narrative.

To elaborate on symbols and their use in self-narratives, this study utilizes Saussure’s (1965) model of the sign. In this dyadic model, an object such as an automobile serves as a “signifier” (or symbol) of another idea, called the “signified.” For example, an HEV may be a signifier for the signified idea of environmental concern. Barthes (1967) extends this model to account for interconnected layers of meanings, classifying them as either denotations or connotations. A denotation is an obvious, widely-shared meaning associated with a signifier. In the previous example, environmental concern is a denotation for HEVs if most people assume that HEV drivers have some interest in preserving the environment.

In contrast, a connotation is a deeper, more subjective meaning that involves interpretation of a signifier and its signified denotations. An HEV may denote an owner who is concerned about the environment, an idea this person may link to, for example, behaving ethically. In this example, protecting the environment is a choice between right and wrong. This is a layering of a widely-perceived denotation and a more idiosyncratic connotation. Chandler (2002) observes that while denotations are generally socially-shared, connotations vary from person to person. Thus, two individuals may agree that the HEV symbolizes environmental concern, but one may view HEV owners as ethical, caring people, while another labels HEV owners as radical or self-righteous.

This study focuses on symbolic meanings, particularly those that are attached to the HEV by the buyers of these vehicles. Both denotations and connotations are explored. Since denotations are socially-shared, it is likely that these meanings are already familiar to the reader. A central point in this analysis is that denotations do not provide a complete picture of the HEV’s symbolic meaning and therefore the social and psychological processes motivating purchases. Simply labeling HEV owners as environmentalists or technology enthusiasts greatly oversimplifies the factors involved in their buying decisions. Connotations must also be explored since

they reveal why a particular denotation is relevant to an individual and thus provide the link between product meaning and self-identity.

With caution inspired by [Derbaix and Vanden Abeele \(1985\)](#), this study does not parse symbols and their meanings into cognitive categories (attitudes, beliefs, norms, etc.), emotions, or acts. It is important to first fully describe these meanings before efforts to classify them, perhaps as a prerequisite to studies that gauge the full market potential of hybrid vehicles and inform policies to achieve social goals. The objective here is to describe as fully as possible the behavior of interest: to understand and illuminate the meanings that were developed, appropriated, and communicated about HEVs.

1.2. Focus on California

This study focuses on HEV buyers in California due to the importance of this region in overall HEV sales. The US accounted for 70% of global HEV sales in 2006, and California accounted for more than 25% of US HEV sales ([Polk, 2007](#)). This study does not assume that the symbolic meanings Californians ascribe to HEVs are universal, but it does assume that consumers in all modern societies assign meanings to consumer products. HEVs do not necessarily mean the same things to residents of the European Union or Japan as they do to Californians, but HEVs do mean something everywhere they have been introduced. Therefore a complete explanation of HEV sales—wherever they occur—must include their symbolic meanings.

2. Objectives and methods: asking questions about symbols

This study examines 25 households that purchased a Honda Insight, Honda Civic Hybrid, or Toyota Prius. The vehicle purchases occurred between 2001 and early 2005, and participating households were interviewed between November 2004 and March 2005. The typical interview lasted two hours; it involved two researchers and all members of the household who were involved in the vehicle purchase. Interviews were conducted in participants' homes using a semi-structured protocol, and sessions were audio-recorded. Additional interviews were conducted as long as they yielded new information, a common sampling technique within qualitative research ([Schutt, 2004](#)).

Data was collected using semi-structured, ethnographic interviews for two reasons. First, HEVs are new types of automobiles. [McCracken \(1988a\)](#) notes that qualitative research methods are particularly effective in evaluating new products since they allow participants to use their own terminology and value frameworks. Second, qualitative interview techniques overcome challenges to examining symbolic meaning and its effect on behavior. [Zaltman and Coulter \(1995\)](#) warn that if asked to do so directly, consumers can have difficulty interpreting and explaining the symbolic meanings attached to a product. Individuals may also deliberately conceal symbolic meanings or downplay their importance. The tendency of individuals to dismiss the influence of symbolic meanings has been observed in prior studies of automobile use ([Steg et al., 2001](#)) and purchase ([Rapaille, 2004](#)).

This study uses [McCracken's \(1988b\)](#) four-step method of interviewing. Steps one and two reveal meanings, and step three tests for expected meanings while providing participants freedom to introduce new ideas. In step four, discrete words or phrases are isolated and then linked with other observations to form themes. During analysis, themes are examined across interviews to identify larger patterns across the sample.

The interview protocol included these sections:

1. *Household vehicle history*: A description of past and current household vehicles, vehicle use patterns and household life stages, who uses the HEV, how far and where the HEV is driven, and what vehicle the HEV displaced (or whether the HEV was added).
2. *Purchase narrative*: A narrative ([Mishler, 1986](#)) of the HEV purchase told by the households with limited prompting by researchers. After the narrative is completed, researchers explore symbolic meanings that emerged using planned prompts (across all interviews) as well as floating prompts (customized to each interview) ([McCracken, 1988b](#)).
3. *Symbolic meaning assessment*: A series of questions and exercises designed to assist participants to verbalize symbolic meanings. For example, participants are asked to define a stereotypical HEV buyer and what they themselves say about their HEV to strangers and friends. Some participants also applied a product

personality scale (Aaker, 1997) to their HEV to describe how personality descriptors (such as “intelligent” or “cutting-edge”) do or do not apply to their vehicles. Many participants were asked to discuss visual images they picked prior to the interview to represent their HEVs (Zaltman and Coulter, 1995).

4. *HEV benefits and disbenefits*: Particularly in the evaluation of HEV benefits and disbenefits, interviewers used laddering methods (Reynolds and Gutman, 1988), a questioning technique that connects product attributes to underlying meanings. Participants identify their perceived or expected advantages to buying an HEV, and explain the importance of these advantages in their own HEV purchase. Researchers prompt discussion about other HEV benefits. The process is then applied to disbenefits.
5. *Stated tolerance exercise* (Lee-Gosselin, 1996): Interviewers propose replacing the household’s HEV with another vehicle, and households discuss the conditions that allow or prevent the substitution of this hypothetical vehicle for their HEV. Proffered vehicles are often hypothetical and are customized for each household based on prior information in the interview.

3. Analysis: meet some early buyers of HEVs

This analysis does not focus on modeling, simplification, or reduction. Instead, it concentrates on what Geertz (1973) called “thick” description—a dense, intentionally complex description providing as much background and context as discussion of any particular behavior of interest. Only by first attempting to see behavior in its full complexity can we hope to know what will be gained and lost when efforts to model, to simplify, that behavior are undertaken.

What follows are representations of four of the interviewed households that illustrate meanings that emerged from the interviews. These four households were chosen because they illustrate a wide variety of all the meanings symbolized by HEVs—positive and negative—heard across all the households, demonstrate a variety of the complexity in semiotic territory for all the households, and reveal important processes in creating these semiotic territories including negotiation between household members and vehicle use behaviors. Although the following four households purchased Toyota Priuses, buyers of all three HEV models perceived similar symbolic meaning in their vehicles.

Each household representation includes a graphic and accompanying text. The graphic is oriented with the vehicle near the top, with links down through specific vehicle features and performance attributes to widely shared denotations, and ultimately to connotations most closely related to personal identity. That is, graphics flow down from signifiers to signifieds. The graphics and accompanying text are our effort to balance thick description with other goals including the illustration of the variety of the symbols, meanings, and identities we heard throughout all our interviews. A summary of the symbolic meanings from all 25 interviews is presented later in Section 4. All personal names used here are aliases.

3.1. *The Lays*

Tom Lay is a retired engineer in his sixties who purchased a Toyota Prius in 2004. Tom made his HEV purchase as he neared retirement and contemplated the changes that would soon occur in his lifestyle. Once retired, Tom would no longer be going to the office each day, but he expected to be busy with part-time consulting work, childcare for his grandchildren, and managing a local youth sports league. The time he would spend in his car and the amount he would spend on fuel seemed likely to increase. As Tom thought about his prior vehicle, a full-sized pickup truck with a powerful diesel engine, he decided he needed a more comfortable, economical vehicle. Once aware of the Toyota Prius, he knew immediately it was the right choice for him.

A representation of Tom’s HEV purchase and use—the semiotic map created from his interview—is shown in Fig. 1. In this map, Barthes’ framework linking products to identity is extended in two ways. First, the diagram is extended “above” the specific product (Toyota Prius) to a more general class of products (hybrid vehicles). We do this because among HEV owners there is disagreement about which vehicles should be included in the category. Second, the diagram includes specific statements (often direct quotes) that help link one layer of meanings to another.

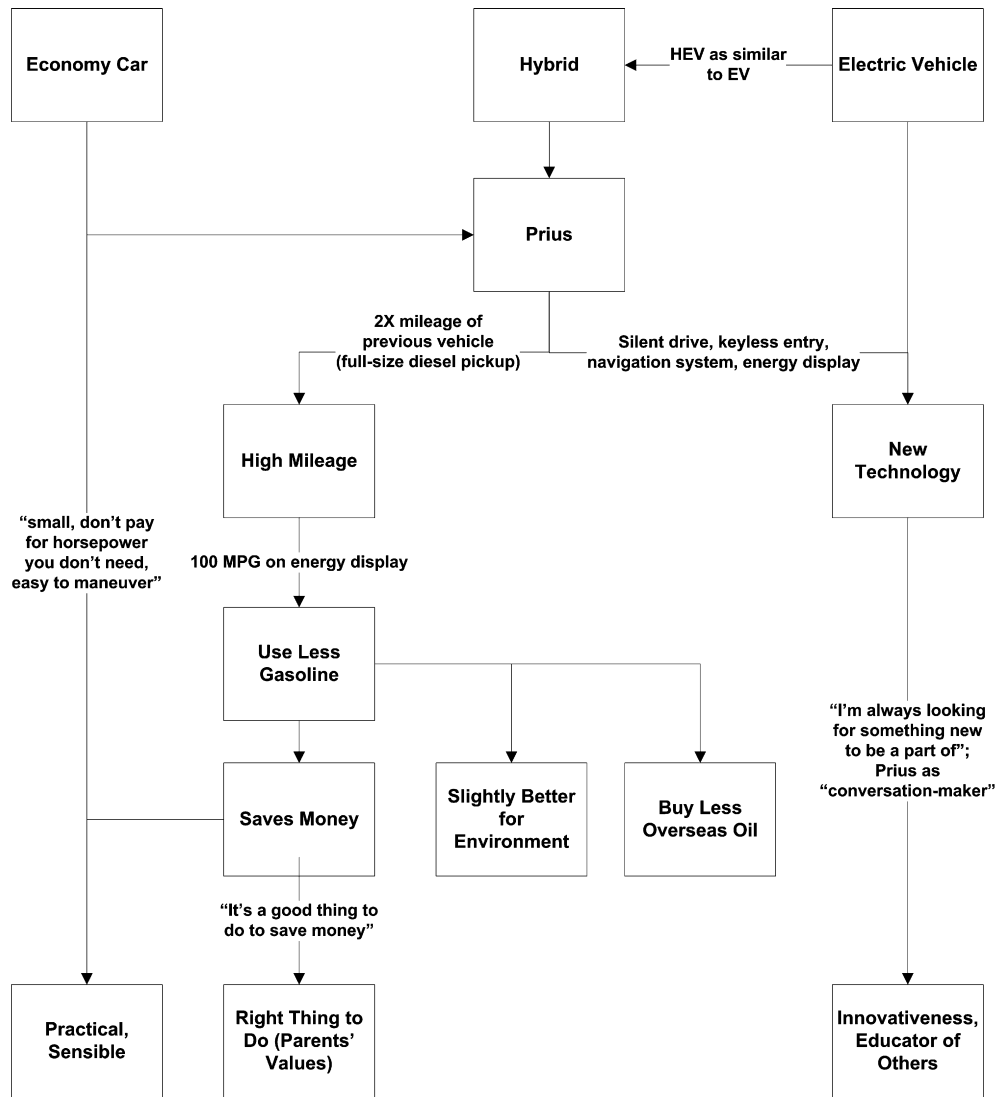


Fig. 1. Lay semiotic map.

Tom borrows meanings for his HEV from two sources. One set of meanings comes from BEVs, which Tom had driven occasionally in his job at an electric utility. Tom remembers when, several years earlier, he drove General Motors electric EV1 for a week. He thought it seemed so advanced compared to conventional cars, and its unique appearance and silent operation often attracted the attention of bystanders. Tom recalls fondly how people approached him to ask about the EV1; even the local police pulled him over to examine the strange new car. Tom answered their questions and offered rides in the vehicle, enjoying his role as a BEV ambassador.

His second source of meanings is economy cars, an unusual source of meaning for HEVs among the households we interviewed. (Most HEV buyers viewed HEVs as very different than conventional compact cars, despite similarities in size). In the past, Tom had owned several compacts; these cars had seemed poorly-made, but they were fuel-efficient as well as easy to park and maneuver. They had provided transportation without excessive power or amenities, features he thought most people did not really need anyway.

Tom selectively applies meanings from economy cars and BEVs to create a desirable mix of symbolic meanings in his HEV. For Tom, the HEV is a practical vehicle; it is small, offers modest horsepower, and does not

use much gasoline. In fact, he thinks the mid-sized Prius offers better gas mileage than conventional compact-sized economy cars. Like most households in this study who articulate their HEV purchase in terms of cost savings, Tom acted on symbols of savings rather than financial calculations. He did not conduct a payback analysis, nor does he keep records of fuel expenditures or calculate fuel savings. When he bought his HEV, Tom did not compare it to functionally similar non-hybrid vehicles, although he recognized that cheaper alternatives to his HEV were available. In fact, Tom guesses that he increased the price of his HEV by \$10,000 by adding optional equipment, some of which he acknowledges he does not need or use.

However, Tom believes he is saving money based partly on the fuel economy advantage of his HEV over his pickup truck, an advantage that is confirmed by the HEV's instrumentation. Tom explains that he checks his Prius' fuel economy monitor as he drives, and is excited to occasionally see it read 99.9 miles per gallon (MPG): a momentary, but powerful, confirmation of the vehicle's—and his own—frugality.

For Tom, saving money is linked to the connotation of ethics. He characterizes saving money as “the right thing to do,” and explains how his parents' upbringing during the Great Depression led both of them to see saving money as a matter of right and wrong. He also explains how the ethics of saving was part of his own identity: “My parents did instill that in me. I can't get rid of it, it's part of me.” For Tom, the HEV embodies the idea of frugality as an ethical value, and makes this value visible to others. Tom also actively communicates with others about his vehicle's frugality, “tell[ing] everyone about it.” Tom won't save any additional money by informing others about his HEV, but this interaction does give him a chance to communicate to others about who he is. Tom's Prius tells the world that he is a person with strong personal ethics. Accessing this meaning (rather than attaining specific, quantifiable cost savings) was the main reason for Tom's HEV purchase.

Tom also emphasizes the denotation of embracing new technology. Like the EV1 he drove several years earlier, the HEV represents cutting-edge technology. In particular, the Prius' silent electric drive, keyless entry, and integrated navigation and energy display provide tangible proof that the vehicle is more advanced than a conventional car. Features like the electric drive—combined with the Prius' distinctive appearance—also attract attention like the EV1 did. Tom calls his Prius “a conversation-maker” since people who notice it seem unable to resist asking Tom questions about his vehicle. Tom is happy to teach them about HEVs, and sees himself as a person who adopts new ideas before others. “I'm always looking for something new to be a part of” he explains, reciting a list of items that he bought and groups he supported long before others did. Tom's HEV purchase is about more than just an interest in new gadgets. His HEV defines him as a visionary person: someone who recognizes the value of new ideas, and who can teach others about new ways of doing things.

Tom's HEV purchase illustrates how HEVs offer buyers a unique combination of symbolic meanings that were previously unavailable in the marketplace. Economy cars gave Tom access to the connotations of practicality and sensibility. The HEV connected to these same symbolic meanings, but also linked to the connotations of personal ethics and innovativeness. Past economy cars identified Tom as a sensible person, but the HEV broadened this definition, communicating that Tom was a practical person with strong personal ethics who was creative enough to experiment with new ways of doing things. His HEV showed that he was concerned about economizing, but he did so through the application of novel ideas rather than by simply settling for less performance or comfort in his automobile. Tom is also notable for the meanings he did not emphasize. While he recognized that his HEV could be “slightly better for the environment,” Tom did not stress the environmental meanings of his vehicle, demonstrating that some HEV buyers purchase for reasons that are unrelated to the vehicles' real or perceived environmental benefits.

3.2. *The Bridgers*

Tony and Ellen Bridger are a couple in their sixties who purchased a Prius in 2004 after Ellen's previous vehicle, a Toyota Celica, was totaled in an accident. Tony is recently retired, while Ellen still works part-time for a local real estate firm. In addition to their Toyota Prius, the Bridgers also own a full-sized pickup truck with four-wheel drive and a powerful V8 engine. Before buying their Prius, Tony used the truck as his primary vehicle, but now the couple regularly assigns the Prius to whoever has the most driving to each day. Tony still likes having the pickup for hauling, but he gradually has become more concerned about the pickup's poor fuel economy and the consequences of its fuel use.

Fig. 2 outlines the Bridgers’ semiotic map. For Tony and Ellen, a hybrid vehicle category exists that includes the Toyota Prius and Honda Civic Hybrid. The Honda Insight, which Tony deems “wimpy, ugly,

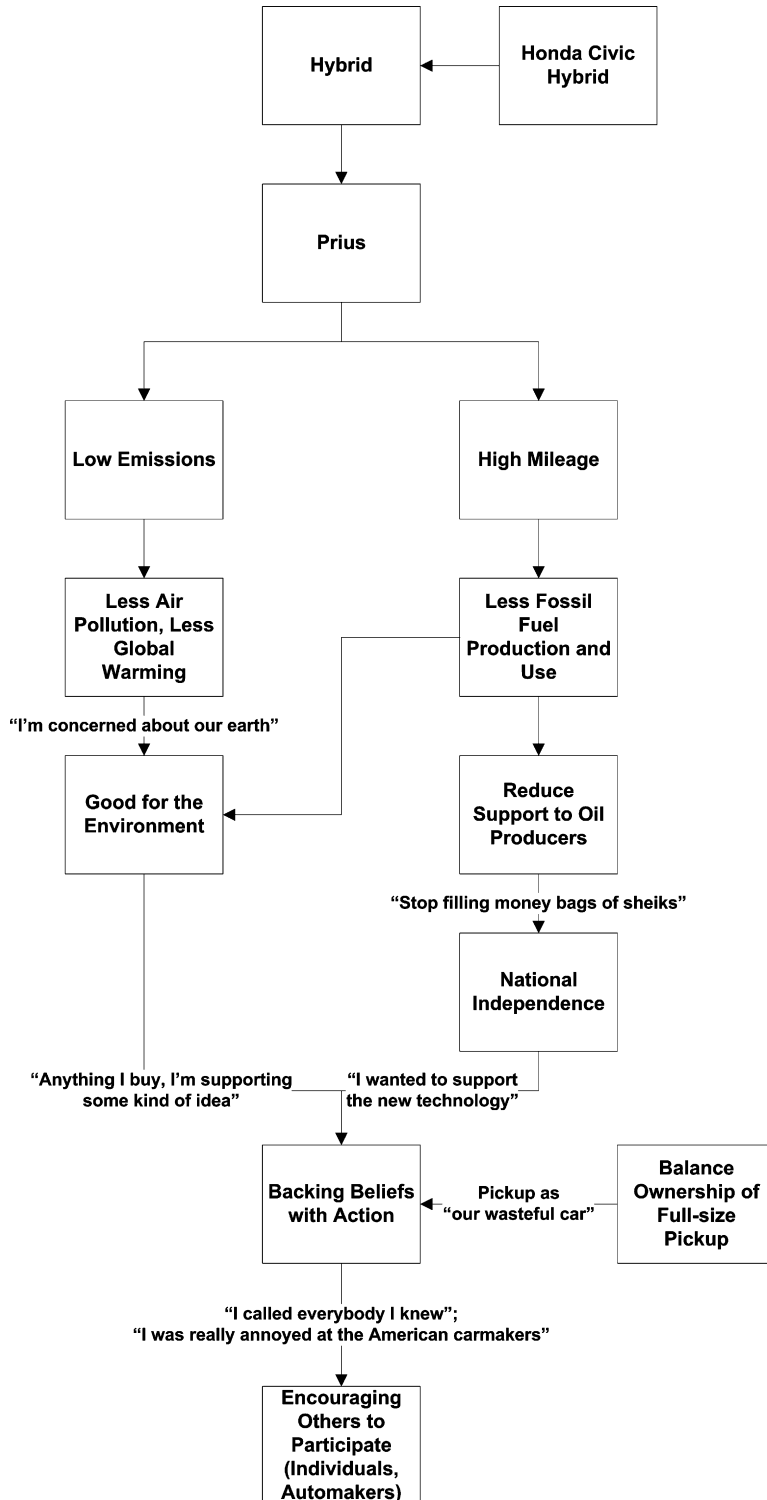


Fig. 2. Bridger semiotic map.

and inadequate,” is excluded from this category and grouped instead with conventional economy cars. Initially, the Bridgers were interested in a 2003 Toyota Prius, but the car’s small size and resemblance to a conventional economy car were issues for Tony. When a friend informed them the 2004 Prius would be a new design, they decided to wait. Seven months later (during which time they managed with only one vehicle, the pickup truck) the Bridgers took possession of their HEV.

For the Bridgers, the Prius accomplishes both low emissions and high mileage. Low emissions connects to less air pollution and lower global warming impacts, and thus to the denotation that HEVs are “good for the environment.” Both Tony and Ellen express concern for the natural environment, although they differ somewhat in the intensity of their views. Tony believes that while his wife is an “emotional environmentalist,” he is a “practical environmentalist” who supports a reasoned assessment of environmental issues and balances environmental goals with other objectives.

For Tony, one of these other objectives is using less foreign oil. For him, the HEV signifies less fossil fuel production and use, which connects to the idea of sending less money to oil producers overseas. Specifically, Tony is interested in de-funding the “oil sheiks” and OPEC governments who he believes manipulate energy prices and finance terrorism. His HEV serves as a symbol not just of consuming less oil, but of gaining independence from foreign governments who are hostile toward the US.

This balance of meanings can be essential for some HEV buyers. While both the Bridgers were attracted to the HEV’s environmental denotation, Tony was interested in more than a “green” vehicle. In fact, he explained that occasionally he was concerned that his Prius could portray him as a radical environmentalist rather than the sensible, environmentally aware Republican he perceived himself to be. For Tony, it was important that the HEV have two denotations: pro-environment and independence from foreign oil. The Bridgers’ divergent views became evident when they discussed the expansion of oil production in North America, including drilling in the Arctic National Wildlife Refuge (ANWR). While Ellen opposed any exploration in ANWR because of the environmental harm it could cause, Tony espoused what he saw as a more pragmatic approach, noting that oil from ANWR would reduce US dependence on OPEC and probably could be achieved without spoiling the environment. For him, both the environment and national independence were important, and his Prius symbolized these two ideas.

The Bridgers do agree that buying an HEV was not about saving money: “for us it was not an economic decision” Tony explains. They have heard others (including a close friend of Tony’s) argue that it is not worth it to pay “several thousand” dollars more for hybrid technology, but they feel that these people do not quite understand what HEVs are all about. While the idea of saving money was not a primary motivation for their purchase, the Bridgers are not oblivious to finances. For example, they accelerated the purchase of their HEV to maximize their federal income tax deduction. Interestingly, the federal tax benefit also reinforced the HEV’s environmental denotation for the Bridgers. In a moment of post-purchase validation, Tony was preparing his taxes using a popular tax software product. As the software guided him through the deductions, Tony remembers happily affirming that he had purchased a “green vehicle.” While he was unsure exactly how much his HEV reduced air pollution, the software confirmed that the vehicle was considered “green” by the US government. Though offered light-heartedly by Tony, this story illustrates how symbols come to be reproduced and exchanged in myriad ways.

For the Bridgers, the denotations of national independence and environmental preservation connect to the connotation of backing one’s beliefs with action. The couple viewed their HEV purchase as providing support for a new technology that fit with their values. For this household, the Prius also served as a counterweight to their pickup truck, whose poor fuel economy conflicted with the ideas of polluting less and consuming less oil from overseas. Both expressed some guilt about the “gas-guzzler on the other side of [the] garage,” and acknowledged that it symbolizes some ideas, such as wastefulness, that are in opposition to the symbolic meanings of their HEV.

The Bridgers also connect their HEV to the meaning of community involvement. The couple are members of a church congregation that includes numerous other HEV owners. The Bridgers enjoy educating others about HEVs, and have spent time talking with strangers who inquire about the vehicle. Not only do they hope to influence other consumers to make HEV purchases; they also want to cause automakers to produce more HEVs. Through buying an HEV, the Bridgers believe they have initiated a dialog with the automobile manufacturers, particularly the American manufacturers who have been slow to develop hybrid technology.

Finally, although the Bridgers talk about “support[ing] the new technology,” they are not technophiles. They never talk about the hybrid technology per se (except to mention their concern about the battery). When they do mention specific technological features, they focus on non-powertrain elements such as the keyless entry. This is common among hybrid owners in this sample, many of whom have only a basic understanding of how hybrid powertrains function. For these users, features such as keyless entry or a navigation system serve as visible reminders that their vehicles incorporate the latest technology. In the Bridgers’ case, technology is a means to an end. By purchasing an advanced-technology vehicle, they access the idea of themselves as people who act on their beliefs and encourage others to do the same.

3.3. The Halls

Richard and Diane Hall are professionals in their forties with three school-aged children. At the time they purchased their Toyota Prius in 2001, Richard was an executive at a San Francisco Area technology company and Diane was a full-time mother. Fig. 3 shows the semiotic map for the Halls. Both Richard and Diane see their Toyota Prius as part of a larger category of hybrid vehicles, which includes compact HEVs such as the Honda Civic Hybrid and the Honda Insight, but cannot include large SUVs (even those with hybrid powertrains). The Halls exclude SUVs because of the strong negative symbolic meanings they perceive in these vehicles. SUVs, they explain, are wasteful and dangerous, and often are driven by people who are selfish, inconsiderate, and preoccupied with social status. These symbolic meanings are incompatible with HEVs, which link to connotations such as caring about others and building community.

The Halls explain that their Prius is different from a conventional car in two ways: it is more efficient and more advanced. These ideas are represented by the silent, all-electric acceleration (a feature they nicknamed “stealth mode”). Each time their Prius operates in electric mode, it affirms the ideas of higher efficiency and technological superiority. But high efficiency is not important for its own sake; it results in less waste and more frugal use of fuel, which leads to lower emissions and therefore reduced environmental impact. As Diane explained, doing less environmental harm now meant securing a better future for herself and her children—who would enjoy a cleaner world rather than one that was stripped of its wealth and heavily polluted. Reducing their environmental impact also fits with a “lifestyle” that Richard and Diane had been gradually embracing during the past few years. This lifestyle involves thinking more about the impact their lives had on others. Increasingly, they ask themselves what they could do (or stop doing) to be a more positive influence in the world. As a result, Diane had become more active in local political organizing, Richard had begun looking at investments in clean energy, and both had become more involved in their children’s schools.

Higher efficiency also links to the idea of using less gasoline and being able to control their resource use. “So much is out of our control” Diane explained, bewildered at how little influence she was able to exert over critical things like whether the food her family ate contained chemicals or genetically-modified organisms. For the Halls, using less gasoline means shifting the balance of power back to the consumer. They feel they are making less of a contribution to the oil companies, who they see as dishonest warmongers. Like the Bridgers, they also believe that their hybrid purchase makes a statement to automakers, rewarding those companies who manufacture environmentally-sensitive products.

Being ahead of others (especially peers at work) in a new technology also played a central role for Richard. A self-proclaimed “car guy,” he became interested in HEVs when they first appeared in *Motor Trend* magazine, and visited a dealership to test drive the first-generation Toyota Prius soon thereafter. During his test drive, Richard characterized the Prius as “geek-a-rific” and an ideal vehicle for someone like himself in a high-technology field. The new technology symbolized two key ideas for him: intelligence and distinctiveness. The technology was “smart” because it was better than conventional vehicles, and it was sure to be adopted in all automobiles over time. Richard said companies that resisted the move to hybrids are stupid; he believes widespread adoption of this innovation is inevitable. Richard also felt that the new technology was distinctive. In fact, it was ultimately this uniqueness that sold Richard on an HEV. While the Prius was much smaller and less powerful than the European luxury cars he was accustomed to driving, it really stood out. He explained, “the Prius was so different, I had to give it a shot.”

Richard’s HEV immediately attracted attention, something other owners in online user forum had told him would happen. With a smile, he recalled how a neighbor’s “jaw dropped” when he silently backed out of his

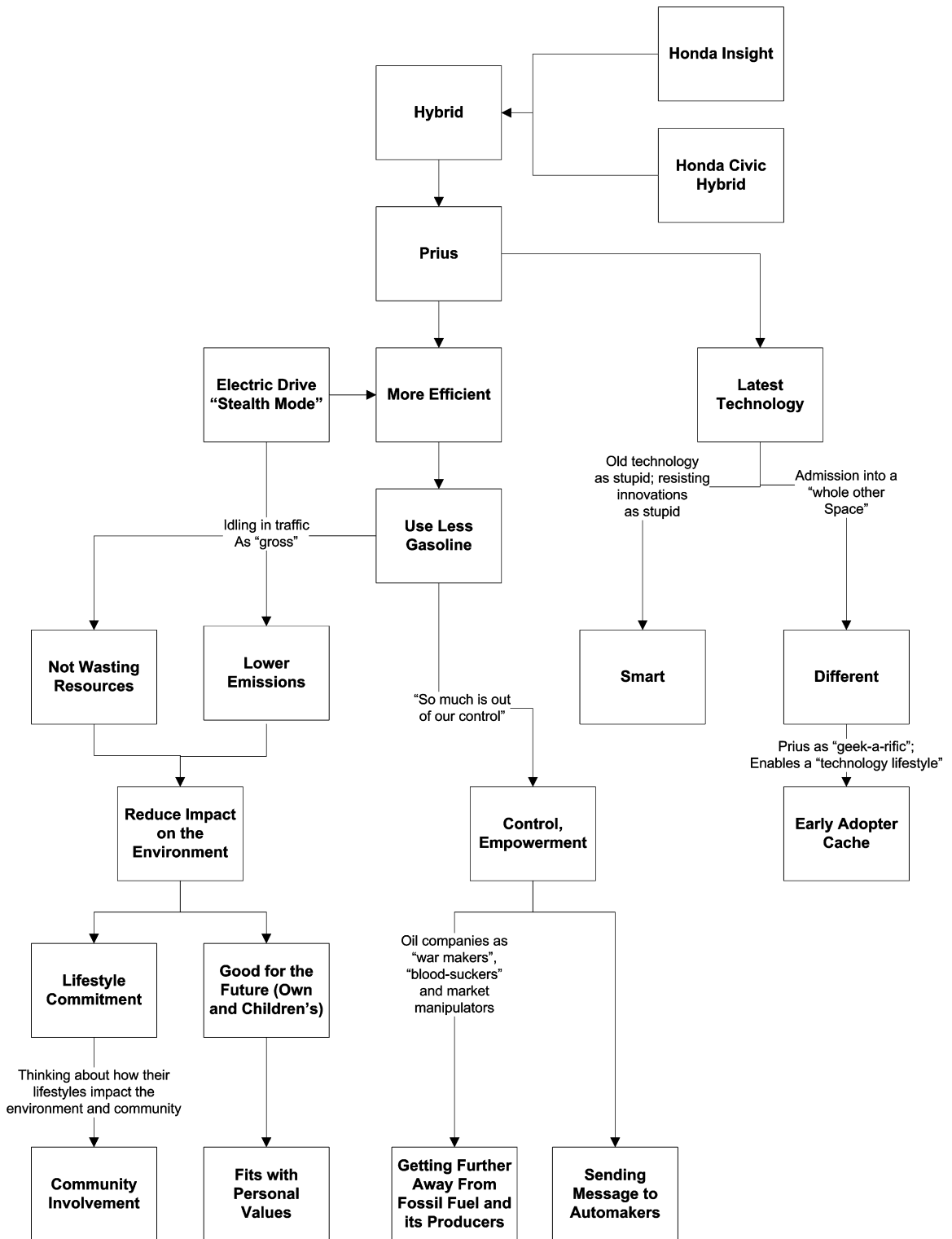


Fig. 3. Hall semiotic map.

driveway, and how a crowd of curious onlookers gathered around his car while he dropped a passenger at the airport. Richard was pleased that his car was so unique, both in its quiet powertrain and its styling. In the

professional culture of Silicon Valley, tremendous faith is placed in the power of new technologies, and people are often judged according to their ability to visualize and develop innovations. While interest from strangers was nice, Richard notes it was his colleagues who really understood his HEV. According to Richard, “those in the know. . . who are working on all kinds of higher-tech things” were the ones who recognized that his HEV was not just another compact car.

Still, the meanings of the Prius were problematic for Richard. It was good to be seen as a technological innovator. Being seen as someone doing something good for the environment was fine too, so long as it did not go too far. But the Prius was smaller and had lower performance than the BMW 5-series it replaced, and Richard was concerned he might be seen as a “tree-hugger” driving an econo-box. He wanted to continue to display himself as a car enthusiast who was interested in performance. To balance the environmental and performance-oriented aspects of himself, he proceeded to drive the Prius “with my foot to the floor” during his first months of ownership, sacrificing some fuel economy to attain an appropriate mix of symbolic meanings.

3.4. *The Grahams*

Ron and Jill Graham are a couple in their late-forties and parents of pre-teen daughter. Ron is a stay-at-home dad and volunteer environmental activist. Jill, a financial services executive, also is concerned about the environment, although she is less an activist than her husband. The Grahams own both a first generation (2001) and second generation (2004) Toyota Prius. Like many other households in this study, they also own a light truck. Before they bought the second Prius, the pickup truck was Ron’s primary vehicle, but now the Grahams use it sporadically to carry kayaks to the river, haul rubbish to the landfill, and for other specialized purposes.

Both Ron and Jill speak readily about the meanings they ascribe to their HEVs. They say their two Priuses are “symbols” and claim that the vehicles “made a statement” to others. In fact, Ron and Jill are critical of visually less distinctive HEVs such as the Honda Civic Hybrid that they feel do not communicate meanings as effectively as the Prius. Fig. 4 illustrates the semiotic map for the Grahams and their HEVs. Like Tom Lay, the Grahams borrowed meanings from BEVs. According to Ron, HEVs were “like EVs, but could be used on [long] trips”—essentially electric vehicles with unlimited range.

For the Grahams, the Prius symbolizes “high efficiency,” a meaning that is reinforced by the vehicle’s engine shut-off feature. High efficiency is connected to the idea of lower resource consumption, and lower oil consumption in particular. Consuming less oil was linked to two other concepts. One was minimizing their support for the war in Iraq, which they characterized as “killing for oil.” The other was the idea of lower emissions, which were seen to be good for the environment. Thus, the product attribute of high efficiency was ultimately linked to the denotations of opposing war and preserving the environment.

The Grahams link these denotations to three connotations: ethics, intelligence, and concern for others. Through further statements, e.g., “stupid, unethical people wage war,” they linked their choice of a Prius to a contrasting image of themselves as intelligent, ethical people. “When you pick a Prius” Jill explained, “you are thinking of the broader society, and not just what’s in it for you.” Wishfully, Ron talked about the improvements that could be made if every family had an HEV, encouraging us to “think about all the pollution that would be saved.”

Yet Ron understood that many of his neighbors did not share his enthusiasm. With some irritation, he discussed a recent episode at a local youth softball game. Several owners of large SUVs had ignored parking guidelines, blocked other vehicles, and then responded angrily to the suggestion that they move their vehicles. While the environmental impact of large SUVs concerned him, Ron was more upset about the attitudes of these owners. “Beyond selfish,” he said, deeming SUVs the “antithesis” of HEVs and his community orientation.

The Grahams also characterize their HEVs as symbols of intelligence and awareness. Jill explained that HEV buyers look beyond advertising, and consider the political and environmental effects of their vehicle purchase. HEV ownership is smart because it offers a solution to the wide-ranging negative impacts of petroleum consumption. For Ron, intelligence was strongly linked to efficiency: those who conserved natural resources and used them efficiently were intelligent. “Hybrids are intelligence” he explained, “and SUVs are stupidity.”

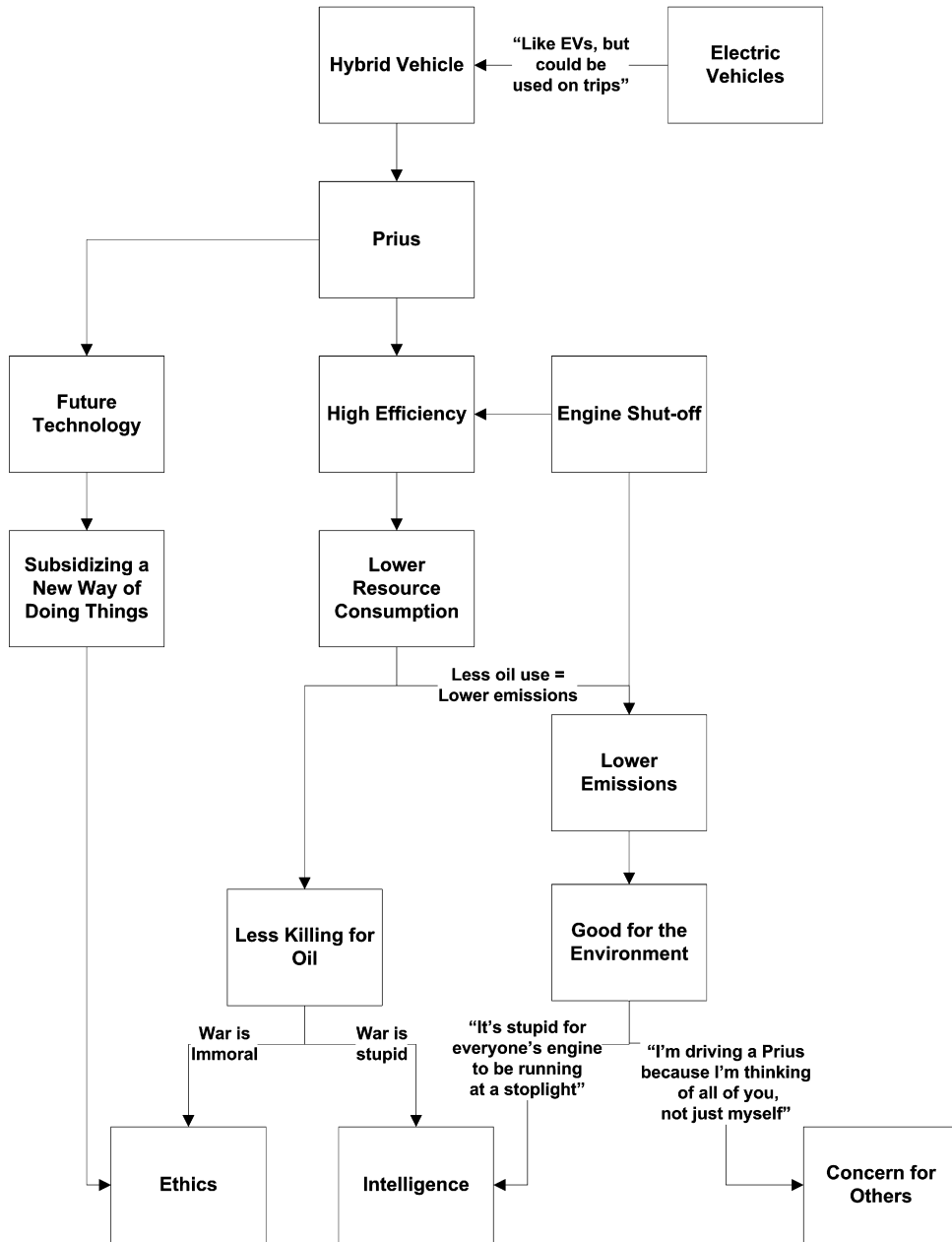


Fig. 4. Graham semiotic map.

4. Discussion: What are all the meanings?

Among the 25 households in this study, five denotations emerged that had major influence on HEV purchases. These denotations are listed in the top row of Table 1. Associated with each denotation is between one and four connotations, shown in the bottom row of Table 1. For example, some households saw their HEVs as symbols of preserving the environment, and linked environmental preservation to the ideas of being an ethical person who is concerned about others. No single household expressed all the denotations and connotations shown in Table 1. Further, households were not always influenced by the same connotations, even if they did agree on the same denotations. For example, two households may both view managing personal

Table 1
The meanings of HEVs among the sample households

Denotations	Preserve the environment	Oppose war	Manage personal Finances	Reduce support to oil producers	Embrace new technology
Connotations	Ethics Concern for others Community orientation Intelligence/awareness	Ethics	Maturity/sensibility Ethics Intelligence/awareness	Personal independence National independence	Individuality Advocate to manufacturers

finances as the most important meaning of the HEV, but one household may emphasize the ethics connotation while the other stresses the connotation of intelligence/awareness. Finally, Table 1 should not be interpreted as a “model” of the early market for HEVs, but rather as a list of symbolic meanings that were important to early HEV buyers in this study.

4.1. Preserve the environment

Many households acknowledged purchasing their HEVs as a response to environmental concerns. However, most had only a basic understanding of environmental issues or the ecological benefits of HEVs. Rather than buying their HEVs with measurable environmental goals in mind, most of the individuals in this study bought a symbol of preserving the environment that they could incorporate into a narrative of who they are, or who they wish to be.

Households who emphasized the preserving the environment denotation connected this meaning to one or more connotations: ethics, concern for others, community orientation, and intelligence/awareness. For households that view the HEV as a symbol of ethics, HEV ownership is a choice between right and wrong. As one owner explained, owning an HEV did not merely reflect environmental views; it was “the right thing to do” and demonstrated that she was a person with strong ethical values. In addition, this participant viewed her HEV as a means to transmit her values to others. Her children increasingly looked to her as a role model, and she hoped her HEV would demonstrate the consistency that existed between her personal ethics and the choices she made, including her transportation choices.

Other households viewed their HEVs as symbols of concern for others. Buyers characterize the HEV as providing benefits to a group that is larger than the HEV owner, and describe HEV ownership as “altruistic” or as “something you do for the world.” Frequently, the other people that HEV owners are most concerned about include their children or grandchildren: members of future generations who HEV owners fear will be most affected by environmental degradation or other negative consequences of motor vehicle use. In addition, numerous households talked about suppressing “selfish” desires for vehicles with more power, luxury, or prestige when buying their HEVs. As one Toyota Prius owner explained, “you don’t buy a Prius to stand out from the crowd. You buy a Prius because you care.”

For some owners, the HEV also symbolizes a community orientation. These HEV owners view society as a community in which collective issues, including environmental issues as well as broad social problems, can be resolved through collaboration. They feel a personal responsibility to participate in solutions to these issues, and see their HEVs as symbols of “making a difference.” In addition, they hope that their HEV ownership will set an example for others, causing other people to buy HEVs and creating a future in which “everyone drives hybrids.” The future they envision not only has an improved environment; it is also enjoys greater cooperation among its inhabitants.

Finally, some households associate their HEVs with the connotation of intelligence/awareness. These HEV owners believe they possess a heightened awareness of environmental problems, as well as the intelligence to comprehend the severity of these issues. They express frustration with those who seem to be either unaware or unconcerned about environmental degradation. “People should be better informed,” insisted one participant, who is so zealous about educating others that she offers strangers rides in her HEV and distributes sales brochures to anyone who expresses interest in her HEV.

4.2. *Oppose war*

All of the denotations ascribed to HEVs by households in this sample are historically as well as culturally situated. Of the denotations discussed here, opposition to war likely depends most on recent events for its meaning and importance. Numerous households discussed the ongoing war in Iraq, as well as the history of US military action in the Middle East. Not all saw themselves as pacifists who oppose war in general, but they questioned this war's underlying causes. They characterized the US invasion of Iraq in March 2003 as "killing for gasoline," the latest example of the US applying deadly force to secure its share of dwindling petroleum supplies. "Killing for gasoline" seemed unethical to these households and conflicted with their views of themselves as moral individuals. By purchasing HEVs that used less oil, these households could speak out against "war that results from oil dependence." Thus, HEVs don't just symbolize opposing war. They symbolize opposition to a particular type of war (war over resources) that violates the personal ethics of HEV owners.

4.3. *Manage personal finances*

Whether HEVs save their owners money has been widely discussed in the popular press (see for example, Valdes-Dapena, 2005; Consumer Reports, 2006). Most of these analyses compare the costs of an HEV to an assumed comparable vehicle. However, past research shows that few consumers conduct this type of analysis (Turrentine and Kurani, 2007). Among the households in this study, none who emphasized the denotation of managing personal finances conducted a comparative cost analysis before purchasing their HEV. In addition, only one household consistently tracked fuel expenses. Many HEV owners are interested in finances, but rather than performing financial calculations, they appropriate and incorporate a symbol of sound financial decision making into stories about themselves.

HEV owners linked their vehicles to three underlying connotations: maturity/sensibility, ethics, and intelligence/awareness. To some buyers, the HEV's high fuel economy symbolizes a transportation choice for sensible people. "I bought it purposely for the mileage" explained one owner, stressing the calculated purpose behind his vehicle choice. The connotation of sensibility is particularly important for households that want to balance the environmental meanings of their HEVs. One couple proudly declared that their Toyota Prius was an altruistic purchase because it was good for the environment, but then quickly added that "economics drives our behavior." As with other HEV owners, this couple did not calculate whether their HEV actually saved them money. Instead, they were attracted to the vehicle's ability to portray them as people who care about society but who also make sensible choices. Young HEV owners often linked sensibility with the connotation of maturity. One college-aged owner noted that her peers typically bought the same vehicles that their friends owned; adults, in contrast, focused more on practical concerns (such as fuel costs) and were willing to buy new types of vehicles like HEVs. Thus, her Civic Hybrid not only symbolized managing personal finances; it also identified her as more mature than her peers. Another young buyer agreed. After buying a Honda Insight, he was ridiculed by male friends, most of whom drove large pickup trucks and SUVs. The young Insight owner eagerly anticipated high gasoline prices that would demonstrate the wisdom and maturity of his HEV purchase.

The connotation of ethics is also linked with managing personal finances. For some HEV owners, frugality is perceived as an ethical obligation more than just a prudent financial choice. One participant characterized her cost-consciousness as a personal value that was instilled in her by her parents. "Saving money is always something you have to do," she explained. HEV owners also see their vehicles as symbols of intelligence and/or awareness. Many believe that gasoline prices will rise in the future, and HEVs represent an intelligent response to higher prices. Owners characterize HEVs as "intelligent," the HEV purchase as "a smart decision," and themselves as "smart consumers" or "intelligent people." These owners also are concerned that the general public remains unaware of the coming energy crisis, so they attempt to share their knowledge with others. While HEV owners receive no financial gain from their advocacy efforts, educating others about HEVs does reinforce their ideas of themselves as intelligent, aware people who have discovered a solution to a serious problem.

4.4. *Reduce support for oil producers*

HEVs also symbolize reducing support for oil producers: multinational energy companies and the governments of oil-producing nations, including Middle Eastern oil-producers. Some HEV owners accuse oil companies of manipulating domestic and international politics, fouling the environment, and inflating profits by gouging hardworking consumers. In addition, they see Middle Eastern governments as generally hostile to the US, and charge them with engineering oil supply disruptions and supporting Islamist terrorists. The solution for these HEV owners is to use less petroleum so as to minimize the financial payments they make to these companies and countries.

Two connotations are linked to the reducing support for oil producers denotation: personal independence and national independence. Some owners feel that their HEVs make them less vulnerable to the seemingly unpredictable actions of oil producers, granting them greater personal independence from entities they characterize as exploitative, cruel, or malevolent. These households characterize HEV ownership as “empowering,” a feeling that is reinforced as they realize they are making few trips (and fewer payments) to the gas station. Other owners emphasize the connotation of national independence. For them, the HEV symbolizes less reliance on unfriendly foreign regimes. “I don’t like being held over the barrel,” explained one owner who was discussing his relationship to OPEC governments, “I want to see them suffer.” Like other participants, this HEV owner was not an expert in energy issues, nor did he have a detailed understanding of which nations supply the US with oil. But for those who see their HEVs as symbols of national independence, memories of 1970s oil embargos, combined with recent images of Islamist terrorism, lead to intense distrust of Middle Eastern governments. The HEV symbolizes freedom from this perceived energy tyranny.

4.5. *Embrace new technology*

Finally, many owners were motivated by their perception that HEVs are new, advanced technology vehicles. However, few owners had more than a basic understanding of the hybrid-electric powertrain. They were more likely to talk about visible features: the engine shut-off, low-speed all-electric mode, or real-time fuel economy displays. As evidence of “high-technology,” some even pointed to features that are not unique to HEVs, such as the Honda Civic Hybrid’s blue dashboard lighting or the Toyota Prius’ keyless entry system.

The connotation of individuality is linked to the embracing new technology denotation. Because HEVs are a new type of vehicle, they distinguish their owners as “a little different” from their peers. One owner explained, “I wanted to make my statement. I wanted to be the one on the block that had the Prius.” He revealed that he was often the first among his friends to try something new, and that he saw innovativeness as an aspect of his identity. Other participants described themselves (and their HEVs) using similar terms. “I get a little bit of pleasure out of being a little ahead of the crowd, or doing something that stands out,” explained another owner. The connotation of individuality was particularly strong for some young HEV owners. One woman who had purchased a Honda Civic Hybrid while still in high school explained how her HEV made her unique among her peers: “I’m excited to be one of the few... a young driver with a hybrid vehicle... no one has one.”

Owners also see their HEVs as symbols of advocating to vehicle manufacturers. By purchasing an HEV, households see themselves as providing support to automakers that have developed hybrid technology, and punishing those who have not. Many talk about “supporting hybrid technology,” and some characterize their HEV purchase as their “vote” for producing cleaner, more efficient vehicles. For these owners, participation in this perceived dialog is new and exciting. They believe that, for the first time, their voices are heard in the debate about energy and transportation. One household explained that the \$3000 difference between their Honda Civic Hybrid and a conventional model was worthwhile because, while it would never be recouped through fuel savings, paying the premium sent an important message to automakers about consumer demand for HEVs.

5. **Why would anyone buy a hybrid electric vehicle? An answer**

HEV owners interviewed for this study bought a rich set of meanings they then used in the construction of narratives of self-identity. Thus, the HEV not only provides its owner with transportation, it also provides

symbolic meanings that owners can incorporate into better stories about themselves (Kurani et al., 2006). The symbolic meanings associated with HEVs are multiple and multi-layered, including widely recognized ideas like preserving the environment, opposing war, saving money, reducing support for oil producers, and owning the latest technology. But these denotations are linked to more personal connotations, such as concern for others, ethics, maturity, national independence, or individuality. Stereotyping HEV owners as “liberal tree-huggers” or “techno-geeks” oversimplifies the identities of these individuals. For example, most buyers in this study—even those who stressed the environmental denotation—had limited environmental knowledge and personal histories of environmental activism, yet perceived the HEV’s environmental meanings as a means to access more personally-relevant connotations. Their HEV purchases were about constructing and communicating—through a widely recognized environmental symbol—that they are (for example) intelligent, moral people who care about others.

The symbolic meanings HEV owners see in their vehicles vary across households. Some owners see themselves protecting their families’ futures through reduced pollution and oil use symbolized by the all-electric launch of some HEVs. Others celebrate making a sensible, mature choice, a feeling that is reinforced each time the fuel economy display shows a reading of 99.9 miles per gallon. Some see themselves as part of a technological vanguard, whether or not they can explain how a hybrid drivetrain works. And in some households the important symbols include things other than the vehicle. If rising fuel prices stoke anger at oil producers in some households, then HEVs provide the tool to strike back, to exert some measure of personal control. More than just the vehicles’ high fuel economy, passing by a gasoline station without having to stop to refuel or telling other drivers at gasoline stations about their HEV are moments during which this control is exerted.

Since this study consulted with a small sample of HEV owners in a limited though crucial market, it is likely that additional symbolic meanings exist beyond the denotations and connotations identified here. As HEVs persist in the marketplace and as the variety of models expands, established meanings will evolve and new meanings will be added. New buyers may be motivated by novel meanings that were not recognized by earlier buyers. This is already evident. Originally cast as clean air and energy conservation tools for liberal environmentalists, HEVs have been redefined by neo-conservative nationalists as symbols of combating US dependence on foreign oil (Bryce, 2005). New meanings will also emerge as HEVs gain popularity in markets outside of the US.

As shown by the stories told here, narrow critiques of HEVs on short-term financial grounds strip away essential symbolic meanings. As a result, many critics are confused by what they see happening with high-fuel economy HEVs—or more likely, are inclined to describe HEV buyers as confused. Such criticism ignores the importance of symbols and their connection to the identities of many HEV buyers, and by extension, the role of symbolism in the market for automobiles in general. Stripping HEVs of their meanings, reducing them to private fuel cost savings, is a normative statement about what people should value and how that value should be assessed. This further strips HEV buyers of the richness of their actual or potential identities. The overall approach used in this paper—a small sample of interviews in which each household was asked a largely customized set of questions related to what a new product means to them—leads to a deeper understanding of the development of markets for products whose value is (primarily or partially) social or environmental. This deeper understanding of the complexity of consumers’ efforts to tell better stories about themselves will enhance our ability to shape rather than merely extrapolate our future.

References

- Aaker, J., 1997. Dimensions of brand personality. *Journal of Marketing Research* 34, 347–356.
- Barthes, R., 1967. *Elements of Semiology*. Jonathan Cape, London.
- Beggs, S.D., Cardell, N.S., 1980. Choice of smallest car by multi-vehicle households and the demand for electric vehicles. *Transportation Research A* 14, 380–404.
- Bryce, R., 2005. As Green as a Neocon. *Slate*. 25 January. Available from: <<http://www.slate.com/id/2112608>>.
- Bunch, D., Bradley, M., Golob, T., Kitamura, R., Occhiuzzo, G., 1993. Demand for clean fueled vehicles in California: a discrete-choice, stated preference survey. *Transportation Research A* 27, 237–253.
- Calfee, J.E., 1985. Estimating the demand for electric automobiles using fully disaggregated probabilistic choice analysis. *Transportation Research B* 19, 287–301.
- Chandler, D., 2002. *Semiotics: The Basics*. Routledge, New York.

- CNW Market Research, 2006. Hybrid Motivators. Report #135Q, Bandon.
- Consumer Reports, 2006. The Dollars and Sense of Hybrid Cars. Available from: <<http://www.consumerreports.org/cro/cars/new-cars/high-cost-of-hybrid-vehicles-406/overview.htm>>.
- Derbaix, C., Vanden Abeele, P., 1985. Consumer inferences and consumer preferences. the status of cognition and consciousness in consumer behavior theory. *International Journal of Research in Marketing* 2, 157–174.
- Ericksen, M., 1996. Using self-congruity and ideal congruity to predict purchase intention: a European perspective. *Journal of Euro-Marketing* 6, 41–56.
- Flink, J., 1988. *The Automobile Age*. MIT Press, Cambridge, MA.
- Geertz, C., 1973. *The Interpretation of Cultures: Selected Essays*. Basic Books, New York.
- Giddens, A., 1991. *Modernity and Self-Identity*. Stanford University Press, Stanford.
- Gjøen, H., Hård, M., 2002. Cultural politics in action: developing user scripts in relation to the electric vehicle. *Science, Technology, and Human Values* 27, 262–281.
- Grubb, E., Hupp, G., 1968. Perception of self, generalized stereotypes, and brand selection. *Journal of Marketing Research* 5, 58–63.
- Grubb, E., Stern, B., 1971. Self-concept and significant others. *Journal of Marketing Research* 8, 382–385.
- Heffner, R., Turrentine, T., Kurani, K., 2006. A primer on automobile semiotics. Research Report UCD-ITS-RR-06-01. University of California-Institute of Transportation Studies, Davis.
- Kurani, K., Turrentine, T., Heffner, R., 2006. Narrative self-identity and societal goals: automotive fuel economy and global warming policy. In: Sperling, D., Cannon, J. (Eds.), *Driving Climate Change*. Elsevier, Burlington.
- Lee-Gosselin, M.E.H., 1996. Scope and potential of interactive stated response data collection methods. In: *Household Travel Surveys: New Concepts and Research Needs, Conference Proceedings 10*, Transportation Research Board, Washington, DC.
- Malhotra, N., 1981. A scale to measure self-concepts, person concepts, and product concepts. *Journal of Marketing* 18, 456–464.
- Marsh, P., Collett, P., 1986. *Driving Passion*. Jonathan Cape, London.
- McAdams, D.P., 1996. Personality, modernity, and the storied self: a contemporary framework for studying persons. *Psychological Inquiry* 7, 295–321.
- McCracken, G., 1988a. *Culture and Consumption*. Indiana University Press, Bloomington.
- McCracken, G., 1988b. *The Long Interview*. Sage, Newbury Park.
- Mishler, E., 1986. *Research Interviewing*. Harvard University Press, Cambridge, Mass.
- Oregon Environmental Council, 2003. *Survey of Oregon Hybrid Gas-Electric Car Owners*. Portland.
- R.L. Polk & Company, 2007. *New Hybrid Registrations Calendar Year-to-Date December 2006*.
- Rapaille, G.C., 2004. *Seven Secrets of Marketing in a Multi-cultural World*. Tuxedo Productions, New York.
- Reynolds, T., Gutman, J., 1988. Laddering theory, method, analysis, and interpretation. *Journal of Advertising Research* 28 (1), 11–31.
- Santini, D.J., Vyas, A.D., 2005. Suggestions for a new vehicle choice model simulating advance vehicles introduction decisions (AVID): structure and coefficients. Center for Transportation Analysis, Argonne National Laboratory. ANL/ESD/05-1.
- Saussure, F., 1965. *Course in General Linguistics*. McGraw Hill, New York.
- Schutt, R., 2004. *Investigating the Social World*. Sage Publications, Thousand Oaks.
- Sirgy, M.J., 1985. Using self-congruity and ideal congruity to predict purchase motivation. *Journal of Business Research* 13, 195–206.
- Steg, L., Vlek, C., Slotegraaf, G., 2001. Instrumental-reasoned and symbolic-affective motives for using a motor car. *Transportation Research F* 4, 151–169.
- Turrentine, T., Kurani, K., 2007. Car buyers and fuel economy? *Energy Policy* 35, 1213–1223.
- US Department of Energy ,2007. *Fuel Economy Guide*. Office of Energy Efficiency and Renewable Energy, Report DOE/EE-0314, Washington DC.
- Valdes-Dapena, P., 2005. Hybrids: Don't Buy the Hype. *Money*. September 26, 2005. Available from: <http://money.cnn.com/2005/09/23/Autos/hybrid_alternatives/index.htm>.
- White, J.B., 2005. Doing the hybrid math: rising gas prices have consumers, auto maker calculating the difference. *Wall Street Journal*, 26 September.
- Zaltman, G., Coulter, R., 1995. Seeing the voice of the customer: metaphor-based advertising research. *Journal of Advertising Research* 35, 35–52.