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Abstract

Hybrid electric vehicles (HEVs) have image, or symbolic benefits, in addition to their functionality. This study examines the images that ten HEV–owning households saw in their vehicles, and the impact symbolic benefits had on these consumers' decisions to purchase HEVs. In general, all of the HEV owners perceived some image in their vehicles, although these images varied in their strength and significance. The majority of households saw their HEVs projecting images that were linked to larger values, including social awareness, responsibility, and concern for others; others connected their HEVs to images of frugality and intelligent consumerism. HEVs served as communication mechanisms in all households, either by projecting their images or by stimulating owner evangelism. In addition, for a handful of participants, the symbolic benefits of their HEVs were significant enough to justify substantial functional compromises.

Keywords: HEV (hybrid electric vehicle), market, marketing, sales

Introduction

Automobiles[a] are widely acknowledged to provide more than just transportation; they have meaning, or symbolic benefits, apart from their functionality. These symbolic benefits influence consumers' choices of vehicles. One individual may purchase a luxury sedan in order to portray himself as affluent and sophisticated; another may buy a sports car to project an image of youth and bravura. As General Motors' Vice-Chairman Bob Lutz explains, "aspirational aspects overwhelm the functional differences" when many consumers make car purchases [1]. In other words, a car's ability to make us who we want to be is often more important than its functionality. Researchers in a variety of academic disciplines, including psychology [2], transportation policy [3], consumer behavior [4,5,6,7,8], and economics [9] all have observed the influence of automobiles' symbolic benefits.

While poorly understood, symbolic benefits may be responsible for major trends in automobile sales. In the United States, the rapid adoption of sport-utility vehicles (SUVs) and light trucks is attributed in part to consumers' fondness for the image of these vehicles [10,11,12]. If symbolic benefits have contributed to the popularity of light trucks, is the same phenomenon also fueling the unexpectedly high demand for gasoline-hybrid electric vehicles (HEVs)? While the message sent by these two types of vehicles is dramatically different, their ability to communicate identity may be similar. Past studies show that many HEV owners recognize their vehicles have a "green image" that makes a strong statement about values such as social responsibility [13]. At the time of purchase, it is possible that many of these consumers were influenced at least somewhat by the strong symbolic benefits of their HEV. This paper investigates the symbolic benefits hybrid owners associate with their vehicles, and explores the role these benefits play in their decisions to purchase an HEV.

Literature Review

Many consumers see meaning, or symbolic benefits, in automobiles. These symbolic benefits are "significance that goes far beyond [the car's] utilitarian, functional, and commercial value" [14]. Symbolic benefits are the "image" of the vehicle, qualities that give it a personality [15] and sometimes even create a "human-like aura" around it [16]. A wide variety of meanings can be

[a] The terms "automobile" and "car" refer to all passenger vehicles and include both cars and light trucks.

attached to an automobile, including images of affluence, youth, practicality, ruggedness, or environmental awareness. Consumers evaluate these symbolic benefits along with other aspects of the vehicle. While numerous frameworks exist to characterize the type of benefits that products like automobiles provide [17,18,19], most authors agree that consumers consider more than just functionality. In the case of an HEV, the consumer purchases a vehicle with a hybrid drivetrain. This feature yields functional benefits, such as low fuel consumption. The feature also yields other benefits, including reduced fuel costs (an economic benefit), and silent operation at low speeds (an experiential benefit). In addition, the vehicle may have meaning to other drivers because it has a hybrid drivetrain: for example, it may signal a owner who cares about the natural environment (a symbolic benefit). Consumers evaluate all of these distinct benefits, weighing each appropriately in the purchase decision.

While different consumers may choose to emphasize one type of benefit over another, symbolic benefits affect the car purchasing behavior of most individuals. Past research has demonstrated that individuals see themselves as compatible with some automobiles and incompatible with others based on the "personalities" of the vehicles rather than specific functional attributes [6,20]. Called self-congruity or self-image congruity, this evaluation of compatibility is conducted frequently by consumers, who compare the meanings of products with their own ideas of who they are and who they would like to be. Consumers' assessment of automobiles' symbolic benefits has been shown to affect preferences for certain automobiles [21], purchase intent [5,15], as well as actual ownership [6,20]. Consumers do not just select vehicles that match who they are; they use automobiles to communicate meaning to others. Past studies show that many people notice the symbolic benefits of vehicles, and evaluate others based on what they drive [4,6]. In a process known as consumption stereotyping, individuals interpret the meaning of a vehicle and draw conclusions about its owner. These conclusions can range from simple assumptions about an individual's age and social status to fairly complex predictions of personality, lifestyle, and values [4].

Many consumers use the symbolic benefits of automobiles to establish, reinforce, and communicate aspects of their own identities. It has been widely observed that individuals in modern societies have unprecedented freedom to define who they are, and possessions like automobiles are frequently used as tools in the process of identity-formation. In the words of automobile psychologist G. Clotaire Rapaille, Americans are in "a permanent search of an identity" [22] and "cars are very key…[they are] maybe the best way for Americans to express themselves" [23]. Who we are is not a simple subject; each person's identity is a rich and unique amalgamation of values, attitudes, and numerous other personal characteristics such as age, profession, ethnicity, interests, and social class [24]. Social status is perhaps the most recognized symbolic benefit of vehicles, and research confirms that some automobiles can communicate status [25]. However, vehicles' meanings are not limited to enhancing social status; in fact, certain vehicles have been observed to represent a conscious rejection of status and affluence [16]. Automobiles can have diverse meaning, encompassing many, if not all, of the areas that constitute individual identity. Because they can offer an array of symbolic benefits, automobiles become instruments for consumers to "define, maintain, and enhance their self-concept[s]" [14] and to communicate identity to others [26].

Like other automobiles, HEVs have symbolic benefits, and these benefits have importance to consumers. Research shows that at least some HEV owners purchase their vehicles because the cars have a "green image," are perceived as "socially responsible," and represent "environmental stewardship"; the same study also confirms that some HEV buyers recognize and embrace the communicative ability of their vehicles [13]. It is unclear, however, just how important the symbolic benefits of HEVs were to these consumers, and whether these benefits had a major impact on their purchase decisions. Another study indicates that HEV owners are motivated more by "a commitment to be pioneers" and by their perception of the gasoline hybrid as "the right vehicle for society" [27] than by economic benefits such as fuel cost savings. While this suggests the strong importance of symbolic benefits, further investigation is necessary to confirm the existence of these symbolic benefits and the extent of their influence on HEV purchases.

Market Background

Introduced in the United States in 1999, HEVs are often characterized as low-volume "niche" vehicles popular only with environmentally-minded consumers. Sales of all HEV models totaled 49,569 units in 2003, representing less than 1% of all U.S. vehicle sales [28]. However, two important trends in the HEV market should be noted. The first is that 2004 U.S. sales of HEVs are substantially higher, particularly for the Toyota Prius. In 2004, Toyota updated the Prius, introducing a larger, more efficient, and better-equipped version that was received enthusiastically by consumers. Over 10,000 pre-orders were placed for the vehicle [29], and excess demand persisted throughout 2004, leading most buyers to wait a month or more for delivery. The table below shows 11-month (January – November) 2004 U.S. sales volumes for numerous vehicles, including the Toyota Prius.

Vehicle	2004 Sales (11 mos)
Subaru Forester	51,856
Mercedes E-Class	51,378
Cadillac CTS	50,953
Kia Optima	48,064
Lincoln Town Car	47,837
Toyota Prius	**47,704**
Audi A4	42,235
BMW 5-Series	40,468
Volkswagen New Beetle	39,506
Mitsubishi Lancer	39,333
Mini Cooper	32,222
Toyota Camry	391,958

Table 1: 2004 U.S. Sales Volumes for Various Vehicles (*Automotive News*, December 6, 2004)

The table illustrates that while Prius sales are small compared to a high-volume vehicle like the Toyota Camry, they are similar to many popular vehicles, including the Subaru Forester and the BMW 5-series. It also should also be recognized that the Prius' 2004 sales total comes close to exceeding sales of *all HEVs combined* during the preceding year. If their popularity continues, HEVs like the Toyota Prius are likely to soon outgrow their "niche" label.

The second key trend is the proliferation of hybrid technology into an array of vehicle body styles. Until recently, just three hybrid models were available: the Honda Insight, Honda Civic Hybrid, and Toyota Prius. Two of these models were compact sedans, and one (the Honda Insight) was a two-seater. At the beginning of 2005, nine hybrid models were either available or nearing completion, including three mid-sized SUVs and two full-sized pickup trucks [28]. In addition, automakers have announced plans to release an additional eight HEVs between 2006 and 2008, including two full-sized SUV models [28]. As more hybrid models enter the market, the meanings of HEVs are likely to evolve. In particular, the use of hybrid drivetrains on light trucks has the potential to alter the perception of all HEVs as environmentally-sound vehicles, since hybrid pickup trucks and SUVs will still be outperformed in fuel efficiency by numerous non-hybrid automobiles. It is also possible that HEVs will no longer be categorized as a single group, but will be separated according to their distinct perceived symbolic benefits.

Research Objectives

This study explores why consumers purchase HEVs, focusing specifically on the role of symbolic benefits. It has three research areas:

1. The symbolic benefits HEV owners associate with their HEV and other vehicles
2. Self-congruity and how households apply the symbolic benefits of their HEV
3. The importance of symbolic benefits in the HEV purchase.

The first area addresses whether HEV owners perceive meaning in their vehicles. Assuming symbolic benefits exist, the second area explores whether the vehicle's image is compatible with the identities of its owners, and how these symbolic benefits affect the HEV owners. In other words, are these subjects using HEVs to define and enhance their own identities as past research suggests, or do the symbolic benefits of HEVs serve another purpose? Finally, the third research area encompasses how symbolic benefits influenced the households' decisions to purchase HEVs. In particular, the study will evaluate how symbolic benefits were weighed against functional and economic benefits, such as reduced fuel costs, during the purchase process.

This study does not aim to prove or disprove well-defined hypotheses about HEVs and their symbolic benefits. With so little public research conducted on HEV purchases, formulating such hypotheses would be premature. Instead, the study provides a group of HEV owners with an opportunity to explain their vehicle purchases in their own words, and to define their vehicles' meanings using whatever framework they choose. Due to its small, geographically-concentrated sample, this study's results cannot be deemed representative of the larger population of HEV owners. Instead, its findings are intended to be a qualitative examination that provides a depth of understanding impossible to obtain through impersonal survey methods. This "illustrative sampling" technique has been used successfully in other studies [27], and ultimately can yield a defined set of hypotheses that can be tested using a larger, more representative sample.

Research Methods

Data for this study was collected in interviews with HEV owners in the Northern California area of the United States. The preliminary results given in this report are based on data from the first ten interviews conducted between November 2004 and January 2005; an additional fifteen interviews will be conducted through February 2005. To be eligible for participation, households had to own one of three HEVs: the Toyota Prius, Honda Civic Hybrid, or Honda Insight.

To facilitate discussion, interviews were conducted in participants' homes using an informal, semi-structured format. With two exceptions, each of the households had all of its decision-makers present during the interview. Including several members of a household in the interview is essential since many vehicle purchase decisions are made jointly [27]. Additional family members also can bring unique insights and differing opinions to the discussion, exposing researchers to a broader set of viewpoints. Each interview lasted roughly two hours and included the following:

1. *Household Vehicle History*: A general review of the household, including its members, vehicles they currently own, vehicles owned in the past, and current vehicle use patterns.
2. *Purchase Narrative*: A narrative of the hybrid purchase process, told by the households with limited intervention by researchers, followed by questions and discussion.
3. *Vehicle Symbolism Discussion:* A series of questions and exercises designed to assist participants in thinking about and vocalizing the symbolic benefits in their HEV and other vehicles.
4. *Benefits/Disbenefits Analysis*: A more detailed exploration of the factors that had the greatest influence on the purchase decision, and evaluation of the compromises that households made in order to own an HEV.
5. *Vehicle Preference Exercise:* A stated adaptation exercise which offers replacement vehicles for participants' HEVs, designed to further evaluate key benefits and disbenefits.

Evaluating symbolic benefits can be challenging. Many of us do not fully understand our own decisions and preferences [30], and thus we may be unaware of the role played by symbolic benefits.

Even when individuals are aware of a product's meaning, many have difficulty interpreting and explaining these symbolic benefits [31]. Discussing the image of automobiles is not an exercise that many households are familiar with, and it is one that can make them uncomfortable. When faced with the challenge of understanding the role of symbolic benefits in automobile purchases, many consumers retreat to more rational explanations, emphasizing the role of functional benefits [3,22]. The goal in this study was to help consumers talk openly and honestly about their vehicle purchases, and to accurately interpret their answers. While there is no litmus test for symbolism, proven techniques for discussing product meaning were incorporated into the interview format. They included a basic analysis of photographs based on the Zaltman Metaphor Elicitation Technique [31], an exercise in which households applied elements of a personality scale [32] to their HEVs, and an application of laddering methods [33] to uncover meaning in households' purchase drivers.

Research Findings

The Images of Hybrid Vehicles

Each of the households interviewed recognized that their HEV had meaning apart from its functional benefits, although there was considerable variation in their views. All participants recognized some symbolic benefits rooted in their HEVs' reputation as "green" environmental vehicles, an image which is reinforced by automakers, the media, and a growing list of vocal celebrity owners. This image is distinct from the vehicles' function, but related to it. In other words, HEV owners saw their vehicles as having functionality that reduced their impact on the environment, and they also believed the vehicles projected an image of their owners as people who cared about conserving precious natural resources and preserving the natural ecosystem. The communicative ability of HEVs was recognized by most participants; as one household explained, hybrids are a "way to put forth feelings about the environment," a clear reference to sending a message to others. It is important to note that several participants were aware of this "green image," even though they believed it did not apply to them or had not influenced their purchase. Two households even saw the "green image" as a potential liability, believing others could perceive their cars as "too progressive" or representative of radical political views. In these cases, the meaning participants saw in their HEVs was different from the images they had of themselves, potential evidence of self-image incongruity in certain households.

The majority of households did embrace the image of environmental stewardship in HEVs, and connected that environmental stewardship to a larger set of social values. In particular, the values of social awareness, responsibility, and concern for others emerged in discussions with eight of the ten households. For many participants, their HEV is evidence of moderating their own needs and desires to avoid treading on the welfare and rights of others. One HEV owner that saw this image clearly was Household #1: a woman in her forties with adult children and a new grandson. In her view, her HEV is a symbol for her caring and concern for others. She stressed that viewing HEVs as an environmental statement is too narrow; for her, the vehicles' significance is about *people* rather than the environment. Throughout the interview, she struggled to balance her own needs and desires with those of her family and community. She had grown up with an enthusiasm for powerful "muscle" cars, and part of her still liked fast automobiles. Recently she had seen a new Jaguar on the highway, a sighting that rekindled her interest in power and performance. Yet she explained that owning a fast car would be selfish and only designed to "satisfy her ego;" in short, it would be a purchase that satisfied her own desires at the expense of her family's needs. In contrast, her HEV represented the right thing to do for others. In particular, it represented responsibility and a sacrifice for future generations, of which her infant grandson was a part. As she explained, her Toyota Prius fit the person "who she should be," a confirmation of self-image congruence and a clear linking of the vehicle to her identity. She also believed that her HEV broadcasted this image, sending an altruistic statement that "opens doors" with people who normally might not be receptive to her.

Members of a second household saw a similarly strong connection between their HEV and their values. Household #5, in which a husband and wife each own a Toyota Prius, spoke the most frankly about their HEV as a symbol. For the husband, a political activist and amateur environmental

scientist, the HEV symbolizes social awareness. In his view, HEV owners are insightful because they investigate critical problems like pollution and resource consumption, consider their own contributions to these problems, and actively seek solutions. His wife, a business professional, saw the vehicles as symbolizing concern for others. For her, her Toyota Prius not only had an image, but made a very clear statement to others on the road: "I'm driving a Prius because I'm thinking of all of you, not just myself." This household identified the Toyota Prius not as *a* symbol, but as *the* symbol of the progressive values and political views held by families like theirs. They likened their HEV to another automobile they had owned that they felt made a strong values statement in its time: the Volkswagen Beetle.[b] Interestingly, this household also saw differentiated images among the various hybrid models. In particular, they felt that HEVs such as the Honda Civic Hybrid that also were available as non-hybrid models failed to make a strong enough statement. Note that this household was not critical of the functional characteristics of other HEVs, many of which achieve lower mileage and worse emissions ratings than the Prius. Instead, their concern was that these vehicles did not *communicate* effectively, demonstrating their recognition of HEVs as communicative objects.

The Images of Other Vehicles

Many households were more forthcoming when discussing the symbolism of vehicles owned by others. In particular, vehicles with negative images were discussed frequently. Numerous participants had strong reactions to SUVs and light trucks, although not all households were opposed to owning an SUV or felt these vehicles had negative images.[c] In general, those households that connected HEVs with progressive values felt that SUVs symbolized the opposite set of views. They characterized the SUV's image as one of selfishness, arrogance, dominance, and disregard for the needs of others. Several connected the vehicles to the Iraq conflict, seeing SUVs as both a cause and a symbol of what they perceived to be an unjust war. Several households also commented on SUVs' communicative ability, and observed that they sent the "wrong type of statement," both environmentally and politically. Finally, two households recognized the marketed image of SUVs as "tough" and "outdoorsy," and believed that consumers bought these vehicles to attain symbolic benefits rather than for functional reasons, a view shared by some automotive researchers [10,23].

Luxury vehicles also had negative images for several households, generally those that had disliked SUVs. The images associated with these vehicles were similar: participants saw them as selfish, purchased to satisfy their owner's ego, and sending the "wrong message." The statement these households saw luxury vehicles making was one of indulgence and vanity, images that run counter to the HEV symbols of selflessness and sacrifice. Interestingly, some participants who associated negative images with luxury automobiles and SUVs felt differently when discussing theoretical versions of these vehicles with hybrid drivetrains. For most, the attachment of the "hybrid" label to a vehicle removed negative symbolism and replaced it with the same positive symbolic benefits enjoyed by other HEVs. This may explain the current green image of the Ford Escape Hybrid. Launched in the United States in 2004, the four-wheel drive version of the Escape is rated at 31MPG, far above other SUVs but lower than many non-hybrid automobiles and significantly lower than existing HEVs. As consumers become more familiar with hybrid SUVs, the images attached to these vehicles may begin to deviate from the symbolic benefits associated with current HEV models.

A difference in images between hybrid and non-hybrid vehicles was observed in small cars as well. Two households owned Honda Civic Hybrids, vehicles that are virtually identical to traditional non-hybrid Civics except in their drivetrains and prices. Even though both Civic versions are available at the same dealerships, neither household considered the non-hybrid model. One of the households deliberately ignored the non-hybrid Civic at the time of purchase, and the other declined to consider the non-hybrid Civic during the Vehicle Preference Exercise portion of the interview. Household #7,

[b] Researchers have observed the same perception of the Volkswagen Beetle as an anti-status symbol and representative of progressive values [16].

[c] Overall, half of the households owned a pickup truck or SUV, and two households considered buying an SUV during their latest vehicle purchase.

which ignored the non-hybrid Civic during purchase, was composed of a young woman (a college student) who was shopping for a new vehicle with her father's assistance. When it became apparent that the monthly payments for the Civic Hybrid were higher than her budget allowed, the salesmen suggested she consider a similarly-equipped non-hybrid Civic LX, which she was told would cost roughly $6,000 less. The woman became upset, angered by the salesman's attempt to "talk her down" into a vehicle that she viewed as inferior to the HEV. While she did not identify the distinction between the two vehicles as rooted in symbolic benefits, it is unlikely that functionality alone is responsible for the perceived difference since the vehicles are so functionally similar.

Toyota Prius owners show similar disdain for non-hybrid compact cars. During her HEV purchase, one woman refused to test drive the Toyota Corolla even though her husband was intent on trying it. Her explanation was that she only was interested in the Prius; for whatever reason, she viewed functionally similar models like the Corolla as distinct. In fact, among all ten households, only two really considered small, non-hybrid vehicles. One of these households was a working college student with budget constraints, a typical compact car buyer; the other was an artist in her 60s who test drove a Mini. Although they are small vehicles, HEVs are not painted with the same brush as compact and midsized automobiles. While the perceived difference may not be due exclusively to the vehicles' images, symbolic benefits are likely to play a role. As one Prius owner explained, compact cars like the Corolla send a very different message from HEVs. Compacts tell the world "I'm doing my best, and this is the best I can do," a message about limited budgets rather than progressive values.

HEV Purchase Drivers: Function or Image?

When discussing the most important factors influencing their HEV purchase, every household mentioned one or both of two key factors: cost savings and environmental impact. At first glance, these purchase drivers seem to refer to functional benefits. The HEV's highly efficient hybrid powertrain results in less fuel use, translating into less time spent refueling and lower fuel costs for HEV owners. HEVs also pollute less than the average vehicle, emitting lower volumes of greenhouse gases as well as smog-forming pollutants, thus contributing less to the problems of global climate change and local air pollution. There is no doubt that HEV owners recognize these functional benefits, and value them to varying degrees. It is possible, however, that some of what HEV owners express as function is actually also symbolism. In other words, the *idea* that these individuals are preserving the environment or saving money may be just as important to them as the actual environmental impact or cost savings that occur. From the images households associated with their HEVs, it is clear that these vehicles symbolize a set of values that encompass environmental preservation but include larger concepts such as responsibility and concern for others. While "the environment" often was cited as a household's reason for buying their HEV, they typically were talking about more than just cleaner air. To some extent, the same was true for those households that valued cost savings. While it is difficult (if not impossible) to fully separate HEVs' function from their meaning, our households' behavior provides some clues as to which aspects are most important.

Natural Greens, Light Greens, and Money Greens

Households in this study were separated into three distinct groups. Four of the ten households can be characterized as *natural greens*, households whose HEV purchases were motivated primarily by the vehicles' environmental benefits. Natural greens felt a strong connection between their vehicle and a larger set of social values, and recognized their HEV's ability to communicate these values to others. This group tended to have strong referents (close friends, family, and acquaintances that shared their views), and engaged in heavy evangelism to educate others about HEVs. In contrast, four other households were *light greens*, participants whose purchases were driven by two desires: preserving the environment and saving money. Light greens saw their vehicles as symbolizing a larger set of values and generally recognized their HEVs' ability to communicate with others, but placed somewhat less emphasis on images and communication. Light greens also had weaker referents (they talked to others about their car, but weren't particularly close to those people), and tended to be less evangelistic than natural greens. Finally, two households could be called *money greens:* participants

who were motivated to purchase their HEV mainly by the potential for cost savings. Money greens recognized some image and communicative ability in their HEVs, but generally did not connect their vehicles to a larger system of values. Like light greens, money greens had weaker referents and were less evangelistic, although they still communicated with others about their HEVs.

Examining Environmental Benefits

Natural greens and light greens stressed the importance of preserving the environment, yet their HEV use actually delivers few direct functional benefits to them. Two households noted that when their HEVs shut off, the air in the immediate vicinity of the vehicle was cleaner, benefiting family members and others who were around the vehicle. Yet in general, the fact that these households drive cleaner vehicles does not mean that the air in their cities, or even their neighborhoods, is any safer to breathe. Several households acknowledged being aware of this issue, and it is likely that most if not all understand this basic "tragedy of the commons" dilemma. Their vehicle, while cleaner, does not directly benefit them since others continue to pollute the environment. In addition, numerous natural greens and light greens were confused about fundamental environmental issues, such as depletion of the ozone layer and climate change. Out of ten households, only two exhibited an advanced understanding of environmental topics and vehicle emissions. Three households were even concerned that HEVs could turn out to be an environmental liability if the manufacture or disposal of the batteries created additional pollution. It is questionable, therefore, whether the majority of participants really understood the environmental benefits of their HEVs.

Of course, a deep understanding of environmental issues is not a prerequisite for purchasing an HEV, and this is the point. Most of these households bought their HEVs because "it was the right thing to do," they wanted to "do their part" in preserving the natural environment. Most did the best research they could, but their purchases were driven less by function of the vehicle and more by a desire to behave in a way that they believed was beneficial for society. When asked whether they were really making a difference, no participants spoke in terms of tons of pollutants reduced or number of barrels of oil conserved. Instead, most of the eight households who emphasized the environment in their purchase spoke about educating and influencing others to adopt HEVs, and evoked the concept of a world in which "everyone drives hybrids." Perhaps this is the solution HEV owners envision for the commons dilemma described above. The functional benefits of a single HEV make an almost insignificantly small contribution to resolving environmental problems. However, a single HEV's symbolic benefits can make a greater contribution by educating others about ecological issues and social responsibility. If this education leads others to purchase HEVs themselves, then a single HEV could ultimately lead to many other HEVs on the road.

While this vision may be idealistic, communication with and education of others is clearly important to the majority of households in this study. While all of the households talked to others about their vehicle to some degree, the most active evangelists were those households that felt strongly about HEVs' environmental benefits. These participants went beyond simply fielding questions from interested bystanders: they carried HEV brochures in their vehicles and distributed them, brought strangers home to give them test-drives, and gave testimonials via telephone to potential HEV buyers. The perception among many of these households is that the HEV vision is not spreading quickly enough, and that they have a responsibility to educate the uninitiated. Numerous households also expressed frustration with the lack of HEV knowledge among members of the general public. For these households, HEVs serve as important communication tools. Even without an evangelizing owner, an HEV can communicate images such as environmental stewardship and social awareness. As one participant observed, "every time you are on the freeway, you are advertising" the HEV image. Evangelizing reinforces this statement, providing active communication of the same message.

One case of HEVs as communication mechanisms comes from Household #4. Composed of a husband and wife in their 40s with three children, this household showed the most sophisticated understanding of vehicles and automotive technologies of any of the study's participants. Cars were a shared interest among several family members, who voiced their concerns over the demise of electric

vehicles and the lack of stylish small car offerings like those available in Europe. This household's purchase was strongly motivated by HEVs' environmental benefits, but was also influenced by another factor: the desire to communicate with automakers. According to this household, buying an HEV and supporting hybrid technology was a way to send a clear message to automakers about the viability of hybrid vehicles. Interestingly, they believe this communicative function to be as important as the vehicle's actual environmental benefits. Other households, particularly the natural greens, are likely to share this sentiment. While they value the functionality that provides their HEVs' environmental benefits, they don't really understand it. What they do understand is that their vehicles represent a contribution to the greater good, a link to important values, and a way to inform others about these ideas. Household #1 confirms this view: she explained that her purchase was motivated by both concern for future environmental conditions, and a desire to "make the right statement," particularly to her children and grandchildren.

Examining Cost Savings

Similar behaviors were observed in households that stressed fuel cost savings. Certainly these participants are concerned about economic benefits, but some also seemed attracted to the image of HEVs as cost-saving vehicles, and to the images of themselves as savvy economizers. Six out of ten households (light greens and money greens) said that fuel costs savings were at least as important a factor as environmental benefits in their decision to purchase an HEV. Interestingly, only one of these households had any systematic method for tracking fuel expenses, and even that household denied recording the information for financial purposes (the husband explained "it's just habit"). In addition, only a few of the households that emphasized fuel cost savings had an idea of whether they would save enough on gasoline to justify the higher price of their HEV, or how long that payback might take to occur. While research indicates that few if any consumers actually calculate payback periods [27], it seems unusual that a group concerned enough with fuel cost to buy a new type of vehicle would not conduct at least a basic investigation of potential savings. The following table[d] shows the likely cost savings for each of the six households:

	Vehicle	Mileage (Mi)	Duration (Yr)	Cost Differential	Cost Savings (PV)
Household 2	Prius	11,000	6	$5,985	$1,947
Household 3	Prius	21,000	9	$5,985	$5,342
Household 7	Civic Hybrid	9,000	4	$4,240	$755
Household 8	Prius	15,000	9	$5,985	$3,816
Household 9	Insight	8,000	3	$4,820	$704
Household 10	Prius	12,000	4	$5,985	$1,457

Table 2: Likely Cost Savings for Households

These calculations show that no household breaks even on its HEV purchase; only Household #3, which has high annual mileage and keeps its vehicles for almost a decade, comes near to recouping the HEV's cost premium. Of course, the cost savings above are highly dependent upon the price of gasoline, and many HEV owners expect fuel prices to rise considerably in the next five to ten years. However, even if prices are increased to $6 per gallon, only two households (#3 and #8) achieve cost savings that equal or exceed their HEV's cost differential. For many of these households, it would be fair to debate the accuracy of the cost differential presented above, since HEV owners may not consider a Civic or Corolla as an equitable replacement for their HEV. However, if fuel costs are really what matter, the comparison is fair, since both vehicles excel in the efficient use of gasoline. It is interesting, then, that none of these households seriously considered a fuel efficient, non-hybrid compact or midsized car during their purchase process. This fact does not prove that HEV image

[d] The Cost Differential shows the difference in base prices between a household's HEV and a comparable non-hybrid vehicle. Duration is equal to the ownership period of the household's vehicle that immediately preceded the HEV. Mileage shows the amount each household estimates they drive their HEV annually. Present value Cost Savings were computed using EPA combined fuel economy ratings, a constant price of gasoline of $2.50 per gallon, and a 3% annual discount rate.

influenced their decisions, but it does suggest the possibility that this is so, particularly since compact cars appear to have negative images for some consumers.

For households that emphasize cost savings, the HEV may serve as a symbol of frugality and intelligent consumerism. Several households provide examples of these images. Household #10, which includes a retired engineer in his early 60s, bought its vehicle mainly for the fuel cost savings. The participant explained that the importance of saving money whenever and wherever possible was a value instilled in him by his parents, both of whom had emerged from the Great Depression with a heightened appreciation for the value of money. Despite the fact that his own family had never had significant financial difficulties, he had a strong desire to economize when possible. For him, the Prius represented an important opportunity to spend less; the vehicle corresponded to a strongly-held value. The actual cost savings yielded, therefore, were probably less important than the *idea* that the vehicle was less expensive to operate. Another household (Household #9) was composed of a young man in his 20s. Operating on a tight budget, the young man lived at home with his parents, working full-time during the day and attending school at night. To save on fuel costs, he purchased a used Honda Insight, a vehicle disliked by his father and ridiculed by his peer group. He relished the possibility of a large spike in gas prices that would convince others of the wisdom of his choice. With some satisfaction he predicted "I'll be laughing all the way to the bank." This young man and several other light greens tried hard to present their vehicles as both a values statement and a wise consumer choice, as if buying an HEV for the values statement alone would be seen as foolish by others. One household (Household #2) acknowledged their HEV's connection to social values, but then insisted, "we're not altruists…we let economics drive our behavior." Interestingly, this is one of the households that was concerned the image of their HEV might be perceived as "too progressive." For this household and other light greens, the image of HEVs as vehicles for smart consumers may serve as an important balance to the vehicles' strong statements about social values and the environment.

Exchanging Function for Image

It is often assumed that the average consumer will not accept compromises in vehicle size, performance, and other key functional benefits in exchange for a cleaner vehicle. Some studies confirm this preference for "functional equivalency" in potential hybrid buyers [34]. Yet this view ignores the possibility that HEVs possess symbolic benefits that compensate owners for small losses in functionality. Among the ten households in this study, numerous compromises were evident. In fact, nearly all households could identify at least minor functional sacrifices they had made in order to own an HEV. Additionally, for some households (particularly the natural greens), substantial sacrifices seemed to be justified by their vehicles' symbolic benefits.

Accepting a smaller vehicle was at least a mild compromise for half of all participants. Their HEV gave them less cargo and passenger room; many also perceived their compact HEV as less safe, particularly if involved in a crash with a larger vehicle. The durability of the traction batteries was another concern, raised by four households. Participants had various levels of anxiety over replacing the batteries in their HEVs, an exercise they were certain would be costly; two households even spent several thousand dollars on extended warranties for their vehicles largely as a hedge against battery problems. Other functional compromises included sacrifices in performance, comfort, and amenities compared with vehicles participants had owned in the past. While the existence of these compromises does not prove that households exchanged functional benefits for symbolic ones, it does show that some consumers are willing to sacrifice functionality in order to drive an HEV.

The functional compromises of at least three households (all natural greens) were influenced by their desires for symbolic benefits. Household #1, a participant who bought her HEV in part because it "made the right statement," became concerned about the durability of her used Toyota Prius' batteries during the purchase process. Although she had never bought an extended warranty for a vehicle before, she spent $1500 for this coverage, motivated primarily by her worry over battery failure. While it is unclear whether she would have refused to buy the vehicle if the extended warranty was

unavailable, the chance of battery failure was clearly a functional disadvantage for her. Household #5 (the household that referred to their Prius as *the* symbol of progressive values) had significant concerns about the traction battery as well. At the time of purchase, the husband and wife discussed the fact that that their Toyota Prius might require battery replacement when the vehicle's mileage reached 100,000 miles and the manufacturer's warranty expired. They also discussed the possibility that at that point, replacing the batteries could cost more than the vehicle was worth. After brief consideration, they decided it was worth the risk. "We'll make this sacrifice if needed" he explained, "you have to be a risk taker." For this household, expressing their values through their HEV was more important than maximizing the longevity of their automobile.

A final household that made a significant functional compromise was Household #6, in which the wife purchased her HEV "to make a contribution as an individual…an environmental and political statement." Her main concern was safety, which she felt was diminished in her Toyota Prius due to the vehicle's small size and relatively low weight. She was particularly attuned to safety issues since she was shuttling her grandson to school, a relatively new task that had not been performed in previous vehicles. To compensate for this perceived flaw, she avoided highway driving as much as possible in her HEV, using her husband's BMW for trips and other freeway travel. While it is not possible to evaluate how much more she might have used her HEV if she had believed the vehicle was safer, it is clear that this participant saw a substantial functional issue in her HEV. Yet motivated largely by the desire to do the right thing and to make a statement, she purchased it anyway.

Conclusion

The behavior of households in this study does not prove that all HEV buyers make functional compromises in order to have desired symbolic benefits. However, these examples do suggest that such exchanges are possible. Certainly consumers are not focused exclusively on image, as some authors have suggested [22]. In this study, many households (including some of the natural greens) evaluated and rejected the two-seat Honda Insight due to its functional drawbacks, despite the fact that it possessed many of the same symbolic benefits of other HEVs. The indication from these HEV owners is that consumers may tolerate some functional compromises if the right rewards are provided as compensation. For some buyers, these rewards may need to be image rather than additional function. This is important to remember as new types of automobiles, including hydrogen fuel cell vehicles (FCVs), emerge in the marketplace. The success of these vehicles may depend not on exactly matching the functional capabilities of existing automobiles, but rather in offering the right mix of functional and symbolic benefits to attract consumers.

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