

Semiotics and Advanced Vehicles:
What Hybrid Electric Vehicles (HEVs)
Mean and Why it Matters to Consumers

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EXECUTIVE SUMMARY

This study addresses the relationship between image and car purchases. Image, defined as the associations linked to a product or brand name (Aaker and Joachimsthaler 2000) is often cited as influential in automobile purchases. But relatively little research has been conducted into what image is or why it is important to consumers. This study focused on the image of a particular vehicle: the hybrid electric vehicle (HEV). The objective was to understand how buyers of HEVs perceived the image of their vehicles, and the role image played in buyers' purchase decisions.

In this analysis of the image of HEVs, I applied theory from semiotics: the study of symbols. Outlined in Chapter 2, this theory includes Saussure's (1965) dyadic model in which a symbol consists of a signifier (such as an HEV) and a signified concept (such as the idea of environmental preservation.) In Saussure's model, a given signifier can be connected with numerous signified concepts (also called meanings). Thus, an automobile can have many meanings associated with it. Barthes (1967) divides these meanings into two types: denotations, which are obvious and widely-recognized, and connotations, which are more personal and idiosyncratic.

Saussure (1965) also observes that some signifiers are collections of other signifiers. In this case, a main signifier (called a syntagm) can be parsed into other signifiers (called paradigms), each of which has separate meanings associated with it. For example, a Mercedes SUV may be connected to the meanings of affluence and adventurousness: the

meaning of affluence is linked to the Mercedes brand (brand paradigm), while the meaning of adventurousness is linked to the SUV vehicle type (vehicle type paradigm).

McCracken (1988a) and Csikszentmihalyi and Rochberg-Halton (1981) explain that consumer goods such as automobiles have meanings attached to them. In Chapter 2, I outline an approach called Products as Self-Creation in which individuals use the meaning in automobiles (and other products) in two ways. In the first, called Project of the Self, individuals use product meaning to define and express who they are. Project of the Self is based on theory from Giddens (1991) who proposes that modern life requires individuals to engage in constant definition and maintenance of their self-identities.

Giddens states that at the core of each person's identity lies a self-narrative, a story the individual tells about himself through regimes (habits or behaviors) and lifestyle (an integrated set of regimes). Project of the Self is also based on theory from Csikszentmihalyi and Rochberg-Halton (1981) who define a similar identity-creation process they call cultivation. In this process, individuals interact with product meanings in two ways. Recognition involves attaching a culturally-assigned meaning, while perception involves developing an individualized meaning.

The second way individuals use product meaning is called Project of Culture, a process in which people influence social systems around them. Project of Culture occurs when individuals become aware of what Giddens (1991) calls life politics: the effects that their lifestyle choices have on others. Csikszentmihalyi and Rochberg-Halton (1981, p. 192) explain that individuals use meaning to influence social systems in order to realize goals

that are larger than themselves, including goals related to their social networks (called social goals) as well as goals related to “the larger harmony of things,” called cosmic goals.

To explore the meanings consumers recognize and perceive in HEVs, this study used qualitative methods within an interpretivist research paradigm. These methods are outlined in Chapter 3. Specifically, I conducted ethnographic interviews based on McCracken’s (1988b) long interview technique. For the first two study phases, data was collected in in-home ethnographic interviews with households; in the third phase, a combination of ethnographic interviews and phone interviews were used. In total, 68 interviews were conducted that included a total of 91 participants. Interviews were followed by analysis that included the development of semiotic maps for selected households.

Research was conducted in three Phases. Phase I focused on buyers of high-fuel-economy HEVs, such as the Toyota Prius and Honda Civic Hybrid. The objective was to understand what meanings these buyers perceived in their HEVs and to assess the role of these meanings in the vehicle purchase. Phase II examined buyers of performance HEVs (such as the Honda Accord Hybrid) and sport-utility vehicle (SUV) HEVs (such as the Ford Escape Hybrid). The goal was to understand what meanings these buyers perceived in their HEVs, and whether they were similar to those meanings identified in Phase I. Phase III concentrated on initial users of plug-in hybrid electric vehicle (PHEV)

conversions. The objective was to understand the meanings PHEV drivers assigned to their vehicles as well as to explore how these new vehicles were being used.

In Chapter 4, I outline the symbolic meanings that the study’s HEV owners attached to their vehicles. Buyers of both high-fuel-economy HEVs and performance/SUV HEVs saw meaning in their vehicles. In fact, both groups associated the same set of meanings with their HEVs. These meanings included both denotations and connotations, and are summarized in Figure A-1. An important finding from this study was that the denotations

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

Figure A-1: The Meanings of HEVs Among the Sample Households

that are commonly associated with HEVs are not the only meanings present in the vehicles. Connotations also exist, and provide an important link between the vehicle and the buyer’s identity. For example, the HEV is connected to the denotation of environmental preservation, and many HEV buyers interested in defining themselves as people who care about the environment. But these buyers are also interested to the connotations that connect to the environmental denotation. That is, they also want to define themselves as ethical people who care about others, individuals who believe in

working collectively to resolve societal and global issues, or as intelligent, aware people who seek creative solutions to pressing problems.

The HEV owners in this study purchased more than transportation in their HEVs; they also bought meanings that were used in the development of their self-identities and to change social systems around them. Chapter 5 shows how two households (one from each of the first two research phases) used their HEVs in a Project of the Self and Project of Culture. These owners' stories illustrate the challenges individuals face in constructing their self-narratives. In particular, these examples highlight the diverse elements individuals attempt to integrate into their identities and the role of vehicle meaning in this process. For example, one owner wanted to define herself as a community-oriented person who did what was right for society, even if it involved consuming less of the things she enjoyed. But she also wanted to define herself as a financially-successful businessperson who had earned the right to consume whatever goods she wished. She considered both of these competing self-narrative elements as she shopped for vehicles and evaluated the meanings in the HEV. For this owner, the Honda Accord Hybrid offered meanings that tied both of these self-narrative elements together. Her HEV was a near-luxury model that communicated her financial and professional status, but also had an efficient hybrid powertrain that connected with the denotation of environmental preservation and the connotation of community-orientation. Chapter 5 illustrates the complex process HEV owners undergo in crafting self-identity, a process that dispels the myth of HEV buyers as people who simply want to "show off" superficial green

credentials. The two examples in Chapter 5 also demonstrate how the HEV is as much an identity solution as a transportation solution.

In Chapter 4, I explored one half of the HEV symbol: the meanings. In Chapter 6, I examine the other element: the signifier. When conducting interviews in Phase I, I assumed that the HEV was a single, unified signifier. However, in Phase II many households introduced meanings that were not related to the “hybridness” of their vehicles. For example, one owner attached the meaning of professional success to his Honda Accord Hybrid. This meaning did not relate to the fact that the vehicle was a hybrid, but rather to the fact that it was a luxury sedan. Chapter 6 defines the HEV as a syntagm composed of at least four paradigms: vehicle type, brand, model, and powertrain. The meanings outlined in Chapter 4 are attached to the hybrid member of the powertrain paradigm. But some owners indicated that other meanings were also important in their purchase decisions, and these meanings were linked to the brand, model, and vehicle type paradigms. In many cases, these meanings complemented meanings of the hybrid powertrain. For example, the Honda Accord Hybrid owner above blended the meaning of professional success from the vehicle type paradigm with the meanings of environmental preservation and ethics from the powertrain paradigm. For him, both meanings were important for the development of his self-narrative. In other cases, meanings from different paradigms were used to balance one another. This was particularly common among HEV SUV buyers, who felt that the positive meanings of their vehicle’s hybrid powertrain balanced the negative meanings of its SUV vehicle type.

The results in Chapter 6 illustrate how the meanings of HEVs connect with the meanings of other vehicles in the automotive marketplace. New vehicles are not simply dropped into the market devoid of meaning. Instead, they often borrow (or are assigned) meanings from existing vehicles based on shared paradigms. Thus, hybrid versions of an existing model assume many of the symbolic meanings that are attached to the existing model. However, new combinations of paradigm members can sometimes confusing to consumers. For example, several households in this study were confused by hybrid SUVs because they found the meanings of a hybrid powertrain and an SUV vehicle type as incompatible. Chapter 6 also shows how consumers define the meaning of their vehicle in contrast to other vehicles, and their self-identities in contrast to other people.

Chapter 7 focuses on a new type of vehicle: the plug-in hybrid electric vehicle (PHEV). The chapter conducts a general assessment of important issues from the user's perspective, and includes exploration of the meanings attached to PHEVs. While my assessment of symbolic meaning was less thorough for PHEVs than for HEVs, Chapter 7 indicates that the same denotations HEV owners attached to their vehicles are also being attached to PHEVs. I also found indications that key PHEV issues are symbolic. Questions such as how much all-electric range PHEVs require, what feedback PHEVs should provide users regarding energy consumption, and how often PHEVs are recharged are influenced by the meanings users attach to PHEVs.

Finally, Chapter 8 discusses this study's implications for policymakers, researchers, and automobile companies as they attempt to understand the market potential of HEVs, PHEVs, and other advanced vehicles. Chapter 8 also outlines directions for future research, and recommends ways to expand the qualitative techniques used in this study.

Keywords: Consumer, hybrid-electric vehicle (HEV), market, plug-in hybrid-electric vehicle (PHEV), semiotics, symbols

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PROLOGUE: MISREADING THE HYBRID MARKET

Early in 2004, General Motors' Vice Chairman for Product Development Robert Lutz made time in his schedule at the North American Auto Show to talk with reporters about hybrid cars. Lutz was something of a legend in the automotive industry. Part of his reputation resulted from a colorful personality and outspoken nature. "A former marine, Mr. Lutz is a car magazine's fantasy of what an auto executive should be" explained a 2005 *New York Times* article, "He chews on stogies. He likes to drive fast. He flies a Soviet-era fighter jet for fun. He thinks global warming is a bunch of tree-hugging liberal hokum and lives off the cuff" (Hakim 2005a). Bradsher (2002, p. 43-44) characterized Lutz as a "macho" executive with a "penchant for taking risks" and claimed Lutz was so well-known in the industry that "everyone in Detroit has a Lutz story."

But Lutz's celebrity was also due to his breadth of experience in the automotive world. In his 44-year career working with vehicles, Lutz had headed sales and marketing at BMW, run Ford's international operations and its North American truck division, and served as President and Chief Operating Officer at Chrysler. Along the way, Lutz influenced the direction of hundreds of vehicles, and played an key role in the development of best-selling models such as the Ford Sierra, Ford Explorer, Plymouth Neon, Chrysler PT Cruiser, Chrysler LH sedans, and the Jeep Grand Cherokee (Lutz 1998). Described by one journalist as "a car guy's car guy" (Lassa 2006), Lutz was an executive who seemed to understand instinctively what buyers wanted. In 2001, he was recruited by General Motors and given control over the company's product strategy with hopes that he would

invigorate GM's aging product lineup and regain some of the company's lost market share.

At the January 2004 show, several vehicles were showcased that Lutz himself had chosen to lead the product renaissance at GM, including the Pontiac Solstice convertible and G6 sedan. But to Lutz's dismay, some reporters were ignoring the new Pontiacs, choosing instead to focus on a small set of new hybrid vehicles from the Japanese automakers.

Honda was displaying a hybrid version of its popular Accord sedan, while Toyota exhibited hybrid versions of two car-based SUVs: the Toyota Highlander and Lexus RX. All three of these new models would be available for sale to the public within the next 18 months, complementing the three hybrid vehicles currently in the marketplace: the Honda Insight, Honda Civic Hybrid, and Toyota Prius. At the time, hybrids had been sold in the U.S. for four years and, while sales were steadily growing, volumes were still low. In 2003, American carbuyers purchased just 47,525 hybrid models; in contrast, a single full-sized SUV model from GM, the Chevrolet Tahoe, sold nearly 200,000 units that same year (*Automotive News* 2004). For Lutz and many other automobile executives, the message was clear: compact cars with hybrid powertrains were not vehicles that most people would want to buy.

To Lutz, cars like the Toyota Prius seemed a bit silly. "It just doesn't make environmental or economic sense to try to put an expensive dual-powertrain system into less expensive cars which already get good mileage" Lutz explained at the 2004 show (Isidore 2004). Lutz reasoned that as soon as customers did the math, they would discover a hybrid

vehicle cost thousands more than a conventional model, yet yielded only modest savings in fuel costs. Besides, compact cars already achieved high gas mileage. A hybrid powertrain wasn't icing on the cake: it was icing on the icing, an unnecessary addition to vehicles that already did what they were supposed to do. Lutz was not unfamiliar with hybrid technology. A few months earlier, GM had launched hybrid versions of its popular Chevrolet Silverado and GMC Sierra pickups. But the company's approach reflected its product czar's skepticism: the vehicles used a hastily-developed and unsophisticated hybrid system, were sold in low volumes, and were offered to fleet buyers only. For Lutz, hybrids remained an "interesting curiosity" (Isidore 2004) but he was confident they held little appeal for the average consumer.

In the months following the 2004 North American Auto Show, hybrid sales began to accelerate. Toyota had redesigned the Prius for the 2004 model year, and demand for the larger, better-appointed model quickly began to outstrip supply. Automotive journalists were also taking notice: the Prius was named 2004 Car of the Year by *Motor Trend*. In the fall, Honda launched the Accord hybrid and Ford (GM's cross-town rival) launched a hybrid version of its Escape SUV, expanding the number of hybrid models. As a result, 2004 hybrid sales rose 77% to nearly 85,000 units. In addition to the larger number of models, hybrid sales may also have been stimulated by rising gasoline prices. Gasoline started the year at \$1.50/gallon, but had exceeded \$2.00/gallon nationally by May, an all-time high in the United States. High prices persisted for the remainder of the year and, in the fourth quarter of 2004, a disturbing trend began to emerge on the sales floors of GM's dealerships. Sales of popular (and highly profitable) full-sized SUVs and pickups,

including the Chevrolet Sierra and GMC Yukon, were slipping (*Automotive News* 2005). 2004 had been an excellent year for light trucks, which outsold cars for the first time ever. But lower sales of some SUVs and pickups in the last quarter hinted that consumers' tastes were moving in a different direction. Automakers like General Motors would soon be struggling to keep up.

A year later, on the floor of the January 2005 North American Auto Show, Lutz reflected on the growth in hybrid sales and GM's lack of hybrid offerings. He stood by his argument that hybrids made no economic sense: "It's not clear that you'll ever be able to recapture the cost of a hybrid in the pricing," Lutz explained (Isidore 2005). But he also acknowledged that GM had made a mistake in not rolling out more hybrid models sooner. The vehicles he had dismissed a year earlier as interesting curiosities were now selling briskly, and interest in future models was substantial. Across the show floor, Toyota spokesman Wade Hoyt proudly announced that the company had received 11,000 customer pre-orders for its upcoming hybrid Lexus SUV. To many buyers, hybrids seemed to be about more than just saving a few dollars at the pump. Lutz agreed. "What we forgot in the equation," he explained, "was the emotional aspect of it" (Isidore 2005).

Lutz was an executive that knew something about the emotional appeal of automobiles. "The single most important thing I have learned in my business career" Lutz explains in his management guidebook *Guts*, "is that you can't totally separate...the rational from the emotional, the left-brained from the right-brained" (Lutz 1998, p. 5) Sixteen years earlier at the 1989 North American Auto Show, Lutz unveiled a car he was certain would

generate an emotional response among carbuyers and, in the process, change the image of the then-struggling Chrysler corporation. The Dodge Viper, Lutz's modern interpretation of the AC Cobra, was a two-seat American super sports car powered by an 8.0L V-10 engine. When it entered production three years later, the Viper boasted 400 horsepower, 0-60 acceleration times of under 4.5 seconds and a top speed of 190 MPH. At a starting price of \$55,630, this was not a vehicle that made much financial sense. With no roof or side windows, it didn't make functional sense either. But the public wasn't excited about the Viper because it provided economical or practical transportation. The Viper was a symbol of the future aspirations of Chrysler and the trajectory of automobiles in general. One observer noted, "The Viper Concept was nothing less than a sensation, with show crowds mesmerized by the sheer spectacle of a car so defiantly out of step with political correctness. This wasn't some sort of alternate-fuel vehicle pointing the way to a diminished future, but a beast looking to feast on fossil fuel and fry rubber. And it looked the part, too" (*Edmunds* 2006). The car guy in Lutz undoubtedly was excited by the Viper's high performance credentials, but he also was pleased by the vehicle's image. To Lutz, the Viper was a "symbol" that told the world that "Chrysler was not dead, that within our company there bubbled the optimism, creativity, and sense of outrage necessary for us to fight our way back to health" (Lutz 1998, p. 48-49).

The Viper wasn't the only vehicle Lutz had introduced in his career that had emotional appeal for carbuyers. At the 1992 North American Auto Show, Lutz managed another important product launch for Chrysler: the Jeep Grand Cherokee. By the early 1990s, Americans were showing interest in light trucks and, in particular, in a new type of

vehicle called a sport-utility vehicle (SUV). Truck sales had been increasing steadily during the previous decade, growing from 16.5% of vehicle sales in 1980 to 32.2% in 1991 (United States Environmental Protection Agency 2006). In 1990, models such as the Ford Explorer and Toyota 4Runner were launched that were larger and more luxurious than previous pickup-truck based models. To attract consumers who were new to the truck market, these SUVs offered better on-road performance and features that had not existed in past truck models, such as leather seating, upgraded interiors, and high-end sound systems. Despite their creature comforts, these SUVs retained their light-truck heritage, and Lutz knew this was important. While only a minority of drivers would ever venture off-road in these vehicles, their rugged, go-anywhere image was emotionally appealing to many buyers. It was this image Lutz was promoting when he introduced the Grand Cherokee at the 1992 show. Behind the wheel of the two-ton SUV with Detroit's mayor Coleman Young in passenger seat beside him, Lutz hurled a new Grand Cherokee up two flights of stairs outside the Cobo Convention Center, through one of the building's plate glass windows, and onto the exhibition floor where it was greeted by a crowd of astonished attendees.

Bradsher (2002) suggests that it was the image of SUVs (and the careful cultivation of this image by automobile executives like Lutz) that led to the widespread adoption of these vehicles in the United States. If so, image was responsible for reshaping the American automotive landscape, and for exacerbating the environmental impact of the country's vehicle fleet. By the end of 2004, 52% of new vehicles sold in the U.S. were light trucks, and the fuel economy of the average new vehicle had fallen to 20.5 MPG, a

level not seen since 1981 (Heavenrich 2006). Image, it seemed, was powerful stuff. As Lutz spoke with reporters about hybrids in 2005, he indicated that image was once again fueling interest in a new type of vehicle. The hybrid's image, of course, was different from that of SUVs. SUVs were depicted as rugged, secure, and unstoppable; hybrids were cast as futuristic, sensible, and socially-responsible. But like SUVs before them, hybrids had an image that evoked an emotional response in many buyers, leading to growing sales.

In the year following the 2005 North American Auto Show, the popularity of hybrids soared. The Toyota Prius alone sold over 100,000 units, outselling high-volume GM models like the GMC Yukon and Saturn Ion (*Automotive News* 2006). In the meantime, GM struggled to ready its own hybrid models for the marketplace. Gas prices continued rising through the spring, and declining sales of many of GM's bestselling light truck models persisted. By summer, GM's dealer inventories had grown to unsustainable levels, leading the company to slash prices on all of its vehicles. The promotion temporarily revived sales, but the discounted pricing eroded margins and distracted consumers from the incoming 2006 models. Sales plummeted when the promotion ended, and GM ended 2005 with an enormous \$10.6 billion loss. While the dearth of hybrids in GM's 2005 lineup was not the main reason for the company's dismal performance, it was indicative of a larger problem. GM executives like Lutz had not developed automobiles (including hybrid models) that consumers wanted to buy.

CHAPTER 1: INTRODUCTION

This story¹ about Bob Lutz and his evolving opinion of hybrid-electric vehicles (HEVs) raises two important questions. First, how important is image and the emotional response it evokes in consumers? Second, if image matters, how can we better understand it? Aaker and Joachimsthaler (2000, p. 40) define image as the “current associations” that are linked to a product or brand name. In other words, a product is connected to a particular set of ideas, also called symbolic meanings (Levy 1959). Hirschman and Holbrook (1982) explain that these symbolic meanings lie at the root of consumers’ emotional reactions to products. An automobile’s styling, for example, excites potential buyers not simply because it is aesthetically-pleasing, but because it symbolizes bigger ideas (such as in the Dodge Viper example cited earlier).

Yet transportation researchers tend to treat consumers as rational actors who focus primarily on the functional and financial attributes of vehicles. Most vehicle choice models include attributes such as purchase price, vehicle class, and vehicle weight but give little consideration to the image of the model or brand (for example, see Choo and Mokhtarian 2002). Even choice models that focus on adoption of new types of vehicles, such as HEVs, emphasize functionality and cost. For example, Brownstone et al. (2000) modeled future HEV sales by analyzing consumer preferences for financial attributes (such as purchase price and fuel cost/mile) as well as functional attributes (such as luggage space, top speed, and acceleration time). But executives in the automotive

¹ Unlike the other stories that appear later in this dissertation, this story about Bob Lutz was not developed from interview data. Instead, it was constructed using media accounts and Lutz’s own story of his career published in his book, *Guts* (Lutz 1998).

industry have a radically different view. Most acknowledge that symbolic meaning and the emotion it evokes play an important role in people's decisions about what vehicles they buy. As DaimlerChrysler Chairman Dieter Zetsche commented recently, "We not only want to sell metal and glass and rubber, but emotion as well" (Vlasic 2005). Bob Lutz agrees: "we're not in the transportation business" he announced during a 2005 meeting with GM shareholders, "we're in the arts and entertainment business" which demands a "less analytical, more emotion-driven product strategy" (Hakim 2005a, p. C1).

So if symbolic meaning is important, how can we better understand it? GM's underestimation of the HEV market provides a cautionary tale for anyone who studies consumer behavior. Bob Lutz is no neophyte when it comes to understanding car-buyers. He has spent his entire 44-year career working with automobiles, and is one of the few executives in Detroit who has experience working inside four major automakers. At GM, he has access to a large, knowledgeable marketing staff and millions of dollars worth of consumer studies performed by many (if not all) of the leading automotive research vendors. If anyone should have been able to understand the HEV's potential, it was Lutz. So what happened? Part of the problem may have been that, like transportation models, many automotive research studies focus on functional attributes and price, ignoring emotional factors such as image. For example, in the same year that Lutz dismissed hybrids as an "interesting curiosity," CNW Market Research (2004a) reported that consumers ranked fuel economy low on a list of important vehicle attributes, even lower in importance than cupholders. This type of attribute analysis is common in automotive research, and this particular finding suggested that consumers wouldn't be interested in

high-mileage vehicles like HEVs. But research results like these may have pointed GM in the wrong direction. HEVs offered something else besides the traditional functional attribute of high fuel economy, and few studies (if any) uncovered what that “something else” was.

Zaltman (1997, p. 426) explains that part of the problem is that consumer research methods are often biased toward reason: “Most methods collect and present information as if decisions were the result of logical inference and conscious processes. People are especially likely to display this quality of their decision making because it is what they are asked about, how they are encouraged to respond, and what they can articulate most readily.” Indeed, research firms like CNW had hints that there was more at work in hybrid purchases than a simple assessment of functionality and cost. A CNW phone survey (2004b) showed that over a third of those buying HEVs in 2004 made their purchases in order to “make a statement” about themselves. CNW never published analysis of the “statement” hybrid buyers were trying to make. Instead, the firm focused on the financial aspects of hybrids, releasing a detailed analysis of hybrid vehicle lifecycle costs (CNW 2005a) and an assessment of consumer willingness-to-pay for hybrid technology (CNW 2005b). Certainly market research firms have a right to define their own research agendas and employ whatever methods they choose. However, CNW’s hybrid research is one example of how experts can fail to identify market trends by focusing on the wrong research questions and applying techniques that are biased toward reason.

Study Objectives

Focusing on the HEV market in California, this report explores the two questions just raised: is image important and, if so, how can it be better understood? This report proposes a new way to look at automobiles and the automobile purchase by applying theory from semiotics, the study of symbols. It considers automobiles not just as machines that provide mobility, but as objects that symbolize larger ideas, many of which are unrelated to transportation. From this perspective, a vehicle purchase is far more than just an economic transaction in which an individual acquires a utilitarian product. The purchase becomes a process in which a buyer accesses, interprets, and manipulates a vehicle's symbolic meanings, and integrates these meanings with his own sense of self. And the automobile becomes both a tool for mobility and self-definition. To evaluate the vehicle with a semiotic framework, this report applies methods to collect and analyze data on vehicle purchases that are uncommon within the transportation field. While most transportation studies rely on quantitative analysis of survey data collected from large numbers of anonymous respondents, this study conducts a focused, personalized examination of a small number of subjects using ethnographic interview techniques. Data are examined using a semiotic mapping technique derived from previous studies in semiotics and consumer behavior. The result is a detailed description of the symbolic meaning buyers attach to HEVs, an explanation of why that symbolic meaning matters to buyers, and an analysis of how symbolic meaning figures into the diverse and complex processes consumers use in selecting an automobile for purchase.

The theory and methods used in this study are less commonly applied in transportation research, but they are fairly well-established in other disciplines. Semiotics has existed

for nearly a century, was first applied to consumer behavior in the late 1950s, and has received increasing attention from academic researchers in the fields of marketing and consumer behavior during the past two decades (Mick et al. 2004). Arnould and Thompson (2005) explain how a growing number of academic consumer researchers have exchanged the rational choice paradigm for a broader view of consumption in which consumers assign meanings to products and use these meanings to construct their own identities. As a result of this transition, ethnographic methods, used in anthropology for decades, have migrated into many academic consumer research studies. Arnould and Thompson (2005, p. 870) do not suggest that quantitative techniques have lost their importance, but rather that many consumer behavior researchers have embraced a “methodological pluralism” that encourages customized application of qualitative or quantitative techniques depending on the research question. Such pluralism is not yet widespread in the transportation field and, as a result, transportation researchers approach consumer behavior issues with a far more limited set of tools than their colleagues in other disciplines.

This dissertation’s findings demonstrate that if transportation scholars are willing to examine vehicles and vehicle purchases in a new way, they will see important dimensions that were not visible to them before. Ultimately, this study aims to complement existing transportation literature by enabling triangulation: the examination of the same problem from a variety of perspectives. Janesick (1994) outlines types of triangulation that are particularly relevant to this work, including theory triangulation, method triangulation, and interdisciplinary triangulation. By examining a transportation topic using theoretical

approaches and methods from other disciplines (namely, consumer behavior, anthropology, and semiotics) this research creates a unique interdisciplinary perspective on vehicle purchase behavior that does not currently exist within the transportation literature.

The Focus on Hybrids

This study examines HEVs because hybrids (and other advanced-technology vehicles) offer one solution to mitigate the negative effects of the automobile on air quality, climate change, and fossil fuel use. The United States is a mobile society, and its mode of choice for travel is the automobile. On average, an American household drives 21,252 miles per year, making more than 85% of its trips by car (U.S. Department of Transportation 2002). Despite already high levels of travel, Americans' demand for mobility shows no signs of abating. The annual vehicle miles traveled (VMT) for households has been rising at nearly 3% annually for the past three decades, and has increased 35% in just the past ten years (U.S. Department of Transportation 2002). While Americans are driving more each year, the fuel economy of their vehicles has remained the same for the past two decades. In 2006, the average new vehicle had a fuel economy rating of 24.6 miles per gallon (MPG), the same rating attained by the average new vehicle in 1983 (Heavenrich 2006). As a result, Americans are consuming more gasoline, which generates greater emissions of greenhouse gases and criteria pollutants and causes faster depletion of worldwide petroleum reserves. The net effects are worse local air quality, greater uncertainty regarding national energy supplies, and a heightened threat of irreversible global climate change.

Because they use less fuel per mile of travel, HEVs offer one strategy to address these issues. Relative to their gasoline counterparts, HEVs use roughly 30% less fuel, emit 25% fewer greenhouse gases, and generate 20% fewer smog-inducing criteria pollutants (Wang 2001). While the benefits of HEVs are promising, they can only be realized if consumers choose to adopt these new automobiles. Since their introduction in the United States at the end of 1999, HEVs have grown in popularity. In 2006, Americans purchased over a quarter-million new hybrids and the bestselling HEV model, the Toyota Prius, outsold 85% of the models available in the U.S. market (*Automotive News* 2007). Nonetheless, relative to the overall market, HEV sales remain modest, accounting for just 1.5% of new vehicles sold in the U.S. in 2006. Part of the reason is that there are still relatively few HEV models available. At the end of 2006, only 11 HEVs² were offered in a market that included over 300 models. Just four manufacturers included HEVs in their 2006 lineups, and no manufacturer offered a hybrid in the important mid-sized and full-sized light truck segments that compose 35% of the U.S. vehicle market (*Automotive News* 2007).

² This total does not include hybrid versions of the Chevrolet Silverado and GMC Sierra. These hybrid full-sized pickup trucks were sold to fleet buyers rather than to consumers, and production of these vehicles ended in December 2006.

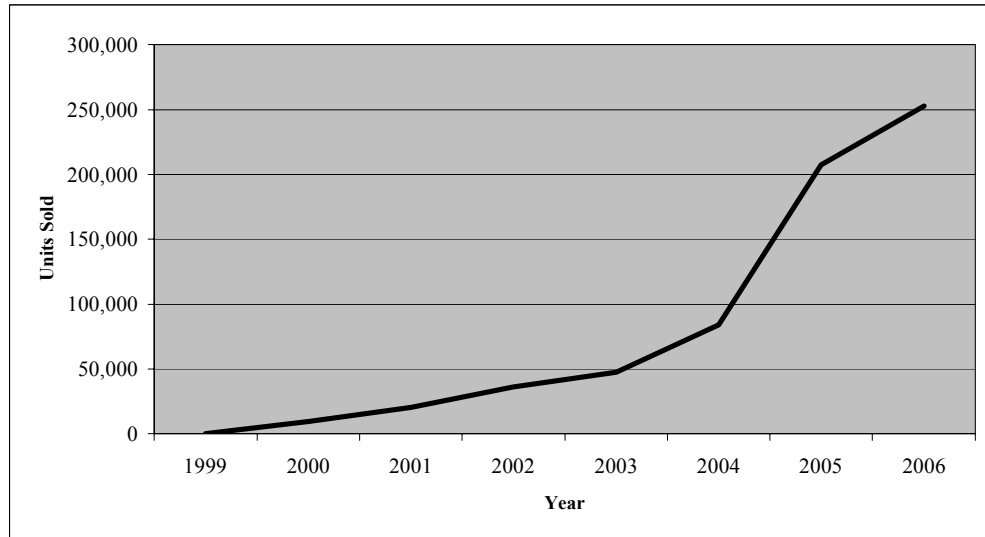


Figure 1-1: U.S. HEV Sales (*Automotive News 2007*)

However, it is not just the lack of hybrid models that accounts for the low penetration of HEVs in new vehicle sales. There is also a lack of interest among some buyers, particularly in certain regions of the United States. On a per capita basis, states like California, Oregon, and Vermont have nearly six times as many HEVs as Louisiana, North Dakota, and Mississippi. In California, HEVs account for 3.3% of new vehicle sales, more than double the national average (R.L. Polk 2007a) In fact, California is the most important HEV market in the United States. While California accounts for 27% of all U.S. hybrid sales, it accounts for just 12% of overall U.S. light-duty vehicle sales (R.L. Polk 2007a). For those wishing to promote HEVs as a solution to environmental and resource issues, understanding the behavior of California's carbuyers is essential. As an early market for HEV technology, California is likely to hold clues about how HEVs can be successfully marketed to consumers in other areas of the United States as well as around the world.

Study Background

This study began examining HEVs in the fall of 2004, just as the HEV market was entering a period of rapid growth. (A timeline of HEV model introductions and this study's research phases is shown in Figure 1-2.) Phase I began in November 2004, and focused on owners of three HEV models: the Honda Insight, Honda Civic Hybrid, and the Toyota Prius. All three models were relatively small, and were designed to provide substantially higher fuel economy than conventional gasoline automobiles in the same vehicle class. Two models, the Honda Insight and the Toyota Prius, were unique vehicles designed specifically as hybrid offerings. The third, the Honda Civic Hybrid, shared all of its components (except for the drivetrain) with the conventional Honda Civic and looked nearly identical to its non-hybrid twin. All three models had been sold in the U.S. for at least two years, although the Toyota Prius was redesigned a year before the study began.

At the time, HEVs were criticized in the popular press for not making financial sense (for example, see O'Dell 2004 and Bradford 2003). Indeed, all three models cost several thousands dollars more than non-hybrid offerings in the same vehicle size class. While HEVs delivered higher fuel economy, the amount they saved owners on gasoline was relatively small compared to their price premiums. In one *Consumer Reports* assessment, the payback period of the hybrid drivetrain on a Honda Civic was estimated to be as long as 21.5 years (Bradford 2003). While few carbuyers actually calculate payback periods before making a purchase (Kurani and Turrentine 2007), discussion of the financial aspects of HEVs in the popular press indicated that the vehicles did not pencil out. Nonetheless, HEVs were popular. In particular, demand for the Toyota Prius was surging as this study began. By the fall of 2004, 3-6 month waiting lists for the Prius had formed

at most dealerships, and Toyota estimated they could sell twice as many hybrids as they were producing (Lerner 2004).

If, as many analysts suggested, HEVs did not make financial sense, why was there such high demand for the vehicles? One hypothesis is that image, or symbolic meaning, played a role. While there was not clear evidence showing that image influenced HEV purchases, there were some indications of a connection. One was the CNW Market Research (2004b) report cited earlier in which a third of HEV buyers said they bought their vehicles in order to make a statement. Another was an Oregon Environmental Council (2003) survey of hybrid owners which revealed that many buyers purchased their vehicles in order to “demonstrate their values” to others. A third indication came from Kurani and Turrentine (2004) who found that some HEV owners were motivated by “a commitment to be pioneers” and by their perceptions of the HEV as “the right vehicle for society” rather than by fuel cost savings.

Building on these findings, Phase I of this study explored the symbolic meaning HEV owners perceived in their vehicles. Since the HEVs in Phase I had been on the market for several years, it was assumed that symbolic meaning, if present, would be well-formed. Phase I also assessed how important this meaning was in buyers’ decisions to purchase HEVs. This required examination of the purchase process, and analysis of how buyers evaluated symbolic meaning in conjunction with other relevant factors, such as functionality and price. Finally, Phase I examined the process through which HEVs acquired their symbolic meanings. While advertisers are typically credited with instilling

image into products, relatively little advertising for HEVs was conducted before 2006. This raised questions about the roles of other actors, such as journalists, celebrities, and HEV owners in developing symbolic meaning for HEVs.

The 25 households interviewed in Phase I confirmed that HEVs did have strong symbolic meaning, and that this meaning impacted their purchase decisions. Buyers explained that they saw their HEVs as symbols of ideas including environmental concern, financial prudence, and technology proficiency, and that these ideas were connected to buyers' identities. Phase I households also talked about the symbolic meaning they perceived in other vehicles. Some of these vehicles, such as battery electric vehicles, had positive meanings and were seen as similar to HEVs. Others, including economy cars, luxury vehicles, and SUVs, often had negative meanings and were viewed as dissimilar to (even opposite of) HEVs. Somewhat unexpectedly, Phase I households also talked about future vehicles, including fuel-cell vehicles (FCVs) and plug-in hybrid vehicles (PHEVs), and shared some of the meanings they were beginning to associate with these vehicles.

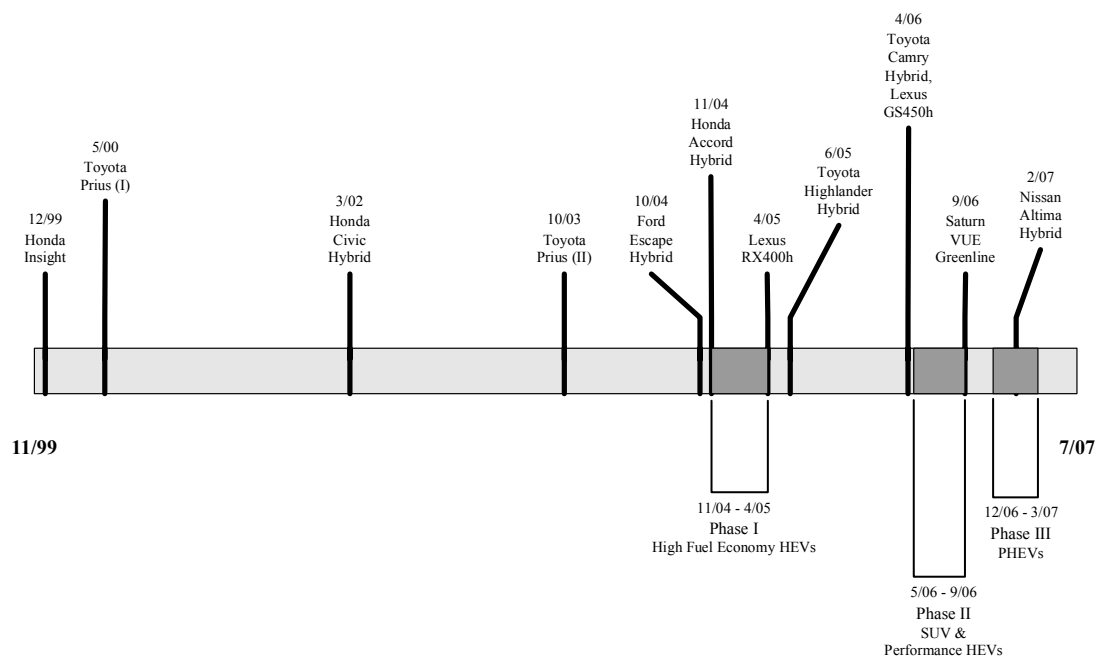


Figure 1-2: Timeline of HEV Market and Study Phases

While Phase I interviews were underway, a second group of HEV models were entering (or preparing to enter) the market. These models included small hybrid SUVs, such as the Ford Escape Hybrid and Toyota Highlander Hybrid. They also included larger, performance-oriented models such as the Honda Accord Hybrid that offered more horsepower and faster acceleration than their conventional counterparts. While high-fuel-economy HEVs like the Insight boasted the highest mileage of any gasoline vehicles in the U.S. market, the new performance and SUV hybrid models could not make this claim. These HEVs coupled more modest fuel economy gains with other features, such as four-wheel drive, increased cargo room, and larger interiors. Phase II explored the same topics as Phase I, but with a focus on buyers of the new performance and SUV hybrids. Because performance and SUV hybrids were relatively new, my hypothesis was that owners would still be in the process of attaching meaning to these vehicles. Therefore, additional attention was devoted to understanding how buyers determined meanings to attach to the new vehicles, and where these meanings originated. Since negative meanings of luxury

cars and SUVs emerged in Phase I, Phase II also explored whether buyers in Phase II perceived the same negative meanings and, if so, whether they were carried over into SUVs and luxury vehicles that utilized hybrid technology. In addition, Phase II included some exploration of what meanings (if any) households associated with future vehicles, including FCVs and PHEVs.

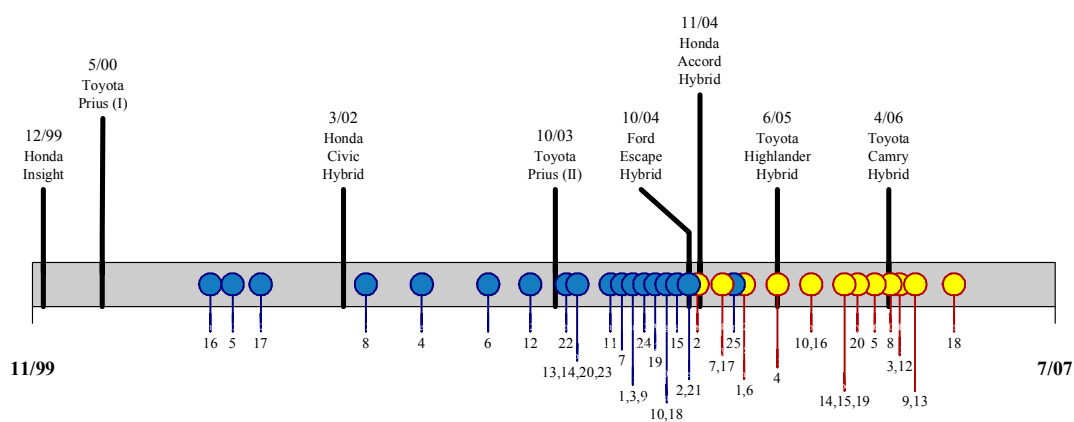


Figure 1-3: Timeline of HEV Purchases (Phases I and II)

I expected that our research in Phase II would yield additional symbolic meanings that had not been attached to the high-fuel-economy HEVs studied in Phase I. New symbolic meanings can develop for a product over time, and a substantial amount of time (over six years) had elapsed between the earliest purchase of an HEV by a household interviewed in Phase I and the latest purchase in Phase II. (Figure 1-3 shows a timeline of purchase dates for all of the HEV owners in this study). However, new symbolic meanings did not emerge in Phase II: buyers of SUV and performance hybrids attached the same ideas to the HEV as Phase I's high-fuel-economy HEV owners did. What we did identify, however, was other sets of symbolic meanings linked to the Phase II vehicles that were

not directly related to their hybrid powertrains. For example, one owner viewed his Honda Accord Hybrid as a symbol of professional success not because it was a hybrid, but because it was a large sedan with luxury features. Another saw his Toyota Camry Hybrid as a symbol of maturity due to the fact that it was a Camry rather than because it was an HEV. These findings showed that the different aspects of the HEV (model, brand, powertrain, etc.) each could have their own set of associated symbolic meanings. The possibility that the HEV had multiple sets of meanings was not considered during Phase I, nor was it explained by the semiotic theory that had been reviewed up to that point. Therefore, I reviewed additional theory and applied it to the Phase II findings. I also reexamined Phase I data and found that those interviews also showed evidence of multiple sets of symbolic meanings. The results (and additional semiotic theory) are discussed in detail in Chapter 6.

At the time of this study's Phase II interviews, PHEVs were receiving increased attention from policymakers, the popular press, and members of the public. In 2004, independent engineers began adding additional battery capacity to an existing HEV, the Toyota Prius, to convert it into a working PHEV. By June 2006, nine Toyota Prius-based PHEV prototypes were on the road in the United States, operated mainly by institutional owners such as city governments, regional air quality agencies, and electric utilities. Press coverage of PHEVs was increasing, and included enthusiastic reviews of PHEV technology on the op-ed pages of major newspapers (for example, see Woolsey 2006 and Morris 2006). Consumer awareness followed: one study found that over 70% of respondents had heard something about PHEVs by the spring of 2006 (Wall 2006). That

summer, Congress saw its first bill (H.R. 5538) that focused exclusively on developing and promoting PHEVs.

Phase III of this study examined the emerging symbolic meanings in PHEVs. Because PHEVs were so new, the goal of Phase III was to conduct more general, exploratory analysis than occurred in earlier phases of this study. Basic questions existed about PHEVs, including who owned the vehicles and why, how PHEVs were being used, when they were recharged, and what benefits and drawbacks were perceived by drivers of the vehicles. Understanding the symbolic meaning that drivers attached to PHEVs, therefore, was one component within a larger set of research topics. The novelty of PHEV technology also meant that the PHEV's symbolic meaning was unlikely to be fully-formed. Therefore, Phase III focused less on constructing a detailed definition of existing symbolic meaning, and probed instead for more general themes that were likely to evolve into more defined symbolic meaning in the future. Phase III also focused more heavily on participants' experiences driving and recharging the vehicles, whereas earlier phases centered much of the questioning on the purchase process. This focal shift was necessary because Phase III participants had not been through a purchase process to acquire their PHEVs. Most participants drove PHEVs that were owned by their employer; even the few private owners in the study had not bought their PHEVs in the traditional sense, but rather had converted them from HEVs they already owned.

Study Outline

This dissertation includes eight chapters. Chapters 1-3 discuss this study's background, theory, and methodology. Chapter 1, the current chapter, provides background on the

study and outlines its objectives. Chapter 2 provides an overview of semiotic theory, including an explanation of what symbols are and how they work. It also reviews several perspectives on why symbols matter to individuals, and proposes a new approach called products as self-creation in which consumers use the symbolic meaning in goods such as automobiles to define and communicate who they are. Chapter 3 includes a brief review of qualitative methods within the transportation field, and outlines the ethnographic interviewing techniques used for data collection in this study. It also explains how the study's interview results were analyzed, and describes the semiotic mapping technique that was employed to examine the symbolic meaning that participants perceived in their vehicles.

Chapters 4-6 discuss findings from this study's interviews with HEV owners. Chapter 4 gives a detailed explanation of the symbolic meanings, both positive and negative, that households associated with their HEVs. It also describes why these meanings were important to HEV buyers, and demonstrates how, in many cases, buyers sought a combination of meanings in their vehicles rather than one specific symbolic meaning. Chapter 5 includes a more detailed analysis of the interaction between HEVs' symbolic meaning and the identities of owners. Using several households as case studies, this chapter shows how the concepts in the products as self-creation approach apply to specific HEV owners. Chapter 6 assesses where HEVs' symbolic meanings came from, and examines how particular meanings became attached to these vehicles.

Chapters 7-8 look toward the future. Chapter 7 examines the symbolic meaning of a future vehicle: the PHEV. Using findings from Phase III interviews, this chapter discusses current meanings of PHEVs as well as potential future meanings. The chapter also explores the sources of these meanings, and highlights features of PHEVs that may deliver symbolic value to users. Finally, Chapter 8 provides conclusions, advice for applying this study's findings to future vehicles, and directions for future research.

CHAPTER 2: SEMIOTIC THEORY

Semiotics is the study of symbols and symbol systems. This chapter focuses on semiotics as it relates to motor vehicles. It explores how automobiles serve as symbols, and the effects symbolic meaning has on consumer behavior. Symbolic meaning in automobiles has been observed by numerous researchers, but has been deeply explored only by a few. As Csikszentmihalyi and Rochberg-Halton (1981, p. 27) note, “In our own culture the enormous symbolic significance of vehicles is so obvious that it is too easily taken for granted.” The first part of this chapter defines what a *symbol* is, identifies the types of symbols, and discusses how consumer goods (such as automobiles) can serve as symbols. Then, the chapter investigates how individuals use the meaning in their automobiles to form and maintain their self-identities. Several theoretical approaches (including conspicuous consumption, self-congruity theory, and symbolic interactionism) are examined and contrasted with a more comprehensive approach, called *products as self-creation*, which is based on the theories of Anthony Giddens, Mihaly Csikszentmihalyi and Eugene Rochberg-Halton, and Grant McCracken. The next section explores how automobiles acquire their meaning, and how this meaning is transferred to the consumer. The final section of this chapter examines how consumers evaluate the benefits from symbolic meaning relative to other types benefits vehicles provide, such as mobility.

Defining Symbols

What exactly are symbols? Simply defined, a *symbol* is something that stands for or represents something else, and *symbolism* is the use of symbols. We are surrounded by symbols, and they serve as essential tools in examining the world and communicating

with others. The spoken language we use is really just a set of symbols (also known as words) that are used to convey the meaning of things we see or feel. Thus, among American English-speakers, the word “car” means automobile, although to speakers of other languages the word “car” may have no meaning or an entirely different significance. That language is a shared system of symbols quickly becomes evident when we travel overseas, or when corporations attempt to market their products across cultures. In a recent case of symbolic misinterpretation, General Motors was forced to rename one of its models (the Buick LaCrosse) in the Canadian market after it was discovered that the word “LaCrosse” carried strong sexual meaning to French Canadians (*Automotive News Europe* 2003). This episode demonstrates an important aspect of symbols: they are so integral to our lives, we often forget they exist. It may be only when their meaning is contested that we become fully aware of them.

Although words are symbols, language is not the only symbol system. Objects (such as automobiles) can be highly symbolic, as can behaviors (such as religious rituals); in fact, virtually anything can serve as a symbol. Like language, objects and behaviors may be interpreted differently by different groups, particularly by members of different cultures. Chandler (2002) identifies several symbolic frameworks; this study utilizes Saussure’s (1965) model of the sign. In this dyadic model, symbols are part of a larger concept known as a *sign*, which is composed of two parts. The first part is the symbol, or *signifier*: a word, object, or other entity that stands for something else. The second part is the *signified*: the “something else” that supplies the meaning. For example, a pickup truck can be viewed as a symbol of traditional, working-class values. The truck is the signifier,

and working-class values is the signified concept; together, they form a sign that connects a tangible object and an intangible idea.³ In this chapter, the words *symbol* and *signifier* will be used to refer to signifiers, and *symbolic meaning* or *signified concepts* will be used to refer to the signified ideas.

Symbols are powerful because they are at the root of how we interpret the world around us. Symbols form the basis for communicating *culture* which, loosely defined, is “a particular way of life which expresses certain meanings and values not only in art and learning, but also in institutions and ordinary behavior” (Hebdige 1979, p. 6). Embedded within culture is a certain way of viewing the world, and symbols are essential to this process. As Geertz (1973, p. 5) explains, “The concept of culture I espouse... is essentially a semiotic one. Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning.”

Anthropologist Sherry Ortner (1979, p. 94) defines a symbol as a “vehicle for cultural meaning” and identifies two types of key symbols: summarizing symbols and elaborating symbols. A *summarizing symbol* distills a wider, more complicated set of concepts into a unified, generalized whole. For example, a hybrid vehicle may stand for environmental preservation; it is a simple statement about a very complex set of technical issues relating to criteria pollutants and greenhouse gas emissions. In contrast, an *elaborating symbol*

³ In this case, the signifier (pickup truck) is an object, but signifiers can also be intangible (a behavior, for example).

addresses specific rather than generalized concepts. An elaborating symbol serves as “a source of categories for conceptualizing the order of the world” or provides value by “implying mechanisms for successful social action” (Ortner 1979, p. 94). In other words, an elaborating symbol provides more detailed information on how to interpret one’s environment and how to behave. For example, automobiles can be used as a means to divide a diverse population. Some consumers identify themselves based on the type of vehicle they drive, and view themselves as different from those that drive another type of vehicle. To declare oneself as “not a minivan person” or someone else as “a pickup truck guy” is to use the automobile as an elaborating symbol, as a tool to categorize elements (in this case, people) in one’s environment. Ortner notes that this is an essential function of culture: to help us order and make sense of the world, and determine how to behave within it (Ortner 1979, p. 95). Symbols are important tools in this ordering process.

Not only does our culture give us a symbolic structure that defines the world; our own cognitive processes also rely on symbols. According to Saussure (1965) the ability to link concepts through signs is essential to human thought. An individual’s culture provides the underlying structure for seeing the world; culture establishes a set of rules, a symbolic framework that defines some ideas as connected and others as separate. The mind internalizes this structure, functioning as a “system of operations that generate structures of similarity and differentiation” (Palmer 1997, p. 24). Thought, therefore, is much like looking up symbolic meanings in a sort of “cultural dictionary” within the mind.

Within the field of anthropology, there has been significant criticism of the rigidity and inalterability of Saussure's symbolic framework (for example, see Desmond 2003). One contrasting view is presented by sociologist Gerald Zaltman, who agrees that people use culturally-imparted symbolic frameworks to process information, but sees symbolic frameworks as a starting point for thought rather than a system that rigidly directs cognition. Zaltman, who describes signs as *metaphors*, proposes that people possess "metaphorical schemes reflecting basic dimensions of culture such as time, information flows, primary modes of activity, assumptions about relationships between people, and so on" (Zaltman 1995, p. 292). Like Saussure, Zaltman proposes that symbolism lies at the root of thought, that "thought is ultimately and irreducibly metaphorical" (Zaltman 1995, p. 292). However, Zaltman sees thought as more than simply accessing existing meanings in a symbolic framework; the individual can also modify symbolic frameworks and create new meanings. The process of imagining new ideas takes place through metaphors. By linking concepts together in unique ways, we develop new ideas and ways of seeing the world. Thus, signs can be given to us by culture, or developed by the individual. In both cases, they serve as essential tools in the interpretation of one's environment.

In a consumer society, products are important carriers of meaning. The rules and classification schemes embedded in culture are abstract concepts, as are the thoughts and ideas that originate in our own minds. Anthropologist Grant McCracken (1988a) has observed that goods make these intangible concepts more visible, and therefore more real. According to McCracken (1988a, p. 132) "material culture makes culture material." Thus, physical objects "bring to life" the beliefs, values, and behaviors that are practiced

within a culture. It is tempting to assume that only certain types of objects are culturally important, and therefore that only specific categories of goods can serve as symbols.

While the symbolic properties of some objects, such as religious icons or national flags, are more apparent and deliberate, this does not mean that they are the only goods that are signifiers. Common, mass-produced consumer goods like automobiles can also carry cultural meaning. In fact, as Western culture abandons many of its ethnic and religious traditions, consumer goods assume an increasingly important role in defining ourselves and our culture. As cultural historian Judith Williamson (1986, p. 227) notes, “Every society has some kind of map, a grid of the terms available to think in at any given time. In ours, consumer goods are some of the chief landmarks which define the natural categories we are accustomed to.”

When consumer goods serve as symbols, function and meaning coexist and often blend together. In Saussure’s view, the relationship between signifier and signified concept is completely arbitrary and is independent of the signifier’s physical characteristics. Using Saussure’s logic, a pickup truck need not signify working-class values: it could signify whatever meaning a culture chooses to assign to it. While this may be theoretically possible, products such as automobiles generally display some relationship between their physical properties and their meanings. McCracken describes a product that displays this relationship as an *icon*: a “sign that reproduces some of the qualities of the thing it signifies” (McCracken 1988a, p. 37). For example, an SUV may be seen as masculine because of its powerful engine or rugged off-road capabilities. The meaning of the vehicle, masculinity, is directly related to physical attributes, power and ruggedness.

Vehicle designers are aware of this connection, and create vehicle designs that project meanings which are appropriate to their particular car and truck models.

This blending of function and meaning can complicate our understanding of consumer behavior. Is a buyer of a truck-based SUV attracted to the vehicle's off-road capability because of the utilitarian benefits it provides or because the off-road features are signifiers for other concepts? As Csikszentmihalyi and Rochberg-Halton (1981, p. 21) observe, "it is extremely difficult to disentangle the use-related function from the symbolic meanings in even the most practical objects." In the case of truck-based SUVs, clearly something other than utilitarian needs is at work since fewer than 15% of owners ever drive their vehicles off the road (Bradsher 2002). Like the Kabyle house in which anthropologist Pierre Bourdieu (1979, p. 135) observed a "loci where symbolic or social necessity is articulated with technical necessity," an automobile simultaneously provides practical benefits and serves as a symbol of larger ideas.

Marketers are aware of this dual function of consumer goods. Much of modern marketing is about the creation and management of signs, although few practitioners use this language. Instead, marketers generally refer to the *image* and *identity* of a product or a brand. Aaker and Joachimsthaler (2000, p. 40) define *image* as the "current associations" that are linked to a product or brand name; this contrasts with *identity*, which is also a set of associations, but associations that are aspired to rather than actually embodied in a brand or good. Both image and identity cast the product as a symbol with a set of associated meanings. In the case of image, these meanings are assigned by consumers; in

the case of identity, they are the meanings that the marketer actively attempts to assign through advertising and brand development. Marketing's focus is generally on understanding how the meaning of a particular product is interpreted by consumers, and how that meaning can be adjusted to align with the desired identity. In general, market researchers give relatively little consideration to the question of why consumers seek meaning at all in the goods they buy. In other words, why do consumers value the signified concepts that are attached to products such as automobiles?

Consuming Symbols

Products embody signified concepts that can be used to interpret, express, and define ourselves. Thus, product meaning is tied to individual identity. This section considers two categories of approaches to the connection between people's identities and products' meanings. The first category, termed *products as self-expression*, involves the use of product meanings to enact or portray one's own identity. In general, approaches in this category assume people exist within fairly defined systems of meaning. Individuals use signified concepts associated with products to portray themselves in different ways, but have little or no influence to alter the overall system of meanings. Self-concepts must fit pre-defined roles or stereotypes, and products can only possess socially-defined meanings. In the second category of approaches, called *products as self-creation*, individuals have much greater freedom to manipulate their own identities and the meanings of products. Rather than simply expressing who they are, people have the capability to invent and re-invent themselves. Self-definition becomes an ongoing, creative project in which the individual constructs a unique self that is capable of viewing

product meaning in novel ways. The two categories (and the four approaches that compose them) are shown in Figure 2-1:

	Approach	Meaning of Individual (Identity)		Meaning of Goods	
		Scope	Actor	Scope	Actor
Product as Self-Expression	CONSPICUOUS CONSUMPTION	LIMITED Identity defined by position in class hierarchy	INDIVIDUAL Individual acts on product	LIMITED Goods only symbolize status; meaning accessed through ownership	SOCIAL Social system defines product meaning
	SELF-CONGRUITY	MEDIUM Identity defined by stereotypes	INDIVIDUAL Individual acts on product	MEDIUM Goods have wider meanings; meaning accessed by matching with self-concept	SOCIAL Social system defines product meaning
	SYMBOLIC INTERACTIONISM	MEDIUM Identity defined by roles	INDIVIDUAL & PRODUCT Individual acts on product, product acts on individual	MEDIUM Goods have wider meanings; meaning accessed by matching with desired role	SOCIAL Social system defines product meaning
Product as Self-Creation	LIFESTYLES AND CULTIVATION	EXTENSIVE Identity defined by unique efforts of individual	INDIVIDUAL & PRODUCT Individual acts on product, product acts on individual	EXTENSIVE Goods have unlimited, individualized meanings; meaning accessed after interpretation of product	SOCIAL & INDIVIDUAL Social system or individual defines product meaning

Figure 2-1: Summary of Approaches Evaluating Product Meaning and Personal Identity

Products as Self-Expression

This section examines three approaches to self-expression through products. Each has its origins in a distinct field: conspicuous consumption from economics, self-congruity theory from social psychology, and symbolic interactionism from sociology. All three approaches assume that predefined systems of meaning exist, and that individuals define products and themselves within the boundaries of these systems. However, there are important differences in the approaches, mainly in the scope of meanings that can be assigned to individuals and products. This section begins by considering the narrow

meanings of conspicuous consumption, then progresses to broader meanings encompassed by self-congruity theory and symbolic interactionism.

Conspicuous Consumption: Expressing Class

Early analysis of product meaning by economist Thorstein Veblen assumes a strict social hierarchy stratified by wealth, in which affluent members enjoy greater status than less-affluent members. *Status* can be defined as “the position or rank in a society or group awarded to an individual by others” (Eastman et al., 1999). Veblen’s analysis centers around status, and on the ability of products to impart enhanced status on their owners. In Veblen’s view, a person’s status forms the basis for his worth, both in his own eyes and in the opinions of others. Goods serve as proof of social status, which generates respect and admiration from other people; “property...therefore becomes the conventional basis of esteem” (Veblen 1899, p. 28-29). The meaning Veblen sees in goods is fairly simple: they can signify wealth. The greater the wealth that is symbolized, the higher the status category of the owner, and the higher his value as a person. Thus, wealthy consumers purchase goods simply because the goods demonstrate affluence and lead to greater status and self-worth, a phenomenon Veblen labels “conspicuous consumption” (Veblen 1899, p. 75). Conspicuous consumption by wealthy consumers spawns a competition among consumers at all income levels as they attempt to elevate themselves within the status hierarchy. The result is a system in which ownership of products is used to conduct “a valuation of persons” (Veblen 1899, p. 34).

As Bagwell and Bernheim (1996) note, Veblen’s seminal work has led to a wide body of research on the consumption of “prestige” or “status” goods. Certainly there is validity in

Veblen's theories; even a century after they were first published, they seem to apply well to consumer behavior. Indeed goods like automobiles are perceived by many as status goods. For example, a 1987 Roper Research report revealed that nearly half of Americans viewed an expensive automobile as a status symbol (Waldrop 1989). Status consumption in the automobile market has been observed in past research (Eastman et al., 1999), and may account for the rapid growth in luxury vehicle offerings in the U.S. market during the past decade.⁴ In addition, studies have demonstrated that people's perception of status symbolized in a particular automobile can affect their behavior toward its owner; the higher the perceived status of the vehicle, the more favorable people's response to the driver (Doob and Gross 1968; Solomon and Herman 1977).

Yet viewing all consumer behavior as status-driven and all meanings of goods as status-related is far too narrow a perspective. The analysis of conspicuous consumption conducted by Veblen and others is valuable because it alerts us to the meaning in products and the impact this meaning can have on purchase behavior. Yet Veblen's approach is limiting because it renders products as capable of carrying just one type of signified concept. For many of us, "status" may be the first idea that comes to mind when considering consumer goods as symbols, but this is not the only meaning present in consumer goods. In fact, certain automobiles have been successful precisely because they represent an obvious rejection of status and affluence (Meenaghan 1995). This observation, therefore, runs directly counter to Veblen's view of acquisition as the pursuit of social status. In short, while Veblen's theories have merit, they do not tell the whole

⁴ *Ward's* data shows 108 luxury vehicle offerings planned for the American market in 2008, double the number of models available in 1993 (Zoia 2003).

story. Consumers desire more than just status, and therefore status is not the only signified concept that appears in consumer goods such as automobiles.

Veblen's approach is also limiting because it assumes people have a fairly superficial understanding of product meanings. Even authors who agree with Veblen on the importance of social status disagree with him on the richness of signified concepts embedded in goods. Bourdieu (1984, p. 31) dismisses conspicuous consumption as "naïve exhibitionism, which seeks distinction in the crude display of ill-mastered luxury." According to Bourdieu, status cannot be attained simply by purchasing and exhibiting expensive possessions. The symbolic system that defines class hierarchy is far more complicated and subtle, and understanding it requires a "cultivated habitus" (Bourdieu 1984, p. 66) that cannot be easily attained. Individuals who wish to climb within the class hierarchy can develop "a (more or less adequate) symbolic mastery of the practical principles of taste" but will never truly acquire high-class taste, which Bourdieu describes as a "natural gift" (Bourdieu 1984, p. 67-68). Like Veblen, Bourdieu sees the meanings of goods as providing demarcation between class boundaries. But Bourdieu identifies a far deeper significance in goods: meaning which cannot be accessed simply through purchase, but which must be comprehended and, by a select few, truly appreciated.

Self-Congruity: Expressing Stereotypes

A second approach is self congruity theory,⁵ which examines self-expression through objects using a wider set of meanings than just status. Rooted in psychology, self-congruity theory focuses on the individual's *self-image* (or *self-concept*) which is defined

⁵ Also called *self-image congruity theory* or *image congruence hypothesis*.

as “the totality of the individual’s thoughts and feelings having reference to himself as an object” (Sirgy 1982, p. 287). Self-congruity begins with evaluation of oneself, and the development of a self-concept as a result of this introspection. Like Veblen, supporters of self-image congruity theory argue that the desire for increased self-esteem is an important source of behavioral motivation; however, they also recognize the importance of a second motive, namely the tendency for an individual to behave in ways that are consistent with his self-concept (Sirgy 1982). This goal of consistency is complicated by the fact that the self-concept contains not just one idea of who the individual is, but multiple “possible selves” (Myers 2005). Most authors agree that at a minimum, the self-concept includes an actual self-concept (an image of who one currently is) as well as an ideal self-concept (an image of the way one would like to be). Sirgy (1982) notes that many researchers include other selves within the self concept, including the social self-concept (an image that one believes others have of him) and the ideal social self-concept (an image that one would like others to have of him). Regardless on the number of selves that are included within the self-concept, self-congruity theory implies that individuals make assessments of who they are and who they would like to be. Behavior is motivated by the desire to enhance one’s self-concept by acting in ways that are consistent with one or more of the various selves.

In self-congruity theory, an individual’s self-image interacts with product image (that is, a product’s symbolic meaning) and drives purchase behavior. A consumer assesses the meaning of a product and compares that meaning to the person he believes he is or would like to be. The closer the match between product meaning and self-concept, the more

likely that a purchase is made. While self-congruity theory permits products to have a range of meanings, the main “associations” in a product’s image involve “stereotypes of the generalized or typical user” (Sirgy 1982, p. 287). By purchasing a product, individuals infuse themselves with the qualities possessed by a stereotyped user of that product. So if the generalized user of a Harley-Davidson motorcycle is a rough and wild Hells Angel, then a balding, middle-aged accountant can assume these same qualities by purchasing a Harley for himself (assuming, of course, that this purchase is congruent with at least one aspect of the accountant’s self-image).

This transfer of meaning occurs due to *consumption stereotyping*, a process in which people judge another individual based on the symbolic meaning of a product that the individual owns or uses. Consumption stereotyping is complementary to self-congruence; self-congruence determines product selection in anticipation of consumption stereotyping later assigning that product’s meaning to its owner. However, theorists disagree about this transfer process and whether it occurs based on an individual’s own perceptions or is rooted exclusively in the perceptions of others. In other words, if an individual purchases a Harley-Davidson and applies the Hells Angel stereotype to himself, does it matter what others think? Sirgy (1982, p. 288) notes that this distinction may be irrelevant since “consumers may not be able to distinguish between their ‘own’ feelings about a product and their beliefs about how they are viewed by others.” Thus, if an individual applies a stereotype to himself, he assumes that others are doing the same.

Numerous studies have applied self-congruity theory to automobiles. Past research demonstrates that individuals recognize a 'fit' (or lack thereof) between themselves and their vehicles, and between other people and their vehicles (Grubb and Stern 1971), indicating some conscious awareness of self-congruity among consumers. Studies of automobiles also show that consumers' actual and ideal self-images influence their attitude toward particular vehicle models (Sirgy 1985), affect purchase intent (Sirgy 1985; Ericksen 1996), and correlate with ownership of particular cars (Grubb and Stern 1971; Heath and Scott 1998). Studies of automobiles also provide evidence of consumption stereotyping. Research indicates individuals stereotype themselves based on the vehicle they own, and view themselves as similar to those who own the same vehicle (Grubb and Hupp 1968). In addition, individuals stereotype others based on their automobiles (Grubb and Hupp 1968). This stereotyping is evident in both adults and children, and often goes beyond simple generalizations. For example, research of consumption stereotyping by Belk et al. (1982) shows that individuals are willing to make fairly significant deductions about a person based on the automobile he owns, drawing conclusions about the subject in areas such as intelligence, life satisfaction, and behavioral inclinations. Based on these studies, it appears that self-congruity theory applies well to the automobile market.

Like Veblen's theory of conspicuous consumption, self-congruity theory provides a useful model of consumer behavior, but it has some limitations. As social psychologist Helga Dittmar (1992) notes, self-congruity represents a departure from earlier studies which viewed product choice as simply a result of the consumer's personality traits. One

study of automobile consumers conducted in the 1950s, for example, examined whether “typical” owners of Fords and Chevrolets had different personalities (Evans 1959).

Instead of seeing purchase behavior as passive choices driven by consumers’ inherent personality characteristics, self-congruity theorists viewed product selection as a process in which the consumer deliberately selects products that match his self-concept. While earlier studies focused on who the consumer *is*, self-congruity research emphasized who the customer *thinks he is*. This implies much more active involvement by the consumer, who formulates impressions of his current self and acts on this self-perception rather than simply being blindly driven by pre-determined personality traits. More importantly, the consumer has freedom to change his image through the creation of other possible selves. Thus, self-congruity theory grants the individual greater freedom in using products as a means of self-expression.

However, self-congruity theory has its drawbacks. First, it offers few guidelines as to which self is most relevant in a given situation, and acknowledges that inconsistencies may arise. As Sirgy (1982, p. 289) points out, a consumer’s preferences may change depending on which self is at the fore: “Consumption of a brand may be highly congruent with self-image in one situation and not at all congruent with it in another.” The middle-aged father of two who is shopping for a new car knows he should buy the minivan, but can’t resist looking at a sports car. The first vehicle matches his actual self, the second his ideal self. Yet if consumers are constantly switching between selves and there is no way to tell which is active in a given situation, self-congruity theory loses much of its value as a predictor of consumer behavior. While some studies have attempted to isolate which

self is operating in a given scenario (for example, see Sirgy 1985) it is not clear that the same self is always active under the same conditions.

A second issue in self-congruity theory is that it assumes individuals work within a framework of predefined product meanings. Dittmar (1992, p. 61) criticizes self-congruity theory for its focus on the individual and individually-defined product meaning “neglects the socially-defined meanings of consumer goods.” Yet self-congruity theory assumes that a user stereotype exists for a given product, and that this stereotype is generally understood by many (if not all) consumers. User stereotypes, therefore, are socially-shared, and may even be socially-defined. This leads to a criticism that is opposite of Dittmar’s, namely that self-congruity theory gives individuals relatively little freedom to interpret product meaning, which must remain rooted in user stereotypes. Consumers simply work with existing product images, selecting those that fit with their self-concepts and discarding those that do not. Redefinition of the stereotypes associated with a particular product does not appear to be possible, at least not for the individual. These fixed stereotypes are limiting; individuals can express themselves through goods, but only in ways that are permitted by existing definitions.

Symbolic Interactionism: Expressing Roles

A third approach, symbolic interactionism, expands the relationship between consumers and products they use. First defined by sociologist Herbert Blumer (1937), the symbolic interactionist perspective emphasizes social interaction as the central activity in the development of self-identity. Like self-congruity theory, symbolic interactionism views the individual as composed of numerous selves. Each self corresponds to a *role*, which is

defined as a “set of related meanings that directs the individual’s behavior in a social setting” (Solomon 1983, p. 321). An individual has numerous roles, and behavior consists selecting an appropriate role for a given situation and acting according to the role’s guidelines. Over the course of a single day, one individual may play the roles of mother, executive, coach, and wife; in each role, she exposes a different self. The various selves together compose the individual’s self concept, which is formed through interaction with others. This interaction involves “taking the perspective of the other” and analyzing oneself from another’s point of view (Dittmar 1992, p. 77). Thus, symbolic interactionism emphasizes the social nature of self-concept; an individual forms his self-concept by imagining how others see him. The idea of a “looking glass self,” of seeing oneself through another’s eyes, it is a key component in the symbolic interactionist perspective. According to Blumer (1937, p. 183) “the individual derives his conception of himself largely from the way in which he is conceived by others.” In fact, this version of the self has been adopted by some self-congruity theorists, who have melded it together with the self-congruity approach (for example, see Sirgy 1985 and Jamal and Goode 2001).

The most distinctive characteristic of symbolic interactionism is how products are used by the consumer. Like in self-congruity theory, products can be used to express one’s self-concept. In his analysis of symbolic interactionist theory, social psychologist Michael Solomon (1983) observes that one function of products is as tools which are used to reinforce the individual’s performance of a particular role. In this case of *product as response*, purchase or use of a product is the result of a consumer’s desire to perform a

role effectively. For example, a consumer who wishes to enact the role of “environmentalist” purchases an HEV because he sees this type of vehicle as enhancing the environmentalist role. But symbolic interactionism views products not just as results of behavior, but also as causes. In a major departure from self-congruity theory, symbolic interactionism allows a product to serve as a catalyst which alters the individual’s self-concept and changes his behavior. In this *product as stimuli* case, a consumer purchases an HEV without explicit knowledge or intentions regarding the environmentalist role, and the product causes him to perform the role. Anyone who has tried on a piece of clothing and unexpectedly felt different as a result can relate to this phenomenon. Products can influence our self-concepts, even if we don’t intend for them to do so. Thus symbolic interactionism establishes our relationship with goods as bi-directional: product purchase can result from an individual’s role intentions, or can be the cause of those role intentions.

According to Solomon, whether a product serves as response or as stimuli is determined by an individual’s level of role knowledge. *Role knowledge* reflects a person’s understanding and mastery of the behaviors associated with the successful performance of a particular role (Solomon 1983). For example, a recent college graduate is likely to have little knowledge about the “business executive” role, while a seasoned corporate manager understands this role well and can play it effortlessly. Solomon (1983) suggests that when individuals face situations which require unfamiliar roles, they look to product meaning for assistance in fulfilling the new role. Products serve as stimuli; they shape the individual’s portrayal of himself, compensating for his lack of role knowledge. The

recent graduate may purchase a luxury sedan, and the signified concepts in this vehicle facilitate his understanding and enactment of his new role. Once his role knowledge has increased, he may continue to purchase symbolic goods, but these goods will be *responses* to his self-concept rather than *stimuli* that alter it. According to Solomon (1983) this occurs because when the required role is understood, an individual uses products to validate his role performance rather than to define it. Thus, a consumer's use of product meaning changes depending on his level of role knowledge. At low levels of role knowledge, products are stimuli that help define roles; at high levels of role knowledge, products act as responses that reinforce roles.

Other researchers have examined these two uses of product meaning further, seeking to identify segments of consumers that consistently emphasize one use of product meaning over another. For example, Leigh and Gabel (1992, p. 7) propose that products serve as stimuli for consumers in role transitions (such as starting a new job or entering a new school) or consumers "who place high levels of importance on social group membership and advancement." In both cases, role knowledge tends to be limited, and new roles must be learned and enacted. Leigh and Gabel's discussion of social group membership is reminiscent of Veblen's theories, particularly since "social group" can easily be interpreted as a euphemism for "social class." Yet Leigh and Gabel repeatedly stress the importance of *reference groups*, which can be defined generally as any groups with whom an individual identifies (Myers 2005). Social group membership, therefore, refers to entry into *all* types of groups, not just those delineated by class. The important element, according to symbolic interactionism, is the role: social groups expect a new

member to enact a certain role in order to gain entry, and expect current members to continue role performances to maintain membership.

There have been numerous interpretations of symbolic interactionism since Blumer first developed the theory. Solomon's version makes a bold assertion about the relationship between consumers and the products they buy. Product acquisition is not merely the result of consumer self-concept; purchasing a good (and the meaning within it) also can shape the individual's self-concept and behavior. Although it expands the relationship between product and consumer, symbolic interactionist theory has limitations in other areas. In particular, it does not extend the boundaries of the individual's self-concept. In symbolic interactionism, the self exists only within predefined roles, and life consists merely of role-playing. Identity-development, therefore, is not a creative process as much as a selection of the self from established options. So while products can have significant symbolic meaning that stimulates behavior, individual identity remains fairly shallow.

Products as Self-Creation

The previous three self-expression approaches outline a relationship between product meaning and self-concept in which the self must be defined within existing categories. Products are used by an individual to act out a pre-scripted part according to class categories, social stereotypes, or social roles. This leaves relatively little room for creative self-definition, since the idea of developing a new stereotype or social role is not discussed. A fourth approach, *products as self-creation*, views goods and their signified concepts as essential elements in the crafting and maintenance of a unique individual identity. 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 automotive market analyst G. Clotaire Rapaille, Americans are in “a permanent search of an identity” (Rapaille 2004, p. 144) and “cars are very key...maybe the best way for Americans to express themselves” (CBS 2003, p. 2). The following section interprets the works of Anthony Giddens, Mihaly Csikszentmihalyi and Eugene Rochberg-Halton, and Grant McCracken and examines the role of products not just in self-expression, but in self-creation.

The Project of the Self

If our self-concepts are more than just stereotypes and roles, what are they? Sociologist Anthony Giddens (1991, p. 53) provides one important viewpoint, describing self-identity as “the self as reflexively understood by the person in terms of his or her biography.” Giddens frames the self as a continuous project and emphasizes the *reflexive* nature of self-development; *reflexivity* refers an ongoing reexamination and redefinition of who one is. At the core of an individual’s identity is his biography, an “ongoing ‘story’ of the self” (Giddens 1991, p. 54). According to Giddens, individuals develop biographies that connect their past experiences and actions with their present circumstances, as well as outlining paths for their futures. This is not a biography in the traditional sense; that is, it does not simply provide a factual account of past events. Instead, it is an interpretation of the past in light of the present and an anticipated future. It is an individual’s attempt to connect who he was with who he is currently and who he believes he will be. According to Giddens, identity-creation is an active development process rather than just passive adherence to assigned cultural roles. “Self-identity, in

other words, is not something that is just given...but something that has to be routinely created and sustained in the reflexive activities of the individual” (Giddens 1991, p. 52).

The identity described by Giddens is a much deeper and more original creation than the self outlined by the theories discussed earlier in this chapter. The creation and maintenance of Giddens’ expanded self requires a more substantial investment by the individual. A person’s ongoing development of his self-identity leads him to engage in particular *regimes*, which are personal habits or behaviors that reveal aspects of identity. Giddens (1991, p. 62) cites the example of a consumer good, clothing, and explains how a consumer’s choice of clothing items “relates directly to concealment/revelation in respect of personal biographies.” Thus, the meaning of products can be used to reflect an individual’s identity. Giddens (1991, p. 81) also discusses how the project of the self leads an individual to embrace a certain *lifestyle*, which is defined as a “more or less integrated set of practices which an individual embraces, not because such practices fulfill utilitarian needs, but because they give material form to a particular narrative of self-identity.” While Giddens does not mention the use of products specifically when discussing lifestyle, he implies that lifestyle practices (including the consumption of products) are motivated not only by functional needs but by the desire to develop one’s identity.

Past research shows that the ownership and use of motor vehicles can be at the center of individuals’ lifestyles. In his analysis of consumer interest in battery-electric vehicles (BEVs), Turrentine (2003) notes how households who were exploring BEV ownership

saw the potential for BEVs to enhance their self-identities by enabling new lifestyle practices. In one household, a father who had little interest in environmental preservation became interested in BEV use after discovering the new technology could be an area of shared interest with his teenaged son. For this individual, it was not just the vehicle that was important, but the lifestyle that it enabled: a lifestyle that included the possibility of spending more time with his child.

Lifestyle adoption is complicated by the fact that we are exposed to many diverse lifestyles during the course of a typical day or week. Giddens (1991, p. 83) frames this exposure as movement through “lifestyle sectors, which are “time-space ‘slice[s]’ of an individual’s overall activities, within which a reasonably consistent and ordered set of practices is adopted and enacted.” Lifestyle sectors are obvious to anyone whose work and recreation contrast significantly. For example, an ambitious business executive who is also an avid birdwatcher moves through two distinct lifestyle sectors: the office environment during the week, and bird-watching club events on the weekends. In each sector, he faces a different set of peers as well as a distinct standard of acceptable behavior, requisite equipment, and shared signs.

At first glance, Giddens’ concept of lifestyle seems to resemble roles or stereotypes, but there are important distinctions. Giddens points out that there is a significant difference between simply playing a part and actually committing oneself to a particular lifestyle. He observes that “All human beings, in all cultures, preserve division between self-identities and ‘performances’ they put on in specific social contexts” (Giddens 1991, p.

58). The adoption of a lifestyle involves more analysis and commitment than the enactment of the symbolic interactionist's "role." In symbolic interactionist theory, individuals can switch from role to role; the only barrier to new role enactment is role knowledge, which can be attained through product acquisition. In Giddens' reflexively-constructed self, new lifestyles that are adopted must fit with the individual's self-concept and underlying biography. The business executive/birdwatcher must weave together his two diverse lifestyles into a coherent self-concept that is compatible with his past and his future. This is a more complex and demanding exercise, which makes adding new lifestyles a more significant event than merely casting oneself temporarily in a new role.

The reason new lifestyles must be woven into an individual's self-narrative points out another important distinction between Giddens' theories and symbolic interactionism. While symbolic interactionism stresses the importance of others in defining an individual's self-concept, Giddens emphasizes the role of the individual in defining himself. According to Giddens (1991, p. 66) one must have "confidence in the integrity and value of [his] narrative of self-identity" in order to have a healthy sense of self-worth. Because an individual's self-esteem is rooted in the quality of his self-narrative, he is motivated to carefully examine lifestyles and adopt only those that are truly compatible with his self-concept. Symbolic interactionism, in contrast, suggests that individuals are more flexible, exploring new roles and adopting whichever yield the most favorable response from others.

Giddens goes on to place development of the self-concept within a broad social context. Self-congruity and symbolic interactionism attribute the expression of one's identity to forces within the individual, namely the simultaneous desires to increase self-esteem and to maintain self-consistency. Giddens looks outside the individual, to the unique conditions of modern social, political, and economic systems. According to Giddens, the conditions of modernity have led to a replacement of tradition with reflexivity. Culture no longer provides a well-defined prescription for how to live one's life; instead, the individual now faces an "indefinite range of potential courses of action" (Giddens 1991, p. 29). Whether they find this liberating or frightening, individuals have little choice but to press on with the process of self-definition. Giddens notes that at the center of modernity lie two important conditions: a network of industries that produces goods, and a capitalist economy that exposes consumers to them. Thus, although Giddens does not make product meaning a primary focus in his work, his portrayal of modern society makes clear the integral position of goods. In the modern industrialized capitalist system, consumer goods (and the meanings attached to them) are an important element in the process of self-definition. The question of "who am I?" is answered "in day-to-day decisions about how to behave, what to wear and what to eat – and many other things" (Giddens 1991, p. 14) including (I would add) decisions about the purchase and use of products like automobiles.

Cultivation and Creation of Meaning

Like Giddens, psychologist Mihaly Csikszentmihalyi and sociologist Eugene Rochberg-Halton examine the individual's creation of his identity, but include a more detailed examination of the role of goods in the self-definition process. These authors view self-

development in much the same way Giddens does, although their terminology differs. What Giddens called “the reflexive project of the self,” Csikszentmihalyi and Rochberg-Halton (1981, p. 13) refer to as *cultivation*, which they define as “the process of investing psychic energy so that one becomes conscious of the goals operating in oneself, among and between other persons, and in the environment. It [cultivation] refers also to the process of channeling one’s attention in order to realize such goals.” An individual has goals that drive his intentions, and his intentions serve to focus his attention (also called psychic energy) on objects and actions that bring him closer to realizing his goals. Since individuals’ goals are unique, the ways they focus attention in their cultivation processes and the identities that result are also highly individuated.

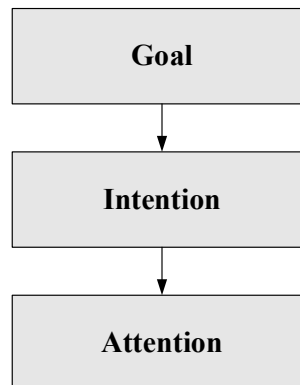


Figure 2-2: Cultivation Process (Csikszentmihalyi and Rochberg-Halton 1981)

Csikszentmihalyi and Rochberg-Halton extend the theories of product meaning discussed previously in this chapter. They agree with symbolic interactionists that goods serve as both responses and stimuli: “this symbolic meaning...of any other expressive object, is not simply to reflect an already existing actuality. It also helps bring that actuality about” (Csikszentmihalyi and Rochberg-Halton 1981, p. 27). However, according to

Csikszentmihalyi and Rochberg-Halton, product meaning is created not just by social forces, but also by the individual himself. This represents a significant departure from structuralism and other theories which view a product's symbolic meaning as constructed entirely outside of any single individual. Csikszentmihalyi and Rochberg-Halton do not deny that a culture can assign signified concepts to an object, or that a product's signified concepts can become widely understood among members of that culture. However, they recognize a second route of meaning creation in which the main agent is the individual rather than society. They call this process *perception*; it occurs "when we experience a thing and realize its own inherent character" rather than its culturally-assigned meaning (Csikszentmihalyi and Rochberg-Halton 1981, p. 44) Since each of us may come to distinct conclusions when exposed to the "inherent character" of a particular object, this leads to unique perceptions of product meaning. Perception, therefore, is a process in which the individual can "create new insights" (Csikszentmihalyi and Rochberg-Halton 1981, p. 45) and attach his own signified concepts to an object. Perception stands in contrast to *recognition*, which occurs "when we experience a thing and interpret it only as something we already know" based on socially-shared meanings (Csikszentmihalyi and Rochberg-Halton 1981, p. 44). Therefore, an individual can either recognize or perceive the meaning of a given product, depending on the level of attention he devotes to it.

The idea that individuals can develop their own symbolic meanings for products has been observed by other authors as well, especially among anthropologists studying social change. In his analysis of style among English youth subcultures, Hebdige (1979) discusses the process of *bricolage*, which involves the appropriation of a recognized sign

and the replacement of its socially-assigned meaning with an alternative meaning. The alternative meaning generally comes from a subcultural group that aims to communicate not only its identity, but its desire for social change. Hebdige (1979, p. 104) describes how “the motor scooter, originally an ultra-respectable means of transport, was turned into a menacing symbol of group solidarity” by one group of youths known as the “mods.” Like Csikszentmihalyi and Rochberg-Halton’s perception process, bricolage leaves a sign’s signifier in place, but changes its signified concepts to a more individualized meaning. This implies that an individual, or at least a group of individuals, can redefine a product’s meaning.

Automobiles also can be the subjects of bricolage. O’Dell (2001) describes how a subculture of Swedish youth called the “raggare” assigned unique meanings to American-made automobiles, and how these new meanings then were adopted by the larger Swedish society. O’Dell (2001, p. 114) explains “The cars became a forum for self-expression, and raggare developed their own aesthetic code which was at least partially a reaction against the dominant and normative Swedish preference for the practical and rational.” The American automobile, which for the Swedish once had socially-assigned meanings of “the beauty and potential of things to come” and a “better standard of living” (O’Dell 2001, p. 110) was transformed by the raggare into “a signifier of potential danger” (O’Dell 2001, p. 122) and rebellion.

In addition to allowing individuals to assign their own meaning to products, Csikszentmihalyi and Rochberg-Halton’s work differs from the theories discussed earlier

in another important way. Csikszentmihalyi and Rochberg-Halton see an important role for signifiers in referencing abstract signified concepts. Signifiers do not simply “stand for” something else, but embody the signified concept and make it real. This is important for intangible concepts like thoughts, feelings, and desires which have no presence in the physical world. According to Csikszentmihalyi and Rochberg-Halton (1981, p. 21), symbols grant abstract ideas “an objective existence outside immediate situations.”

Csikszentmihalyi and Rochberg-Halton’s analysis raises an existential question. Do abstract concepts like love, freedom, or religious beliefs *really* exist if we cannot touch or see them? In other words, do we need proof of physical existence in order to recognize that something is real? Perhaps not, but Csikszentmihalyi and Rochberg-Halton suggest that it helps to have physical evidence to objectify an abstract concept. This may be especially important given our limited understanding of many abstract ideas. For example, all of us recognize love, but do we really understand it? With only a limited comprehension of what love is, it may be easier to consider the concept generally; this generalized concept is then accessed through a summarizing symbol. The symbol, rather than a detailed understanding of the concept, now makes the concept “real.” In this case, the signifier and the signified concepts merge. In other words, the symbol *becomes* its meaning. This explains why, as Ortner (1979, p. 94) notes, many summarizing symbols become “sacred symbols.” For example, many Americans view desecration of the U.S. flag as desecration of the ideals for which it stands. In this sacred summarizing symbol, the piece of fabric that serves as signifier cannot be separated from the its underlying

signified concepts. The sign and signifier merge due partly to our limited understanding of the complex set of abstract ideas embodied within the sign.

In his analysis of consumer behavior, McCracken (1988a) observes the same merging of signifier and signified concept noted by Csikszentmihalyi and Rochberg-Halton.

However, McCracken proposes another explanation for why this merging occurs. In his *displaced meaning strategy*, McCracken (1988a, p. 104) examines “cultural meaning that has been deliberately removed from the daily life of a community and relocated into a distant cultural domain.” Displaced meaning is a method for individuals to cope with the discrepancy between their abstract ideals and the world around them. For example, although we may believe in utopian ideas such as peace, equality, and kindness toward others, life often exposes us to the opposite. According to McCracken (1988a, p. 106) people respond to this type of incongruity between reality and ideals by relocating their ideals to any of an “almost infinite number of locations on the continua of time and place,” virtually anywhere except current reality. The future is a popular choice: individuals often look forward to a time in the future when their utopian vision will be realized. The past can also be used. McCracken (1988a, p. 106) notes that the idea of a “golden age” in which life was better is also a common location for displaced meaning.

Wherever individuals choose to relocate their ideals, they need a method to access them so they are not lost. McCracken (1988a, p. 104) suggests that consumer goods serve as this link: “Consumer goods are bridges to these hopes and ideals.” Since the ideals are not compatible with current reality, consumer goods serve as their surrogate: they serve

as signifiers for ideals without removing the ideals from their displaced locations. For example, displaced meaning may be evident among HEV buyers in this study. Owners view the purchase of an HEV as “the right thing to do” and look forward to a world in which “everyone drives hybrids” (see Chapter 4 for more detail). Their idealistic vision is far from the current reality of a car-dependent, heavily-polluting society, so they relocate it to the future. Their automobiles serve as a bridge between today’s unpleasant reality and their ideals of environmental harmony. For these individuals, HEVs serve as important symbols: they are “real” things that link to ideas that their owners recognize cannot be “real” in the current version of the world.

The Project of Culture

As reviewed above, much of the analysis of people’s relationships with goods focuses on the role of product meaning in the formation of individual identity. Yet goods can have a broader impact: their meaning contributes not only to the definition of individuals, but also to the definition of their surrounding culture. In his discussion of *life politics*, Giddens suggests that the development of the self is closely linked to changes in larger social systems. Giddens (1991, p. 214) observes that a consequence of the individual’s process of identity-creation is *life politics*, “political issues which flow from processes of self-actualization in post-traditional contexts” In other words, “the ‘personal is political’” (Giddens 1991, p. 215): a person’s lifestyle decisions have an inevitable impact on those around him. In modern globalized society, one’s lifestyle can have far-reaching effects. Automobile use by American consumers, for example, generates greenhouse gas emissions that threaten the entire world’s ecosystem. Individuals who become aware of the politics of their lifestyles may choose to modify them, like HEV owners in this study

who purchased their vehicles in order to minimize their contribution to global warming and world resource depletion.

Csikszentmihalyi and Rochberg-Halton agree that “identity” can transcend the individual. They suggest that an individual’s goals, which are the driving force behind his behavior, exist at several levels. In addition to personal goals, an individual possesses larger *social goals* that are shared with others within his network of social groups (Csikszentmihalyi and Rochberg-Halton 1981). The individual also has a even broader set of *cosmic goals* that connect him with people and things far larger than his immediate social network, creating a “portion of the self whose ultimate goal is the larger harmony of things” (Csikszentmihalyi and Rochberg-Halton 1981, p. 192). Thus, people are interested not just in forming their own selves, but in shaping their societies and influencing conditions at the global level. Therefore, when an individual accesses product meaning, he may be attempting to cultivate himself, or he may wish to cultivate the cultural system(s) around him.

Other authors have noted how product meaning is used to evoke social change in areas such as gender, race, and class in addition to eliciting changes in individual identity. McCracken (1988a) outlines how American feminists manipulated the meaning of selected clothing items to confront gender politics they faced in the professional workplace. McCracken (1988a, p. 97) explains “The authoritative look for women’s business wear is an attempt to isolate certain of the properties of male business clothing and incorporate them into female fashion. The object of this undertaking is to give

businesswomen new credibility, presence, and authority in the business world.” While individual identity-definition may be partly responsible for this manipulation of product meaning, the women who redefined these signs also were motivated by the desire to change the collective identity of *all* women. Product meaning was an important instrument in the redefinition of culture and the female role within it.

Gilroy (2001) observes a similar use of product meaning to confront another cultural issue: racial stereotypes. Gilroy (2001, p. 94) outlines the link between the automobile’s signified concepts and the individual identities of African Americans: “cars seem to have conferred or rather suggested dimensions of citizenship and status that were blocked by formal politics and violently inhibited by informal codes.” For the African Americans observed by Gilroy, racial stereotypes complicated the project of individual identity by blocking access to certain narrative elements. By using the meaning in automobiles, African Americans were able to re-access these elements, including the idea that they had the same rights and social status as other members of society. As these African American car-owners redefined themselves, they also altered society’s racial prejudices. Thus, for African-Americans, the automobile’s meaning was used to evoke changes in both individual identity and cultural categories.

The Swedish raggare mentioned earlier confronted a third set of cultural categories: social class. The raggare’s appropriation of the American-made car as a signifier and their redefinition of its meaning represents both a statement about individual identity and a demand for social change. O’Dell (2001, p. 126) notes that the raggare’s interest is not

just in self-definition, but in “the agitation of the middle class.” The working-class youth that compose the raggare subculture are demanding a reevaluation of their society’s class structure and their own place within it. Their use of the automobile’s meaning is not simply about developing their own identities; in fact, the signified concepts they choose are deliberately “defined in contrast to those of the middle class” (O’Dell 2001, p. 126). Their statement about themselves is simultaneously a statement about another group, and a declaration about the politics of class.

Mechanics of Meaning

The previous section considered the relationship between product meaning and individual consumers’ identities. This section will examine where the signified concepts in products originate, and how a product’s meaning is “transferred” to the consumer. While advertisers are perhaps the best-known sources of product meaning, this section considers numerous actors who assign meaning to products, including journalists, public leaders, and academics. This section begins by discussing Williamson’s (1978) three stages of product meaning and the “levels” of meaning that can be present in a product. It then examines McCracken’s (1988a) assessment of where meaning is located and how it moves into and out of products.

As discussed earlier, Csikszentmihalyi and Rochberg-Halton (1981) identify two processes that assign meaning to products. The first, recognition, occurs when others define meaning in a product and we “recognize” those meanings. In its purest form, recognition is a passive acceptance of socially-shared meanings with little or no analysis on the part of the individual. The second way a product receives meaning is through

perception, a process in which an individual constructs a novel interpretation of a product's meaning. Perception involves a more intensive evaluation in which an individual actively considers socially-shared meanings in light of his own experience.

An example of the two processes is evident in the various meanings American consumers see in vehicles such as pickup trucks. Dan Neil, automotive critic for the Los Angeles Times, notes that pickup trucks have a strong, socially-shared meaning that has contributed to their growing popularity: "pickups as a type [of vehicle] have meaning: a rootsy, red-state nobility, a mild scolding of sophistication and effete urbanism" (Neil 2004, p. G1). Yet individuals also can have their own interpretations of the pickup truck. One participant in this study characterized large pickup trucks as symbolizing aggressive hostility, arrogance, and a desire to dominate others. This individual is perceiving rather than simply recognizing meaning: the signified concepts he saw in pickup trucks were the result of personal interaction with pickup drivers in his own community, negative encounters which led him to reevaluate these vehicles and the concepts they signified.

Csikszentmihalyi and Rochberg-Halton (1981) point out that recognition and perception are not really two distinct processes, but rather represent two extreme points on a continuum. The more analysis conducted by the individual on a product's meaning, the more his product interaction moves toward perception and away from recognition. It is important to note that both perception and recognition begin with socially-shared meaning: in recognition, this meaning is accepted without question, while in perception it

is evaluated and modified. But where does socially-shared meaning originate, and how does it become associated with a specific product like automobiles?

Stages of Product Meaning

Advertising is an obvious starting point in the analysis of how products receive their meaning. In 2004, the automobile industry spent over \$20 billion (Advertising Age 2005) to infuse its products with meanings designed to attract consumers. In her analysis of how advertisements function, Williamson (1978) has developed a three-stage model to describe the level of symbolic meaning associated with products. When a new product is introduced into the marketplace, it begins in the first stage, called *product as signified*. In this initial stage, a product has no meaning attached to it. Because it is new, it has no reputation or standing with consumers. In order for the product to acquire meaning, it must borrow signified concepts from another object or person. Thus, in addition to showing the product they are selling, advertisements often include a company founder, celebrity endorser, or significant object with which the viewer is already familiar.

One example is the print advertisement for Volvo automobiles shown in Figure 2-3, which depicts a Volvo P-1800 coupe next to a Viking sailing ship (Volvo Car Corporation 1962). While the advertisement does not directly discuss the similarities between the car and the ship, it aims to access characteristics the audience recognizes in the Viking vessel: its durability, practical design, and advanced engineering (for its time). Since Volvo vehicles were not well-known in the United States in the early 1960s, the advertisement was designed to transfer signified concepts from a known object, giving the new Volvo model meaning that did not exist previously in the minds of American

drivers. The advertisement's title and supporting text assists in this transfer, stating that there is a "centuries-old Swedish flair for beautiful, practical design" (Volvo Car Corporation 1962). The advertisement implies that two-thousand years ago, this particular Swedish skill led to the development of advanced sailing ships; today, it is embodied in a unique automobile.

2000 YEARS OF SWEDISH PROGRESS

At last . . . a car that captures the rhythm of our modern age in its dynamic lines. The centuries-old Swedish flair for beautiful, practical design is combined with modern engineering skill and craftsmanship in the sensational **P-1800 Sports Car.**

The P-1800 offers a combination of big car comfort and unbelievable small car economy that can be matched by no other car, domestic or imported. **Drive a Volvo today . . . compare it feature by feature . . . and you'll see why thousands of motorists are making Volvo one of America's fastest selling imported cars. VOLVO OWNERS ARE OUR BEST SALESMEN!**

West Coast P.O.E. Price \$4886.
Other Models start at \$2395.
Parts and Service Available everywhere.

VOLVO
P 1800

114 hp 18 P. 2-Door Sports Sedan

1175 2-Door and 4-Door 99 hp. - One Model

IN ALL THE WORLD, THERE IS NO CAR LIKE A VOLVO!
Consult the yellow pages of your phone directory for the name of your local Volvo dealer.

Figure 2-3: Volvo Sailing Ship Advertisement (Volvo Car Corporation 1962)

In the second of Williamson's product meaning stages, a product comes to signify certain concepts. Called *product as signifier*, this stage is reached when the product can communicate its signified concepts without assistance from another object or person. Advertising attempts to condition consumers to form this strong association between

product and signified concepts, but it takes time and consistent messaging for products to reach the *product as signifier* phase. A second Volvo print advertisement (shown in Figure 2-4) provides an example. The advertisement states that “over the years, Volvo has become the very symbol of the safe, sane automobile” (Volvo Car Corporation 1976). At some point after the 1962 sailing ship advertisement, Volvo changed the meaning it wanted to attach to its vehicles and began associating them with safety. By 1976, safety had become part of the vehicles’ “reputation” (Volvo Car Corporation 1976), a reputation

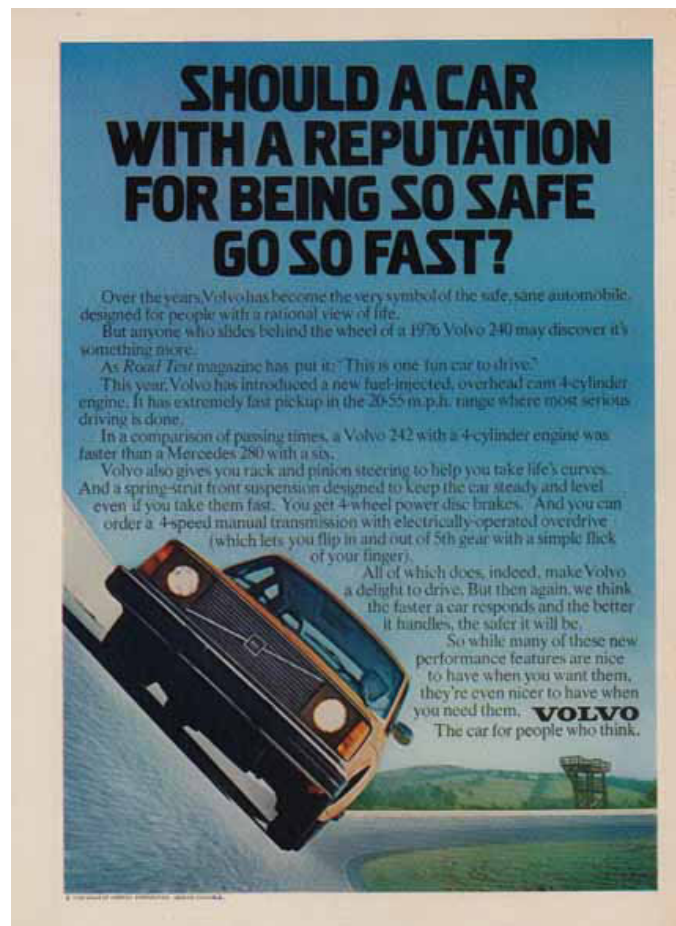


Figure 2-4: Volvo Racetrack Advertisement (Volvo Car Corporation 1976)

that persists to this day (Jewett 2002). As this advertisement demonstrates, Volvo was so confident that its 240 model was *product as signifier* for safety, the company began attempting to attach other meanings to its product in addition to safety. Thus, the racetrack setting (as well as the text discussing the car's acceleration, handling, and braking) is designed to suggest that the 240 is "one fun car to drive" (Volvo Car Corporation 1976) in addition to being a safe vehicle.

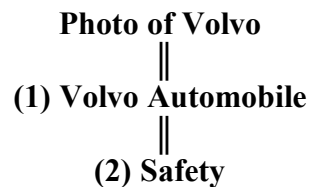
The final stage of product meaning is called *product as generator*. In this phase, a product merges with its signified concepts: the product doesn't just stand for an abstract idea, it *becomes* that idea. Using the Volvo example, this means that Volvo doesn't just represent the concept of safety, but Volvo *is* safety. Safety becomes defined by whether the car is a Volvo or not, and therefore no other brand of vehicle really can be considered to be safe. This merging of signifier and signified concept is the same phenomenon described earlier in the discussion of Ortner's summarizing symbols. In the product as generator phase, the product becomes a summarizing symbol.

The *product as generator* phase may explain why some consumers conduct little or no information search when purchasing a new vehicle: they select one brand or vehicle type because they perceive only one choice which can deliver the signified concepts they seek. For example, findings from HEV buyers in this study show that these vehicles tend to be perceived as environmentally-friendly, and many buyers see HEVs as the only commercially-available vehicles that convey the concept of environmental friendliness. Therefore, for many consumers, hybrid vehicles don't just signify environmental

preservation: they actually have merged with that concept. Environmental friendliness *is* owning an HEV, even though other types of vehicles such as compact gasoline vehicles with a partial-zero emissions vehicle (PZEV) emissions rating deliver similar levels of low fuel consumption and emissions.

Meaning Chains

Williamson's analysis of advertisements also yields a method for dissecting the meaning attached to a given product. Utilizing terminology from philosopher Roland Barthes (1967), Williamson (1978) explores the levels of meaning attached to products through two processes. The first, *denotation*, is a basic and direct connection between signifier and signified concept. The second, *connotation*, is a deeper, indirect association. A simple example illustrates these processes:



The advertisement in Figure 2-4 includes a photo of a Volvo sedan. In this advertisement's first layer of meaning, the sign is composed of the photo (signifier) that signifies the actual vehicle (signified concept). This is *denotation*: a basic association between an object and an idea that can be understood with little or no external knowledge. However, a photo of a Volvo automobile symbolizes more than just the real vehicle: there is an additional layer of meaning that is less obvious. In the second layer, the photo of the Volvo (signifier) signifies safety (signified concept). This deeper

meaning is an example of *connotation*, and its interpretation in the manner the advertiser intended requires additional knowledge on the part of the viewer.

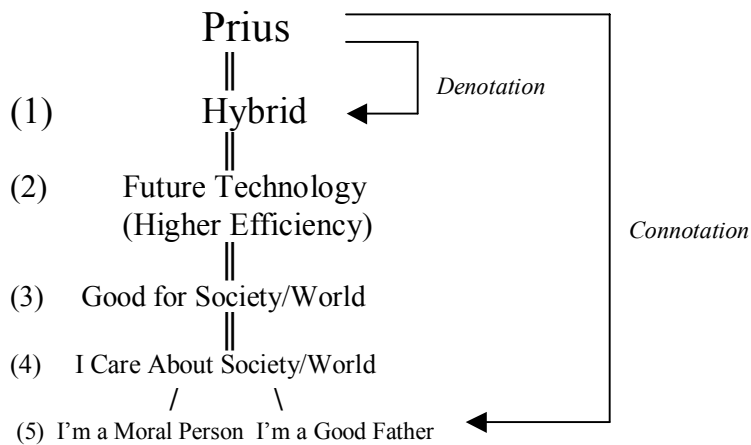
It is the use of this additional knowledge, which Williamson (1978, p. 26) calls “referent systems,” that separates denotation from connotation and makes deeper meaning in products possible. In the Volvo racetrack advertisement, the referent system that must be understood is a system of automobile brands and a system of vehicle characteristics. This does not mean that the viewer needs to be an expert on cars, but he must comprehend, for example, that Volvo and BMW are two distinct automobile brands, and that safety and performance are two different vehicle capabilities. This relationship is shown in the following example:

Volvo Automobile	≠	BMW Automobile
Safe	≠	High-Performance

In Williamson’s view, a Volvo automobile only can have meaning when placed within a larger system of meaning; that is, when it is contrasted with another vehicle that also has significance. Therefore, an individual who has never heard of Volvo or any other brand of automobile may understand that a photo of a Volvo car signifies the actual car (denotation), but he lacks the referent systems necessary to determine as the manufacturer intended that Volvo symbolizes safety (connotation).

The examples provided above are simplified: in reality, meaning chains often have numerous links that separate the signifier from the signified concept it connotes. Saying

that a Volvo symbolizes safety may be correct, but it does not tell us much about why safety is important to Volvo buyers. A more complete meaning chain connotes something about the user's identity, linking the product and person. For example, research of HEV owners yielded the following meaning chain for one owner of the Toyota Prius:



I interpret that this individual's automobile held five layers of meaning. Driving a Toyota Prius meant that he was driving a special type of vehicle called a hybrid (1), and this vehicle type symbolized high efficiency and future technology (2). Using a high-efficiency vehicle signified doing something good for society and the world (3), an act that identified the Prius owner as a person who cared about the people and world around him (4). Caring about others signified that he was a moral individual, and a father who loved his children (5). Thus, his Toyota Prius connoted that he was a good father and a moral individual, symbolic meaning that related directly to his own identity. In addition, as Williamson suggests, this individual perceived the meaning of his own vehicle not in isolation, but within a system of vehicle meanings. One example the subject provided contrasted his Toyota Prius with a Hummer H2, a large sport-utility vehicle. Our interpretation of the two vehicles' distinct meanings is shown below:

	Prius	≠	Hummer
(1)	Hybrid	≠	Large Truck
(2)	Future Technology (Higher Efficiency)	≠	Past Technology (Lower Efficiency)
(3)	Good for Society/World	≠	Good for Me
(4)	I Care About Society/World	≠	I Care About Myself
	/ \		
(5)	I'm a Moral Person I'm a Good Father/Mother	≠	I'm an Immoral Person

This comparison contrasts two vehicle models, associating each with a different vehicle type (1), level of technology and efficiency (2), group receiving benefits from vehicle use (3), focus of owner's concerns (4), and finally ethics of the owner (5). For this Prius driver, the Prius and Hummer were not just vehicles with different levels of fuel efficiency and environmental impact: they were vehicles that symbolized their owner's morality (or lack thereof.)

It is important to note that the meaning chains shown in the example above may be shared by others, but do not necessarily capture the views of all consumers. For example, buyers of large SUVs probably have very different opinions about the meanings of these two types of vehicles, and it's doubtful that they see themselves as immoral people simply because they drive trucks. The fact that different groups within society can assign distinct meaning to the same product complicates the process of dissecting the meanings in products. It also adds complexity to the advertiser's mission, since it cannot be assumed that every member of a society will interpret an advertisement in the way its creators intended. Ultimately, understanding the meanings an individual sees in a product

means understanding the interpretation process. Is he recognizing socially-shared meanings assigned by the cultural and sub-cultural groups to which he belongs? Is he adding his own meanings to the product by perceiving it in a unique way? Both of these questions must be investigated in order to comprehend the meanings associated with a given product by a particular consumer.

Meaning Locations and Transfers

Like Williamson, McCracken (1988a) recognizes the importance of advertising in the transfer of meaning to consumer goods. However, in his analysis of the movement of meaning, McCracken identifies additional actors that affect what products signify and how they receive their meanings. McCracken views meaning as highly dynamic: signified concepts are constantly evolving and migrating from one “location” to another. The first location, where all meaning originates, is called the *culturally-constituted world*. This is the world around us, as we perceive it through the lens of culture. As discussed earlier, culture gives us a symbolic framework within which we interpret the world. Culture helps us to make sense of the things and people in our surroundings, and instructs us on how to interact with them. As McCracken (1988a, p. 73) notes, culture functions by providing “cultural categories” in key areas such as “time, space, nature, and person”; using these categories to interpret their surroundings gives members of a culture their “own special vision of the world.” It is these cultural categories that provide the underlying meaning that eventually resides in products. For example, in order for an automobile to define someone as “youthful,” the cultural category of “young person” must first exist. While this may seem obvious, it is worth noting that categories and definitions can vary significantly between cultures and subcultures.

From cultural categories, meaning then can move into the second location, the *consumer good*. McCracken (1988a, p. 72) notes that goods are important because they symbolize elements of culture and make these elements more tangible: “they give cultural meaning a concreteness for the individual that it would not otherwise have.” For example, automobiles available in the U.S. range from the \$10,000 Chevrolet Aveo to the \$440,000 Porsche Carrera GT. Such a large disparity in vehicles and vehicle prices may seem natural in a free market, but it reveals something about our culture: namely, that we are willing to tolerate and exhibit sizable differences in personal wealth. The consumer that purchases an expensive vehicle thus makes a statement about his position within the economic hierarchy, a cultural category that is important for Americans in classifying others. In order for this classification to occur, however, the meaning of the vehicle must be transferred to its owner. This reveals the third location for meaning: the *individual consumer* himself.

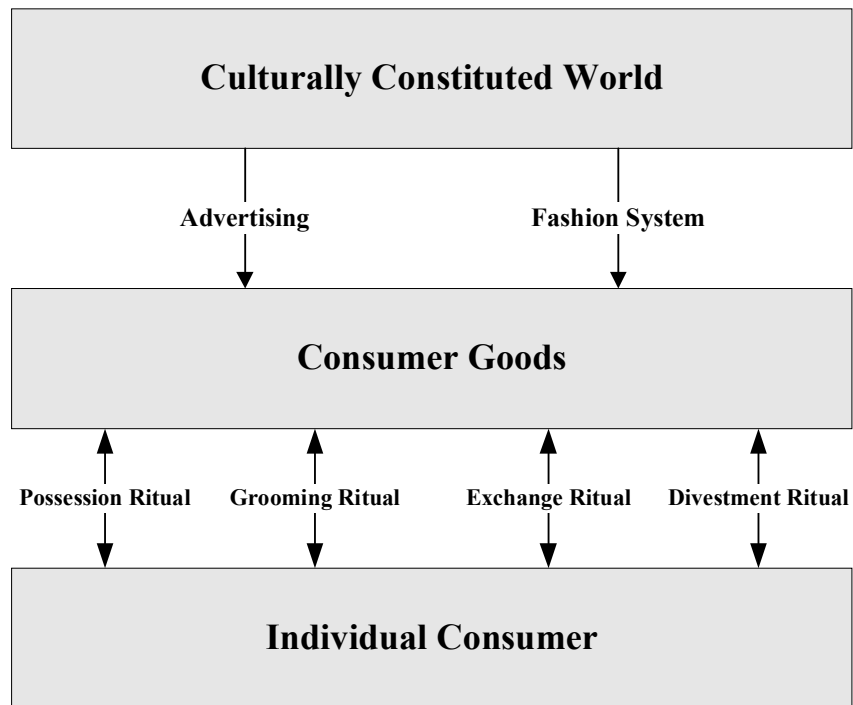


Figure 2-5: Meaning Locations and Movement (Adapted from McCracken 1988a)

McCracken's three locations of meaning are shown in Figure 2-5, along with the two major types of meaning movement. The first flow of meaning is from the culturally-constituted world into consumer goods. Like Williamson, McCracken sees advertisers and marketers as important actors in this process, since they create media that connects products with signified concepts. In an advertisement, this connection is established by showing both the product and elements of the culturally-constituted world that have meaning, and by portraying these elements and the product as similar. Thus, the Volvo automobile receives some of the meanings present in the Viking ship, an element from the culturally-constituted world. But McCracken also identifies a second set of actors that also infuse products with meaning: members of the *fashion system*. McCracken's fashion system does not refer simply to the clothing industry. It includes designers of all types of products, journalists, social observers, market researchers, and opinion leaders: virtually

anyone who recognizes relevant meaning in the culturally-constituted world and can “gather this meaning up and accomplish its transfer to consumer goods” (McCracken 1988a, p. 81).

McCracken’s analysis is important because it recognizes that advertising (and the producers that fund it) is just one of numerous sources of meaning for products. Equally influential are journalists, social observers, and market researchers, who observe both consumer trends and cultural changes, and communicate their findings to the public. For example, HEVs had strong meaning to many early buyers (see Chapter 4 for more detail). Since there were few advertisements for these vehicles before 2004, it is likely that much of the meaning was transferred by journalists through their extensive coverage of these vehicles in popular magazines and newspapers.

Other important actors include *opinion leaders*, a group defined as “individuals who by virtue of birth, beauty, celebrity, or accomplishment are held in high esteem” by consumers (McCracken 1988a, p. 80). When actress Cameron Diaz praises her Toyota Prius on the Tonight Show (Tapper 2002) or rap artist Snoop Dogg calls the Daimler Chrysler CEO to place his order for a Chrysler 300C (Clanton 2004), these individuals transfer meaning to those vehicles. McCracken notes that opinion leaders not only give meaning to products; they also are able to modify culture itself through redefinition of cultural categories and principles. Diaz’s promotion of the Prius’ environmental benefits creates two new cultural categories of people: those who choose to preserve the natural environment and those who don’t. These new categories cut across existing cultural

divisions, such as age, gender, and social class; they change, in a subtle way, how our culture defines and organizes people. It is worth noting that opinion leaders who drive cultural change need not be famous celebrities: this group can include anyone with influence over the views of others, even within a geographic segment or subculture of society. Leaders of community groups, political causes, and interest groups all have an audience for their views, and can evoke changes in the meaning of products and culture itself.

The second flow of meaning in McCracken's model is from consumer goods to the individual consumer. A product "says something" about its owner because other people attribute its signified concepts to the person who buys it, or because the buyer adopts those meanings. McCracken explains that this transfer occurs through one of four acts, or *rituals*. The first are *possession rituals*. In the possession ritual, an owner uses and displays his product; he also reflects on its qualities, compares it with other products, and discusses it with other people. Through this behavior, the consumer is not only asserting his ownership over physical goods, but also aims to "assume a kind of ownership of the *meaning* of his or her consumer goods" (McCracken 1988a, p.85). The act of making something his necessarily leads to an association between himself and the product, between the product's characteristics and his own. If this association does not occur, the consumer does not really "possess" the product. McCracken cites findings from his own research in which individuals claim that a particular "car, house, article of clothing, or other meaning-carrying good 'never really seemed to belong to me'" despite having physical possession of the object (McCracken 1988, p. 85). In McCracken's view,

ownership involves accessing both the physical and the symbolic characteristics of a product.

In the possession ritual, the flow of meaning between individual consumer and consumer good can be bi-directional in certain cases. For example, an individual who personalizes a product, such as an automobile, alters its physical appearance to make it unique to himself. In other words, personalization allows the product to better reflect who the individual is. Thus, personalization imbues the product with some of the signified concepts of the individual's identity. So meaning can flow both ways: from product to consumer, and from consumer to product.

Grooming rituals involve physical maintenance of products. These rituals including cleaning, repairing, and enhancing the appearance of an object, such as an automobile. In fact, McCracken (1988a, p. 86) cites "the extraordinary amounts of largely redundant time and energy that are lavished on certain automobiles" as the best example of the grooming ritual. If a product is allowed to age and undergo changes in physical appearance, underlying changes in meaning can occur as well. A faded, twenty-year-old Cadillac with missing hubcaps does not possess quite the same symbolic meaning as it did when it appeared new on the showroom floor. Grooming rituals, then, are not only a way to maintain an object's physical appearance, but also allow the owner to continually extract meaning from a product for as long as possible. The time spent by an owner in the grooming ritual also represents an investment in the object. This investment draws him

closer to the object and, like personalization in the possession ritual, allows him to put part of himself into the good.

Exchange rituals and *divestment rituals* relate to the acquisition and disposal of consumer goods. *Exchange rituals* involve the “choice, purchase, and presentation of consumer goods by one party and their receipt by another” (McCracken 1988a, p. 84). When we give a gift to someone, we provide them with both the physical object as well as the concepts it signifies. The father who purchases his daughter a Jeep for her birthday provides her with transportation, but also gives her the image of herself as the type of person who drives a Jeep: young, outdoorsy, and adventurous. Exchange rituals, therefore, let us grant symbolic properties to others for them to use in the development of their identities. Finally, *divestment rituals* are used to empty a good of its meaning. Before selling a car, most sellers clean the vehicle thoroughly and remove signs of personalization. There are practical reasons for this exercise: the owner wants to collect his possessions from the vehicle, and perhaps enhance the selling price by improving the automobile’s appearance. However, cleaning and erasing signs of personalization can also be a divestment ritual. This ritual is performed to erase any personal meanings given to the vehicle by its owner, and to prepare the car for a new owner, who will assign his own personalized meanings.

Symbols in Perspective

The first part of this chapter discussed how products simultaneously provide meaning and useful functionality. Cars, for example, say something about us and take us where we want to go. Both meaning and mobility are benefits to the consumer, and it is the sum

total of a product's benefits that make it desirable. This section examines ways to categorize product benefits, including symbolic meaning. The goal is to better understand how consumers perceive products, and to determine how various types of benefits are considered in the purchase process. This section examines three approaches to classifying product benefits. The first approach sees products as primarily utilitarian objects: only their functional benefits matter. The second approach recognizes the importance of both functional capabilities and symbolic meaning, allowing a product to provide benefits in both areas. Finally, a third approach adds experiential benefits, the positive feelings generated by products, to symbolic and functional benefits.

Focus on Function

Nearly all products have some functional benefits; that is, they assist the user in accomplishing a specific task, "permitting control of the environment and allowing the solution of externally-imposed problems" (Fournier 1991). In the most basic sense, an automobile moves people and cargo from one point to another. Any car that can't perform this task effectively will receive interest from few consumers, no matter how rich it is in signified concepts or other benefits. Yet the obvious importance of function has led many authors to focus exclusively on this type of benefits. Indeed, the classic definition of product concept in marketing emphasizes practical, utilitarian elements; it states that "consumers will favor those products that offer the most quality, performance, and features" (Kotler 1984). In this view, the only real benefits from a product are functional benefits. This view underlies many marketers' and economists' assessments of consumer behavior. For example, Murphy and Enis (1986, p. 34) attempt to classify products based on the distinct costs and benefits associated with different goods. While

the authors conduct a detailed examination of the costs associated with products, they devote almost no attention to benefits, assuming simply that “how a product functions is usually the main reason for purchase.”

This is the same assumption made by many in the transportation field when analyzing vehicle choice. Analysis of eleven vehicle choice models conducted by Mokhtarian and Choo (2002) reveals that researchers typically focus on monetary costs (such as purchase price) and functional attributes (such as vehicle weight) in constructing their models. Attempts to predict the adoption of advanced-technology automobiles show the same focus on costs and functionality: a study of California consumers in the late 1990s (Brownstone et. al., 2000) aimed to predict adoption of HEVs by analyzing consumer receptiveness to vehicle-related costs (such as purchase price and fuel cost/mile) as well as functional attributes (such as luggage space, top speed, and acceleration time). A more recent study sponsored by the California Energy Commission (Adler et al. 2003) used a similar approach, although a slightly different combination of costs and functional characteristics were selected for analysis.

It is tempting to emphasize functionality because it is quantifiable: vehicle characteristics such as cargo room, engine displacement, and fuel economy all can be easily measured and compared among market offerings. But attributes do not always correspond directly with benefits, nor do enhanced features necessarily mean a product is better at performing its essential functions. Is a car with 200 horsepower really better at transporting its owner to work than a car with 160 horsepower? Both provide virtually the same mobility, which

is the basic function of an automobile. Of course, one of these vehicles may be more exhilarating to drive, but “exhilaration” has no real functional value, and therefore cannot be recognized in a framework that focuses only on functional benefits. This deliberate exclusion of other types of benefits, including the feelings and meanings products generate, is a significant weakness of this approach. In addition to function, there is something more that automobiles (and other products) provide.

Function and Symbolism

That “something more” is symbolism, and it can often be difficult to identify because it can be closely coupled with a product’s functionality. In her analysis of advertising and product meaning, Williamson (1978) points out that aspects of automobiles that seem purely functional, such as fuel economy, actually are rich in meaning. She explains that high fuel efficiency “could be translated into terms of thriftiness, the user being a ‘clever’ saver, in other words, being a certain kind of person” (Williamson 1978, p. 12). Low fuel efficiency can also be symbolic, appealing “to the ‘above money pettiness,’ daredevil kind of person who is too ‘trendy’ to be economizing” (Williamson 1978, p. 12).

Williamson describes a translation process that occurs when consumers interpret product features. A feature such as high fuel economy has *use value*: that is, it delivers practical benefits such as lower fuel costs or less time spent in visits to the gas station. However, fuel economy also has *symbolic exchange value*: particularly at very high or low levels, it makes a statement about the vehicle owner’s identity. Our analysis of HEV owners in this study supports Williamson’s functional-symbolic approach to benefits. Owners of these highly-efficient vehicles cite both use values and exchange values as reasons for their

HEV purchases (see Chapter 4 for more detail). Thus, a vehicle attribute (in this case, a hybrid-electric powertrain) yields both functional and symbolic benefits.

Numerous authors have used the functional-symbolic framework in their analysis of product benefits (Levy 1959; Grubb and Grathwohl 1967; Sirgy 1985; Meenaghan 1995). While its two categories do a better job of capturing the reasons for using a product, some authors find this framework lacking. Let's return to the example cited earlier of the 200 horsepower automobile that is exhilarating to drive. Is the exhilaration experienced by the driver directly connected to his identity? It is possible that it is. Perhaps this driver wants to define himself as young, and he believes that young people drive fast cars with powerful engines. The exhilaration that occurs while he is driving results from his interpretation of his vehicle's symbolic meaning. In other words, he is excited not by the physical sensation of moving quickly, but by the idea that his automobile shows how young he is.

Hirschman and Holbrook (1982) would characterize this driver's experience as hedonic consumption: interaction with a product that generates emotional arousal and/or involves multisensory imagery, such as fantasies or recollection of past events. According to Hirschman and Holbrook, hedonic consumption is far more than simple sensation-seeking. The emotional responses that consumers experience in the marketplace are rooted in the meanings they assign to products and in their manipulation of these meanings. So while the driver in the example above feels exhilarated, the feeling of exhilaration is not his goal; rather, the feeling results from his successful transfer of his

vehicle's meaning onto himself. This is an essential point in Hirschman and Holbrook's view: consumers do not simply use products to feel good. Instead, consumers aim to access the symbolic meaning within products, and if this meaning is manipulated successfully, positive emotions result. Therefore, while products can evoke emotional responses in consumers, these responses are not separate benefits. They are simply the result of the consumer's reaction to a product's symbolic benefits.

Function, Symbolism, and Experience

In contrast with Hirschman and Holbrook's analysis, other researchers characterize hedonic responses as a separate category of benefits (Park et al. 1986; Dittmar 1992; Keller 1993; Ligas 2000). Park et al. (1986) describe three types of consumer needs and corresponding product benefits: functional, symbolic, and experiential. While symbolic benefits "fulfill internally generated needs for self-enhancement, role position, group membership, or ego identification," experiential benefits "provide sensory pleasure, variety, and/or cognitive stimulation" (Park et al. 1986, p. 136). This division between symbolic and experiential benefits implies that consumers seek experiences or feelings that do not directly relate to the maintenance of identity. It is reasonable to assume that some of an individual's feelings and actions are disconnected from the process of defining who he is, although it is difficult to determine exactly which ones. Perhaps because of the difficulty in making this distinction, some researchers consolidate symbolic and experiential benefits in practice even though they recognize they may satisfy distinct consumer needs. For example, in their analysis of automobile use, Steg et al. (2001) test for participants' perception of functional benefits as well as "symbolic-affective" benefits, a combined category which captures all emotional responses, whether

they are achieved through identity formation and maintenance or sought as ends in themselves. This consolidation addresses a shortcoming with the functional-symbolic-experiential approach, namely the difficulty in determining whether a particular benefit is merely experiential or whether it has deeper symbolic roots.

Susan Fournier (1991) attempts to address this issue in a product classification scheme that extends the functional-symbolic-experiential framework. In her analysis, Fournier evaluates products using three criterion: tangibility, emotional response, and commonality of meaning. As shown in Figure 2-6, each criteria can be seen as an axis. *Tangibility* refers to the source of a product's meaning and the degree of interpretation it requires. At one end of the tangibility axis is the purely utilitarian product, whose benefits are readily apparent from its functionality; at the other end lies an entirely symbolic product, which has benefits only to the user who can comprehend its symbolic meaning. *Emotional Response* describes the level of arousal that occurs during the consumption experience, and also refers to the consumer's level of involvement with the product. At one end of the emotional response axis lie products that generate little excitement and attachment, such as can openers or snow shovels, while at the other end are products that evoke significant emotional responses and commitment in consumers. Finally, the *Meaning Commonality* axis addresses the source of meanings within a product. This axis is similar to Csikszentmihalyi and Rochberg-Halton's recognition-perception continuum presented earlier. At one end of the axis, product meanings are socially-shared and widely understood; at the other end, product meanings are uniquely defined by individual consumers.

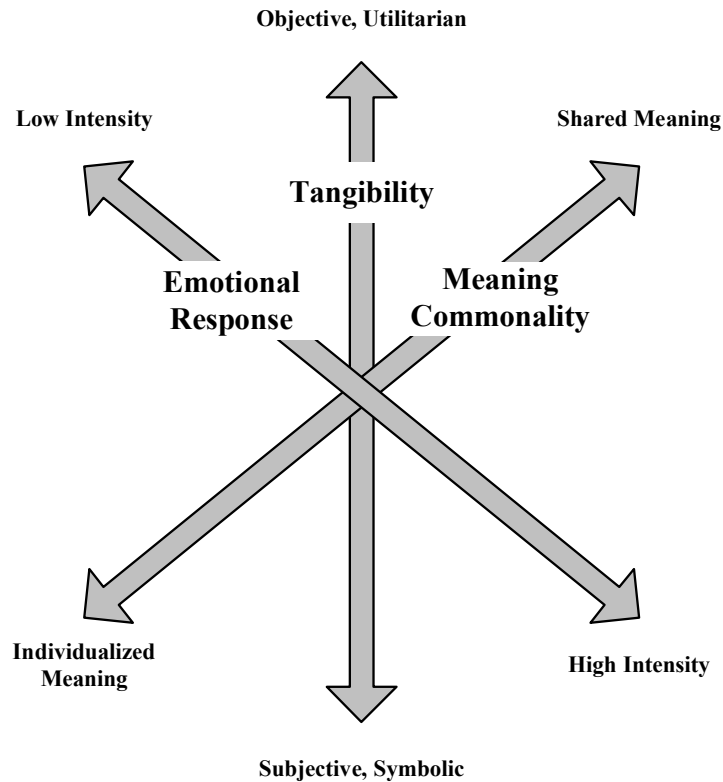


Figure 2-6: Product Classification Scheme (Adapted from Fournier 1991)

In her analysis, Fournier develops eight product categories (shown in Figure 2-7) using the three criteria outlined above. For a given consumer, she argues that a product such as an automobile can fit into only one category. Fournier recognizes that certain products are tightly coupled with personal identity, namely those products that are highly symbolic, evoke strong emotional responses, and possess individualized meaning. Typically, these *objects of personal identity* include items such as “tangible records of accomplishments (e.g. diplomas), reflections of goals and interests (e.g. bicycling gear), creative outlets (e.g. woodworking tools), and symbols of aspiration (e.g. books on sailing)” (Fournier 1991, p. 740). *Objects of position/role* is a similar category, although in this model it is divorced from personal identity. Products in this category “make

statements regarding self at the cultural level” and include products that serve as status symbols or characterize someone as fitting into particular cultural group (Fournier 1991, p. 740).

Fournier’s framework also contains categories of products that are consumed exclusively for their experiential benefits. These include *objects of appreciation*, which are purchased “to provide the user with a quality emotional experience” and include items such as “the performing arts, household decorative items, and fine wines” (Fournier 1991, p. 739). Also consumed for experiential benefits are *objects of action*, in which sports cars are cited as an example. Objects of action are products with more objective meaning whose function “is to provide the user with stimulation, excitement, and arousal” (Fournier 1991, p. 739). In Fournier’s framework, both objects of appreciation and objects of action are consumed simply for the way they make their users feel; they have no effect on the creation and maintenance of individual identity.

SUBJECTIVE, SYMBOLIC	Objects of Appreciation	Objects of Personal Identity	HIGH EMOTION
	Objects of Position/Role	Ritual Enhancers	LOW EMOTION
OBJECTIVE, TANGIBLE	Objects of Action	Objects of Transition	HIGH EMOTION
	Objects of Utility	Objects of Childhood	LOW EMOTION
	CULTURAL MEANING	PERSONALIZED MEANING	

Figure 2-7: Product Categories (Fournier 1991)

Fournier's analysis of product categories is a useful expansion of the functional-symbolic-experiential framework. While many authors insist that a particular product be categorized the same way for all consumers, Fournier recognizes that different individuals may interpret the same product in a distinct manner. In Fournier's approach, an automobile, for example, can be classified as an *object of personal identity* by one individual and an *object of utility* by another.

However, Fournier's framework has its limitations. The main concern is that she requires a product to fit into a single category for a given consumer. It seems more likely that a product like an automobile can deliver a consumer benefits in several (or all) her categories simultaneously. This is particularly true for the *object of personal identity* category: an automobile can relate to personal identity while also delivering other benefits. For example, a sports car may be an *object of action* because it can "provide escapes" (Fournier 1991, p. 739) for consumers, but it may simultaneously define its driver as a free-spirited and risk-taking individual. A consumer who purchases the same brand of pickup truck that his father did is making his vehicle an *object of childhood*, but he may also be trying to define himself as a "Chevy truck man."

Thus, while Fournier's framework is useful to sort out the various types of benefits that products deliver, a consumer's use of a particular product does not always fit neatly into a single benefit category. This leads to the same overlap between experiential and symbolic benefits that occurs in the functional-symbolic-experiential framework. As Fournier suggests, an individual may consume a fine wine as an *object of appreciation*; that is,

simply for the sensory pleasure that it brings. However, the individual's ability to consume and appreciate fine wine may also be a critical component in his overall perception of himself as a cultured, well-educated individual. In this case, experiential and symbolic benefits are closely linked and cannot be separated.

Chapter Conclusion

The basic premise of this chapter is that automobiles are symbols, and that the meaning in automobiles is relevant to consumers because it is used in the creation and maintenance of self-identity. This chapter explored a range of theories to explain the linkage between product use and individual identity. While each of these approaches has its strengths, the view of a *product as self-creation* provides the most insight into the behavior of the modern automobile consumer. As Giddens (1981) observes, elements of culture (including social class, religion, and ethnicity) used to tell the individual who he was and who he supposed to become. Now modern culture encourages the opposite: it tells us we can, indeed must, be whoever we want to be. We are required to define and construct our identities and, as Csikszentmihalyi and Rochberg-Halton (1991) note, consumer products are essential tools in this process. Products like automobiles symbolize more than just social status, stereotypes, or social roles: they can signify any aspect of identity. For some individuals, pickup trucks make them members of red-state nobility, minivans identify them as loving parents, and HEVs show that they are ethical people. And while socially-shared meanings are extensive, an individual does not simply have to accept a product's meaning as given. Instead, he can "perceive" the product in his own way, assigning unique significance to a vehicle or other product.

The *product as self-creation* approach also recognizes that individualized product meanings do not have to remain with the individual. This is because, as Williamson (1986) notes, consumer products are cultural elements, and it is ultimately the actors within the culture that define them. Advertising is one important source of meaning, but it hardly has the power to dictate consumer behavior. Instead, it is one voice among many that are competing to define product meaning. Consumers, along with members of the fashion system such as journalists and opinion leaders, play an active role in determining what products mean, and in sharing those meanings with others. As new product meanings are transferred from person to person, they gradually can be adopted by larger groups and even spread throughout an entire culture. Thus, the process of using products to define our own identities can lead to alterations in the cultural significance, or socially-shared meanings, of those products. In the *product as self-creation* approach, the individual has tremendous power and responsibility: he defines himself, and in doing so he can also redefine the culture in which he lives.

This chapter also explains how automobiles are both symbols and functional objects. Frequently function and meaning are intertwined, and it is important to remember Williamson's observation that features such as fuel economy can have both a practical *use value* as well as a *symbolic value*, a larger meaning that is relevant to personal identity. Analysis of use value alone does not yield a full understanding of an automobile's benefits to the consumer. Yet this is the approach many in the transportation field have applied in their analysis of vehicle choice. Focus on use value is also evident in the recent assessment of consumer demand for new types of vehicles. For example, some

authors question the value proposition of HEVs, pointing out that consumers may wait years to recover the initial expense of their hybrid, and many will never be fully “paid back” by the new technology at all (Bedard 2004; Isidore 2004; Edmunds 2005). This analysis ignores the fact that HEVs deliver substantial meaning to their owners, and symbolic meaning generates value for consumers just as use value does. Symbols matter in vehicle purchases, and whether new automotive technologies such as hybrid-electric and fuel-cell vehicles are accepted in the marketplace depends partly on the symbolic value they deliver to buyers.

It is also important to note that just as different consumers can see distinct meanings in the same vehicle, different consumers can also place varying levels of importance on either functional or symbolic benefits. While one individual may perceive a strong linkage between his vehicle and his self-identity, another may choose to define himself using other products or behaviors. Thus, the individual who claims his automobile is “just a way to get around” may be telling the truth. Although all of us are engaged in the maintenance of our self-identities, not all of us will choose to incorporate the symbolic meaning of automobiles into our self-narratives, or do so in exactly the same way. However, none of us can “opt out” of symbolic communication. We are surrounded by symbol systems, and the goods we purchase are parts of these systems. Therefore, our vehicles say something about us whether or not we intend for them to serve as signifiers.

CHAPTER 3: METHODS

This chapter describes the methods that were used to collect and analyze the data in this study. In all three phases, qualitative techniques (specifically, in-depth interviews) were employed. Overall, 68 interviews were performed that included a total of 91 participants. This chapter begins with a brief discussion of the predominance of quantitative research within the transportation field and highlights studies that have examined transportation topics using qualitative interview methods. The chapter then provides a detailed description of this study's research approach (i.e., interpretivism) and contrasts it with the positivist paradigm, which is more commonly used in transportation research. Finally, the chapter explains how the study was conducted. It divides the study into four steps (participant selection, ethnographic interview, case analysis, and case comparison) and explains the techniques that were applied in each step. It also discusses a semiotic mapping technique that was developed to analyze the symbolic meanings that emerged in the interview data.

Transportation's Quantitative Paradigm

Much of the consumer behavior research in the transportation field involves discrete choice modeling based on the rational actor model from economics. Examples across three decades include Beggs and Cardell (1980), Calfee (1985), Bunch et al. (1993), and Santini and Vyas (2005). In this approach, a consumer is assumed to choose options to maximize individual utility subject to his preferences, knowledge of alternatives, and budget. Ortúzar and Willumsen (2001) provide a review of discrete choice modeling and its underlying theoretical framework. This approach is amenable to quantitative analysis,

providing a framework for statistical modeling and extrapolation. It is also a largely deductive approach: it begins by assuming that utility-maximization guides consumer behavior, and then develops hypotheses within the boundaries of this theoretical framework. Clifton and Handy (2001) note that within the rational actor model, qualitative research can play an important role in exploring topics such as how individuals evaluate the utilities of their options, which factors affect utility and why, and how a particular option's utility changes over time. They also propose that there is a role for qualitative research in the improvement of choice models. By examining how consumers actually make choices, qualitative techniques can yield greater insight into the composition of their random error terms. From this perspective, qualitative techniques are compatible with the dominant paradigm in transportation research, particularly if they used as a precursor to choice model development.

However, qualitative research can also highlight deficiencies in the theory upon which choice models are built. One example is findings from Kurani and Turrentine (2007) that demonstrate that many consumers lack the knowledge and skills to evaluate vehicle fuel economy in a way that the rational actor model suggests they should. The study's results suggest that vehicle choice modelers should not only adjust the attributes they include in their models, but also that they should reexamine the fundamental assumptions they make about consumer decision-making.

One of the key strengths of qualitative research is that it exposes researchers to how consumers actually behave. In the case of consumer decision-making, the succinct,

orderly choice process found in textbooks often bears little resemblance to the complex, nuanced process that occurs in the real world. Rather than simply being used to fine tune existing approaches like utility theory, qualitative research can also be applied to radically reconstruct current frameworks or to develop entirely new theory. In particular, qualitative studies can employ an inductive approach, which Glaser and Strauss (1967) call grounded theory, that makes no initial theoretical assumptions but instead derives new theory from research results. A hybrid deductive-inductive approach can also be used in which initial theoretical assumptions are made but are constantly modified based on research findings (Huberman and Miles 1994). This flexible approach allows for the testing of new frameworks, such as semiotic theory, in areas where they have not been previously applied.

Jones et al. (1983) argue that it is precisely this type of theoretical experimentation that is missing from much of the transportation literature. While Jones et al. made their observations over two decades ago, their assessment of transportation research still applies. Jones et al. note that transportation researchers have become so focused on analytical tools that they have neglected other essential activities, including thinking about transportation issues in new ways:

One of the key difficulties with much current research is that it is dominated – even overwhelmed – by the ready availability of well developed analytical tools... This has moved the emphasis in research away from original theorizing towards the analytical exploration of postulated axioms, or the analysis of large data sets using standard routines. As a result, it has inadvertently: a) encouraged research workers to use existing procedures, perhaps with slight modification, rather than develop new ones with analytical requirements that lie outside the range of current techniques [and] b) made the acquisition of empirical data a secondary activity, more concerned with providing input for pre-defined models and analyses, than with the search for relevant variables and descriptive models of behavior. (Jones et al. 1983, p. 7-8)

Indeed, mathematical models and other analytical tools have an important role within transportation research. However, Sayer (1992) points out that no matter how

sophisticated these models become, there are limitations on what they can tell us. Models show how certain variables change in relation to one another, but don't necessarily explain the underlying causes of this change. A model may estimate, for example, that some individuals are more likely to drive their cars instead of taking the bus, but this gives us little explanation of why this behavior occurs. Sayer claims that mathematical modelers are uninterested in exploring why people behave in the ways that they do, choosing instead to focus on representing behavior and calculating its effects. Handy (1996, p. 152) echoes some of this criticism. In examining the relationship between land use and travel behavior, Handy explains that past research has revealed much about the strength between the two factors, but little about "the how and the why" of the relationship. Qualitative techniques are particularly strong in revealing "the how and the why": providing explanations of behavior rather than just representations.

Qualitative Research in Transportation

While quantitative methods remain dominant within transportation, numerous researchers have employed qualitative techniques. Typically, transport studies have coupled qualitative methods with quantitative techniques. Studies such as Jones et al. (1983) and Dix et al. (1983) include a preliminary qualitative research phase prior to collecting data from a larger sample. In these cases, the qualitative phase assists researchers in hypothesis generation and in the development of data collection instruments such as surveys and travel diaries. Other studies include a qualitative research phase after large sample data collection efforts. For example, Gjøen and Hård (2002, p. 265) administered a survey to BEV users in three countries, then conducted in-depth interviews with a handful of respondents to more deeply explore users' behavior and to put a "human face"

on respondents. Handy et al. (1998) used a similar approach, first administering a travel survey to residents of Austin, Texas, and then conducting focus groups that probed a subset of participants about how they made travel decisions.

While qualitative and quantitative methods can complement one another, there is some risk in this approach. The main risk is that the quantitative portion of the study can be interpreted as the “real” research, while the qualitative work is characterized as simply a necessary step in the attainment of quantitative results. Poulenez-Donovan and Ulberg (1990, p. 5) explain that qualitative techniques can reveal fundamentally different information than that yielded by quantitative techniques. They explain “in terms of using qualitative methodology, it is not enough to simply pull out such factors from individuals or focus groups and place them into the standard survey.” According to this view, qualitative findings are valuable not just as tools to design better quantitative surveys, but as research results in their own right. Grosvenor (2000) agrees, pointing out that qualitative studies are not necessarily scaled-down quantitative exercises that eventually will be grown into large-sample surveys. Qualitative research results also can stand on their own, although studies that include only qualitative findings are still uncommon in the transportation field. Examples of studies that have presented qualitative findings independently include analysis of electric vehicle demand by Kurani, et. al. (1994), exploration of consumer understanding of fuel economy by Kurani and Turrentine (2007), assessment of automobile use by Maxwell (2001), and examination of how travelers describe transport modes by Guiver (2006). The first two of these studies used

in-depth household interviews, and the second two applied focus groups, an example of the various techniques available to qualitative researchers.

This study relies exclusively on qualitative methods. Specifically, it employs in-depth interviews, also called “long interviews” (McCracken 1988b) or “ethnographic interviews.” In Phases I and II, these interviews lasted between 1.5 and 3 hours, involved multiple researchers, and included both household decision-makers. Generally interviews were conducted with participants in their homes, placing researchers in the middle of the household’s evening routine. The nature of these interviews meant that we were able to collect some data through participant observation, a technique in which researchers study a subject’s behavior in a natural setting. Atkinson and Hammersley (1994) explain that there is some debate as to whether interviews such as these deserve to be called “ethnographic” since they do not yield the long-term exposure to subjects that is typical of fieldwork in anthropology. However, they are referred to as “ethnographic interviews” here because they meet the basic criteria for ethnography. According to Atkinson and Hammersley, these include exploring social phenomena rather than testing hypotheses, working with uncoded data and without predetermined analytic categories, investigating a limited number of cases, and conducting analysis that requires the researcher to interpret verbal descriptions to determine the meanings of behavior.

To use Grosvenor’s (2000) language, this study does not hope to soon “grow up” into a quantitative survey with a larger sample and statistically-significant results. At some point, posing questions about automobile semiotics to a larger audience may be desirable.

However, at this time, not enough is known about the topic to successfully incorporate it into an impersonal data collection mechanism. In addition, semiotics may be a topic that is never explored effectively through quantitative methods. Johnson (2002) notes that in-depth interviews excel in surfacing ideas that are not readily articulated by subjects, particularly deep understandings that go beyond commonsense explanations. Symbolic meanings fall into this category. Some analysts have mistakenly stereotyped HEV buyers as tree-huggers, tightwads, or techo-geeks (for example, see Freeman 2003 and Lerner 2004). Their simplistic assessment is due, in part, to data from survey-based research that does not yield a deep understanding of why consumers buy HEVs (for example, see CNW Market Research 2005c). This study hopes to avoid this mistake.

This dissertation also aims to introduce some of the anthropological tradition to the transportation field. For over a century, anthropologists have conducted qualitative studies. Bernard (2002) points out that as the discipline of anthropology has matured, it has grown to include a significant amount of quantitative research as well. However, the emergence of quantitative techniques in anthropology has not rendered its qualitative methods obsolete. This is because many anthropologists understand that, for certain research problems, qualitative techniques remain the best method of investigation.

Transportation researchers would benefit from adopting this balanced approach. Our goal should not be to quantify as much as possible, but rather to deepen our understanding of transport issues using whatever technique is most effective for a particular research question.

Toward an Alternate Paradigm

Before the methods used in this study are described in detail, it is important to discuss the overall research paradigm of which they are a part. Guba and Lincoln (1994) identify three components of a research paradigm:

1. ***Ontology***: The nature of reality, and what can be known about it
2. ***Epistemology***: The relationship between the researcher and what can be known
3. ***Methodology***: How the researcher discovers what he thinks can be known

Many researchers in the transportation field conduct their research using a positivist paradigm, although some may be unaware that they are using this paradigm (or any paradigm at all, for that matter). This study applies an alternate research paradigm called interpretivism. When researchers talk about “qualitative” or “quantitative” studies, they often are talking about more than just whether the results can be expressed numerically. The research paradigm is often implicitly indicated by the “qualitative” and “quantitative” labels. Qualitative studies generally are conducted using the interpretivist research paradigm, while quantitative studies tend to employ the positivist paradigm. Bernard (2002) notes that this does not necessarily have to be the case: positivists can (for example) conduct qualitative focus groups, just as interpretivists can generate quantifiable survey data. But understanding a study’s underlying research paradigm is as important as knowing whether its results can be quantified or not.

Positivism

Guba and Lincoln (1994) define the positivist paradigm in terms of the three components outlined previously. Positivism’s ontology is realism (sometimes called naïve realism): one true reality exists, and its universal, context-free laws can be discovered by the

researcher. The epistemology is objectivist, meaning that the researcher essentially stands apart from this reality and can study it without influencing the results. Positivism's methodology usually involves controlled experiments that attempt to prove hypotheses and quantify results. Finally, study quality is judged by traditional benchmarks: internal validity, external validity, reliability, and objectivity. In this paradigm, attaining high external validity generally means using large, statistically-significant samples so that results can be generalized to a larger population. Achieving high internal validity means clarifying causal relationships between variables through techniques such as control groups. And attaining high reliability usually implies minimizing subjective interpretation by researchers so similar results can be obtained repeatedly.

Fontana and Frey (1994) note that interviewing techniques can adhere to the positivist approach and generate quantifiable data. They define a structured interviewing method that uses closed-end questions which are administered in-person by an interviewer. In this technique, the interviewer strictly adheres to the predetermined set of questions, and questions are asked in the same order using precisely the same wording. Participants choose their response from a preset list, and any additional information they offer is not tabulated in the study's quantitative findings. In order to remain neutral, the interviewer establishes "balanced rapport:" he may be pleasant, but is generally impersonal and does not share any information with the respondent that is not directly related to the questionnaire. The interviewer may clarify questions for the respondent, but must be cautious not to rephrase questions or influence the respondent's answer in any way. Fontana and Frey note that this structured interview technique views interviewer-

respondent interaction as stimulus-response: if the interviewer asks a question in the correct way, the respondent will deliver a comprehensive, truthful answer.

While there are some advantages to this structured interviewing method, there also are clear issues. One problem is that this method assumes researchers understand not only the right questions to ask, but also the answers that respondents will provide. Even for experienced researchers, this can be challenging. There is always risk in assuming how subjects think about a topic, and McCracken (1988a) notes that this risk increases when examining new products (such as HEVs). In addition, limiting the response frame discourages participants from introducing new ideas, and also ignores the context of their answers. Under the rules of structured interviewing, responses such as “Yes, I drove my car to work today, but I don’t usually” and “Yes, I drove my car to work today, and I’m feeling guilty about it” might both be recorded simply as “yes”. Yet both these responses provide significant context that further explains the behavior or introduces related topics. Another shortcoming of this form of structured interviewing is that it assumes participants can readily provide an accurate answer to whatever question is posed to them. For questions that examine behavior, structured interviewing requires that participants understand their own behavior and can explain it. Yet decisions like vehicle purchases are often complex, and can involve both emotional and rational elements that may not be well-understood by the decision-maker. Finally, this method downplays the fact that the interview is a social encounter between two human beings. Techniques such as balanced rapport try to prevent the interviewer from influencing the participant. However, it is not clear that all sources of influence can be fully controlled in a social

setting. Also, social settings typically include some mutual disclosure between participants that leads to trust and greater exchange of information. By deliberately restricting the relationship between participant and researcher, structured interviews limit the amount and type of data that can be collected.

Interpretivism

The structured interviewing described above and this study's ethnographic interviewing both are forms of interviewing, but their format and underlying research paradigm differ substantially. The methods used in this study fit within the interpretivist paradigm (Schutt 2004). In interpretivism, the ontology is relativistic. Rather than seeking a single reality, interpretivism acknowledges that people can view the same world in very different ways, in effect seeing different worlds. Schutt explains that interpretivist researchers see reality as socially constructed, and therefore their goal is to understand what meanings people give to reality. In interpretivist epistemology, the researcher does not examine reality from a distance. Instead, he is immersed within it and has influence on the subject he studies. Interpretivists collaborate with their research subjects to develop results, and the quality of interviewer-respondent interaction affects the robustness of the findings. To positivists, this type of collaboration sounds like a recipe for instilling bias. Indeed, interpretivists must be careful not to exert too much influence on their subjects. But a main strength of the interpretivist approach is that it allows a researcher-subject bond to form that permits deeper, more thorough exploration of research topics. As its name suggests, interpretivism also acknowledges that researcher interpretation plays an important role, during both data collection and analysis. Finally, quality measures in interpretivism differ from those applied by positivists. Guba and Lincoln (1994) note that

there is some debate about how best to judge interpretivist work, but at least two important metrics exist. The first is authenticity, a measure of how well the researcher understands the respondent's reality and how accurately he describes it. The second is reliability, which assesses whether researchers were consistent in collecting essential data from subjects and in evaluating each set of interview results.

The ethnographic interviewing used in this study is based on the interpretivist paradigm. The research here is guided by four underlying principles: treating the subject as an expert, preserving the decision-making context, assessing both emotion and reason, and viewing the interview as a social encounter between researcher and participant.

Subject as Expert

When anthropologists study foreign cultures, they recognize two distinct viewpoints. The etic perspective is the view of an outsider, and the emic perspective is that of an insider. Guba and Lincoln (1994) explain that positivist studies often impose etic theory that does not fit well with the emic views of research subjects. The result is social research that becomes disconnected from the people it is attempting to study. This study seeks to understand the emic perspective. Johnson and Weller (2002) note that to attain the emic view, interviewers must treat participants as experts and view themselves as students. As diligent students, interviewers are required to constantly ask questions, including questions to which the answers appear obvious. For academic researchers who are accustomed to acting as respected experts in other settings, this experience can somewhat humbling. However, Goffman (1989, p. 128) explains that an interviewer's ego has no

place in social research; he (colorfully) declares that, to do good fieldwork, “you have to be willing to be a horse’s ass.”

Understanding the emic perspective also requires that participants be allowed to explain things in their own words, and to think about the research topic using whatever framework they find most useful. This permits participants to introduce important ideas, even if they don’t realize they are doing so. Grosvenor (2000) recalls one subject in a travel behavior focus group who declared “My car is me.” With one short phrase, the participant told researchers that she had an emotional connection with her automobile, and that this connection was important in her mode choice decisions. Emotional connections may not have been a topic that was originally on researchers’ agendas, but the qualitative format of data collection enabled them to identify it as an important area and to explore it further with the participant. This flexibility is a strength of qualitative techniques since it allows researchers to focus on topics that the emic perspective deems most relevant.

While this study let participants guide its research, it is virtually impossible for researchers to begin without some etic theory. In fact, beginning with some etic ideas is essential since researchers must have some defined topics to explore and predetermined questions to ask respondents. The goal, however, is to use preconceived theories about the research topic as starting points for the research rather than as well-defined hypotheses that must be tested. McCracken (1988b) encourages this approach, recommending that ethnographic interviewers develop a set of assumptions that can be

expanded, revised, or abandoned during the interview process. In this study, we began with concepts from semiotic theory, a well-defined set of interview topics, and a small number of “soft” hypotheses to explore. However, all of these etic elements were revised considerably during the data collection process as we became more familiar with the emic viewpoint. This approach allowed us to employ both inductive and deductive reasoning in our analysis, a common approach even in grounded theory work (Huberman and Miles 1994).

Context Preservation

When examining human behavior, context is critical. Mishler (1979) explains that human behavior is context-dependent, and therefore can only be fully understood when viewed within its larger context. Geertz (1973) uses the example of winking to illustrate context dependency. If someone winks at us, how do we interpret their behavior? It is possible that the person simply has a twitch, but it is also possible that it is a social gesture intended to communicate a message. To understand the behavior, we must examine its context, which includes factors such as our relationship to the winker, what we know about his intentions, and what messages winking is used to convey. Geertz (1973, p. 6-7) uses context to differentiate between two types of information. “Thin description” describes a behavior without its context, while “thick description” involves a more elaborate presentation of a behavior and its contextual surroundings.

Much of transportation research focuses on thin description by using methods that are designed to strip away context. Grosvenor (2000) cites an example in which passengers expressed dissatisfaction with the lack of late-night rail service in London. When the rail

carrier examined the timetables, it found that there were frequent late-night trains, and it assumed that customers were either unaware or misinformed about the service. In fact, passengers were really concerned about security: they wanted to ride the train at night, but perceived late night train service as threatening and (perhaps unconsciously) ignored the last trains on the timetable. In this case, the decision-making context is crucial because it revealed why rail passengers were behaving the way they were. Guba and Lincoln (1994) point out that a major drawback of context-stripping methods is that they blind the researcher to important variables that influence behavior. In the case of late-night rail service in London, consumer perception of security was an important variable that was initially overlooked.

This study examines households' vehicle purchases within the larger context of participants' lives and personal identities. We collect data not only on the HEV purchase, but on events that preceded and followed the purchase, as well as about ongoing experience with the vehicle. In addition, contextual information is collected on topics related to the HEV (such as use patterns, previous household vehicles, and opinions of other vehicles) as well as more general topics that relate to individual identity (such as occupation, interests, and major life changes). By exploring and preserving much of the context of the HEV purchase, this study is able to better identify important factors that may not have emerged in previous research.

Assessment of Emotion and Reason

Automotive marketers are not alone in their view that consumer decision-making involves emotion. Zaltman (1997) proposes that emotion and reason are equally

important in consumer decisions, and that the two elements cannot be easily separated. Yet emotion does not fit particularly well with the positivist research paradigm. Fontana and Frey (1994) note that techniques like structured interviewing tend to elicit rational responses from participants and have difficulty capturing the emotional aspects of decision-making. If emotion didn't play much of a role in consumer choices, this wouldn't be an issue. But since emotion significantly influences decisions, research that only reveals the rational components of behavior fails to fully assess the underlying causes of that behavior.

It is beyond the scope of this study to conduct a thorough assessment of emotion or the role it plays in decision-making. However, this study applies techniques designed to capture both the emotional and analytical aspects of the HEV purchase. This is because, as Friedlaender (1984) notes, both are relevant in the interpretation of symbolic meaning. Grosvenor (2000) provides an example of graffiti on public transport that illustrates this point. Graffiti on subways and buses is unsightly, but this is not the only issue. For many passengers, graffiti also is a symbol of poor oversight and control on the part of the transportation operator. This lack of oversight and control indicates to passengers that they may not be protected, which makes many feel vulnerable and afraid. Thus the symbolic meaning in graffiti is interpreted both analytically (there is poor oversight) and emotionally (I feel afraid). In this case, both the analytical and emotional interpretations must be examined to understand why transit passengers respond to graffiti in the way that they do.

Interview as Social Encounter

Ethnographic interviewing involves people. Rather than trying to minimize and control the social interaction between the researcher and respondent, ethnographic interviewing embraces this interaction and uses it to improve data collection. This occurs in two ways. The first is that interviewer-respondent interaction leads to greater trust, which can lead the respondent to disclose greater amounts of relevant information. As McCracken (1988b, p. 21) notes, “At crucial moments in the interview, the entire success of the enterprise depends upon drawing out the respondent in precisely the right manner.” Asking the right questions helps in getting respondents to share essential pieces of information, but an atmosphere of trust is also essential. Oakley (1981) suggests that reciprocal disclosure is a necessary condition of this trust. Ethnographic interviewers must express emotions and share information about themselves in order to establish rapport with their subjects. In reality, this type of disclosure involves a balancing act since an interviewer who discloses too much about his own opinions risks leading his subject’s responses.

In this study, we promised delayed reciprocity: subjects were told that they would be given the chance to “turn the tables” on interviewers and ask whatever questions they chose during a debriefing during the last 10-15 minutes of the interview.⁶ Prior to that time, we acted much like we would in a normal social situation, disclosing personal details, sharing anecdotes, and making jokes. While we opened ourselves up somewhat to respondents, we would redirect respondents’ questions if they probed too deeply into our knowledge or opinions. Johnson and Weller (2002) note that asymmetric questioning is

⁶ In fact, some of our frankest exchanges with respondents often occurred during those last few minutes, once respondents had full disclosure about where researchers stood on the issues.

an issue in ethnographic interviewing, but that respondents often accept the asymmetry if researchers seem interested in what they have to say. Thus, it is essential that interviewers remain engaged throughout the interview. In this study, we followed McCracken's (1988b, p. 38) recommendation that the interviewer portray himself as "a benign, accepting, curious (but not inquisitive) individual who is prepared and eager to listen to virtually any testimony with interest."

Interviewer-respondent interaction also improves data collection because it provides a setting in which respondents can examine their own behavior. Few people have thought deeply about actions such as car purchases until researchers arrive and begin asking questions. One of the advantages of the ethnographic interview is that it provides respondents with far more time to reflect on their behavior than they would be given in other research methods. In the social setting of the interview, the interviewer and respondent can work together to analyze the HEV purchase. Warren (2002) notes that people often shift their perspective and opinions as they examine an issue. These shifts are evident in our data: often we ask a respondent the same question several times during an interview and receive three different answers. But this is a strength of the method rather than a weakness. The differing responses are evidence that a respondent is evaluating a topic, and each answer provides the researcher with additional insight into the respondent's behavior. These differing responses sometimes are inconsistent with one another, illustrating that people can simultaneously hold conflicting ideas and viewpoints, and that these conflicting elements can affect decision-making. Positivists may be

alarmed that our interviews do not yield one “true” answer from participants, but our goal is to understand participants’ behavior, not to extract a single “true” response.

Treating the interview as a social encounter implicitly recognizes that both the subject and interviewer are human beings. This may seem obvious, but one criticism of positivist techniques like structured interviewing is that they objectify respondents, treating them as data rather than as people. Fontana (2002) notes that a growing number of researchers are questioning whether methods that restrict the answer frame are fair to respondents.

Ethnographic interviews do not provide a ready-made solution to these ethical issues, and even in-depth interview techniques have been accused of dehumanizing respondents (Fontana and Frey 1994). However, by treating the interview as a social exchange between people, ethnographic interviewers are less apt to forget that their research subjects are human beings just like they are. As Reissman (2002, p. 696) notes, there is a trend in social science toward “less dominating and more relational modes on interviewing that reflect and respect participants’ ways of organizing meaning in their lives.” The techniques used in this study are designed to support this trend.

Interview Methods: Phases I and II

This section outlines the four main steps of this study’s ethnographic interview process (shown in Figure 3-1). This process was used in the first two phases of research in interviews with HEV owners, and in general was based on McCracken’s (1988b) long interview technique. Phase III mixed ethnographic interviewing with other techniques, and is discussed in more detail later in the chapter. In a general sense, each interview in Phase I and Phase II progressed through the four steps sequentially: the interview was

scheduled, conducted, analyzed by itself, and then compared with other interviews. However, in practice significant iteration occurred between the last two steps as researchers conducted data analysis.

Participant Selection

The objective of Phases I and II was to explore the role of semiotics in HEV purchases. The target population, therefore, was households that already owned an HEV. For each phase, a set of vehicles was specified. Phase I focused on buyers of high-fuel-economy hybrids, including the Toyota Prius, Honda Civic Hybrid, and Honda Insight. Phase II

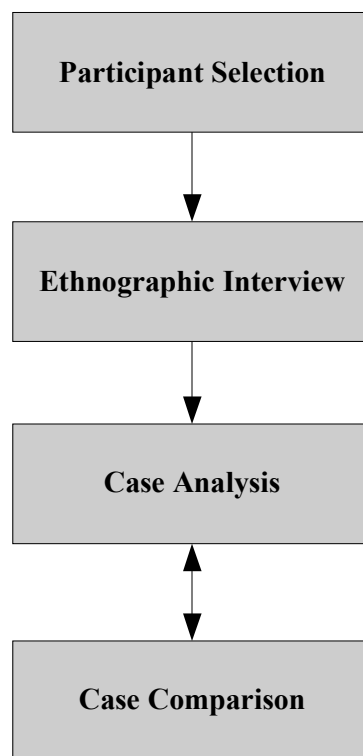


Figure 3-1: Interview Steps

examined buyers of performance and SUV hybrids, including the Honda Accord Hybrid, Ford Escape Hybrid, Toyota Highlander Hybrid, and the Toyota Camry Hybrid. Due to

the high adoption of HEVs in Northern California and researchers' proximity to this area, recruitment focused in the Sacramento and San Francisco-Oakland-San Jose metropolitan areas⁷. A third-party market research firm was used to identify appropriate respondents for this study, and this firm also managed the scheduling and compensation of respondents. Outsourcing these tasks allowed researchers to focus on the most critical tasks: collecting and analyzing respondent data.

Since this study planned to use a limited sample of respondents, non-probability sampling methods were used. Subjects that were identified and fit the geography and vehicle ownership requirements generally were accepted into the study. Occasionally, some purposive sampling (Silverman 2001) was used to include households that had characteristics we wished to explore. For example, after interviewing a long-time Prius owner in interview 16 of Phase I, we scheduled another long-time owner in interview 17 to examine whether the earlier buyers had unique purchase processes or perceptions of HEV meaning. Some snowball sampling (Aaker et al. 2004) was also used in which an existing participant identified other potential respondents for the study. For example, a single snowball sample in Phase I yielded five households, all congregants of the same Sacramento church. Including groups like this one allowed us to explore more deeply some of the influence social networks played in defining HEV meaning and encouraging HEV purchase.

⁷ All respondents resided in one of these two areas, except for one household who were previous San Francisco Bay Area residents who had relocated out of the area.

An initial target of 25 interviews per phase was set based on our prior experience conducting interview-based research. Researchers including McCracken (1988b) and Zaltman (1997) suggest that far fewer interviews are required to capture mental frameworks and symbolic meanings that are generalizable. However, we were uncertain whether owners of different vehicle models would think and behave differently from one another, so conducting a larger number of interviews seemed to be a more thorough approach. In general, new interviews were conducted until a saturation point (Shutt 2004) was reached. At this saturation point, additional interviews fail to uncover concepts that have not been previously introduced in past interviews. In truth, an additional interview almost always yields something that is new to the researchers. However, as the returns from additional interviews gradually diminish, researchers must determine whether the information they obtain from continued interviewing merits the time and effort required. Using this approach led us to include 25 interviews in Phase I and 20 interviews in Phase II.

Prior to the interview, households completed and returned a pre-interview questionnaire: a 10-question survey that collected basic information about the household's members, current and previous vehicles, travel patterns and vehicle use, and opinions about their HEV. (Appendix II includes a copy of the pre-interview questionnaire and its instructions.) Responses to this questionnaire gave us a basic understanding of the household and its vehicles before the interview, and most interviews began with some discussion of the content in the household's questionnaire response. Households were also requested to select photographs that represented their "thoughts and feelings" about

their HEVs. These materials were used in a photo elicitation exercise that is described later in this chapter; wording for the instructions was based on examples from Zaltman and Coulter (1995). In total, respondents could be expected to spend at least two-and-a-half hours preparing for and participating in the ethnographic interview. To encourage participation of households who might not normally devote this level of time to a research study, households were compensated between \$75 and \$250, depending on the research phase and the number of participants involved.

Ethnographic Interview

As mentioned earlier, most interviews were conducted in respondents' homes, involved two researchers, and included multiple household decision-makers. Adler and Adler (2002, p. 528) note that "interviewing in a respondent's home casts a guest ambience over the researcher's presence and imbues the researcher with an aura of friendship." Our objective was to have the interview feel as much like a normal social encounter as possible, and to site this encounter in a place where respondents would feel comfortable disclosing details about themselves and their car purchases. Typically this resulted in an informal situation where children and other family members often wandered in and out, pets climbed on researchers' laps, and participants answered phone calls or prepared refreshments. Some interviews also moved throughout the house, beginning (for example) with discussion in the living room, moving to the den to examine photographs on the computer, and then ending in the garage to look at the household's vehicles. Fontana (2002) notes home-based in-depth interviews allow researchers to blend interviewing with participant observation. In this study, observing subjects in a natural

setting gave us a better sense of who participants were and how they behaved, providing important context for evaluating the purchase decision.

The majority of interviews involved two researchers. This allowed each of us to share in the management of the discussion, and also increased the chance that important elements would be captured and explored. Interviews also included all household decision-makers in the vehicle purchase when possible. Since vehicle purchases often involve two people, it made sense to talk with both of them in the interview. Respondents also helped each other to recall details, and sometimes offered very different accounts of the HEV purchase. In many interviews, sustained discussion between respondents occurred with no interviewer intervention. In these periods, respondents seemed to forget momentarily that the interviewers were present, and we were able to observe authentic interaction between household members. Involving multiple respondents also balanced the multiple researchers who were present in the interview. It can be intimidating for some respondents to face multiple questioners in a “two-on-one” setting; a “two-on-two” setting is more equal and allows respondents to support each other during the interview process.

We used a protocol to guide discussion in the interviews. (A copy of the interview protocol is included in Appendix III). The protocol includes a list of topics that were covered in each interview. However, the protocol was not shared with respondents, nor was a topic list provided prior to the interview. To some extent this study employed what Adler and Adler (2002, p. 525) call “shallow cover” in which researchers “are overt about

their intentions but remain oblique or vague about their specific purpose.” Respondents were given full disclosure about researchers’ identities, the interview format, and their rights as subjects. They were also informed that we were interested in understanding why they purchased their HEVs. However, respondents were not told that we were studying the HEV’s symbolic meaning and its potential connection with subjects’ identities. Our goal in using shallow cover was not to mislead participants, but rather to avoid leading them at all. Following the interview, participants were debriefed and given the opportunity to ask us questions about the study.

The following topics were discussed in all interviews:

- 1. Household Background:** Discussion of information provided in the pre-interview questionnaire; includes information on household members, the HEV and how it is used, other current vehicles and how they are used, and past vehicles the household has owned.
- 2. HEV Purchase:** Examination of the story participants tell about their HEV and why they bought it, including events surrounding the HEV purchase and the purchase itself; also examines other vehicles that participants considered
- 3. Vehicle Symbolic Meaning:** Discussion of symbolic meaning participants perceive in their HEV and other vehicles; also examines communication participants had with others about HEVs before and after the purchase
- 4. HEV Benefits:** Discussion of the main benefits participants perceive in their HEVs, and assessment of the importance of these benefits in the purchase decision
- 5. HEV Disbenefits:** Discussion of the main drawbacks participants perceive in their HEVs, and assessment of the importance of these drawbacks in the purchase decision
- 6. Future Vehicles (Phase II only):** Brief discussion about participants’ awareness of future vehicle technologies

While this basic topic list remained consistent across all interviews, protocol questions and interview techniques were adjusted throughout the study. Questions were removed or added as we sharpened our focus on important topics, and in some cases questions were

revised so that they would be better understood by respondents. Techniques were also adjusted based on how effective they were in eliciting information from respondents. In general, we approached each interview with a “toolkit” of methods. We selected the technique we felt was most appropriate for a particular respondent, and if the first method did not yield results, other techniques were applied.

We applied several techniques throughout the interview to elicit information from respondents. Planned prompts and floating prompts were used to guide discussion. McCracken (1988b) explains that planned prompts are questions or elicitations that are used to open up new topics, while floating prompts are used to sustain discussion of the current topic. Planned prompts were developed prior to the interview and were applied across all interviews, while floating prompts were chosen during the interview and often were unique for each household. We also used grand tour and mini tour questions to encourage respondents to share information without prompting. Johnson and Weller (2002) describe grand tour questions as general, open-ended inquiries, such as asking a respondent to describe her typical day. Mini tour questions are open-ended also, but focus on a more narrow area of activity, such as asking a respondent to describe a particular part of their daily routine. Finally, laddering methods were used, particularly in discussion about attributes of the vehicle. Reynolds and Gutman (1988, p. 12) define laddering as a probing technique “used to develop an understanding of how consumers translate the attributes of products into meaningful associations with respect to self.”

Two key methods were applied in specific sections of the interview: personal narrative and visual elicitation. Discussion of the HEV purchase relied heavily on the exploration of personal narrative, a story an individual tells about himself (Mishler 1983). In this study's interviews, each participant told the story of his HEV purchase: why he decided to buy the vehicle, how the purchase occurred, who was involved in the process, and what was occurring in his life at the time he bought the HEV. This story was about more than just the participant's car: it was also about the participant himself, an expression of his personal identity. Reissman (2002, p. 705) notes that as subjects organize past events and develop a coherent story about them, they also position themselves relative to these events: "The truths of narrative accounts lie not in their faithful representation of a past world, but in the shifting connections they forge between past, present and future." This fits well with Giddens' (1991) idea of identity and self-narrative, namely that individuals are constantly molding past and present events into a story that fits with who they think they are. In this study, we are interested in understanding how people came to own HEVs, but we recognize there is not one "true" interpretation of a household's HEV purchase. What is most interesting about an HEV purchase story is not the verifiable facts it yields. Rather, it is the glimpses of personal identity that researchers are given by respondents as they develop and share the narratives of their HEV purchases.

Examination of symbolic meaning involved the use of visual elicitation techniques.

Harper (1994) explains that these techniques involve the use of visual media (photos, video, drawings, etc.) to stimulate and guide discussion in ethnographic interviews.

Visual media can be provided by the interviewer or the participant, but in either case they

serve as the catalyst for interview conversation. This study used a photo elicitation technique based on methods from the Zaltman Metaphor Elicitation Technique (ZMET) (Zaltman and Coulter 1995). Prior to the interview, participants selected at least two photographs from sources such as newspapers, magazines, the Internet, or personal photo collections. Participants were free to select any photographic content they chose, as long as it represented the “thoughts and feelings” they associated with their HEVs. Photos selected by participants were diverse; examples include pictures of undisturbed natural areas, scenes of war and conflict, photos of gas stations, and pictures of electronic devices like the Apple iPod. The instructions for this exercise were purposely vague: participants were not told to find photos of what they thought their vehicles symbolized. However, through their photographs, participants revealed some of the concepts they associated with their HEVs. These concepts were discussed and further explored in the interview. This clarification was essential, since not all of the photos spoke for themselves. In one case, a respondent showed a *National Geographic* photograph of a beachside neighborhood that had been devastated by Hurricane Katrina. We initially assumed that the woman intended to demonstrate the links between her HEV and reducing global warming, with the hurricane damage serving as a visible consequence of climate change. In fact, she explained that the damaged neighborhood represented the type of natural destruction that occurred in oil exploration. By choosing an HEV, she was lowering her petroleum use and lessening the need for additional oil exploration and environmental damage.

With some households, discussion of symbolic meaning was the most challenging part of the interview. Zaltman and Coulter (1995) warn that 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. Aaker, et. al. (2004) provide an example of a man who purchases an expensive sports car to overcome feelings of inferiority, yet claims that his purchase was motivated by “the great deal the salesman offered him” rather than by the vehicle’s hoped-for effect on his self-esteem. In the transportation field, the tendency of individuals to dismiss the influence of symbolic meanings has been observed in studies of automobile use (Steg et al. 2001) and automobile purchase (Rapaille 2004). To assist subjects in examining symbolic meanings and assessing their importance, the study used a variety of techniques. One of the most effective was deflection (Adler and Adler 2002), a method used when subjects are uncomfortable with themselves as the object of study. Deflection shifts discussion from the respondent’s behavior and opinions to the behavior and opinion of others. For example, participants in this study were asked to define the qualities of a “stereotypical” HEV buyer and explain why that person purchased an HEV. Deflection was effective because it allowed subjects to introduce the symbolic meanings they perceived in HEVs without having to acknowledge that these meanings mattered in their own purchases. As the discussion continued, participants could reflect on the importance of these meanings in their own decisions to buy HEVs, comparing and contrasting their own behavior with that of others.

Other techniques were employed in Phase I and Phase II with varying degrees of success. We had some households in Phase I apply a product personality scale (Aaker 1997) to their HEVs to describe how personality descriptors (such as “intelligent” or “cutting-edge”) did or didn’t apply to their vehicles. Numerous households in Phase I also completed a stated tolerance exercise (Lee-Gosselin 1996) in which we proposed replacing the household’s HEV with another vehicle (often a hypothetical vehicle), and households discussed the conditions that allow or prevent the substitution of that vehicle for their HEV. Initial interviews in Phase II included an unconstrained judged similarity task (Johnson and Weller 2002) in which participants sorted vehicle models (both HEV and non-HEV) into groups and then explained the similarities of the vehicles in each group. Part of the strength of this study’s methods is that they allowed us to constantly refine our data collection techniques. Those that worked were left in the “toolkit” and applied as needed. Others, such as the similarity task, proved challenging for most respondents and were removed from use.

Case Analysis

The objective of analyzing an individual interview was to draw out themes that were important to the respondent in the HEV purchase, including any symbolic meanings that emerged. The interviewer has four sources of data from each interview: the pre-interview questionnaire, an audio recording of the session, field notes taken during the interview, and materials provided by the respondent (usually photographs from the photo elicitation exercise). Case analysis begins with a review of these materials, which includes listening to the interview again. This re-listening process allows us to reevaluate what we heard during the interview. In most cases, new information emerges that was missed during the

live session. Since the interviewer controls the pace of the recording playback, he can slow or repeat sections of discussion that are of particular interest. In this study, verbatim transcriptions were not created from interview recordings since the volume of transcription data from the interviews would have been excessive. Instead, we used selective transcription (Strauss and Corbin 1990). In this technique, researchers transcribe only the information from the interviews that they consider most relevant. This study's interview transcripts typically were 10 to 20 pages each. The audio recordings for all interviews were maintained in an archive, and researchers referred back to them as needed.

Analysis of interview content applied McCracken's (1988b) method of analytic category discovery. Researchers first identify a "useful utterance" which McCracken (1988b, p. 44) describes as an "entryway...into assumptions and beliefs." These utterances form the basis for observations which are of interest to the researcher. As observations are examined and linked together, patterns and themes emerge for a particular household. For example, the phrase "killing for oil" was used by numerous respondents in Phase I. So a phrase like "killing for oil" became a useful utterance that indicated the potential presence of a larger theme. In a particular interview, we examined the statement "killing for oil" within the larger context of the discussion in which it appeared. We also attempted to link the phrase to other observations from the same interview. For example, one participant who talked about "killing for oil" also spoke about the Gulf War during a different portion of the interview, and showed a photograph of U.S. soldiers in Iraq during the photo elicitation exercise. For this respondent, we connected these three

observations (and others) and identified a theme: the participant's opposition to war, specifically wars fought over natural resources.

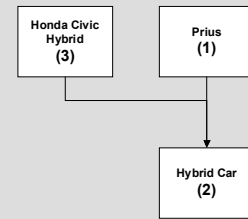
These themes become the basis for the symbolic meanings that are examined in this study. This is because participants connect some of these themes to their HEVs. For example, the HEV was a symbol of opposition to the Iraq war for the respondent discussed above. Once the main themes for an interview are identified, they are used to construct a semiotic map. Generally, interview data yields enough linked observations for us to determine why the participant connects a particular theme with his HEV. These linked observations are used to develop a meaning chain like those diagrammed by Williamson (1978). However, the semiotic maps in this study display the denotations and connotations graphically, using a layout based on Zaltman and Coulter's (1995) mental maps. The semiotic map begins with the HEV (the signifier) at the top and moves down through the signified concepts, reaching the most personal connotations at bottom of the map. While the process of map construction varies for each participant, an example is provided in Box 3-1.

Case analysis involved substantial discussion among researchers as we interpreted the data collected from each household. Particularly in Phase I, we often had an informal debriefing after an evening of meeting with households to discuss key findings from recent interviews. We also held more formal sessions to discuss interview findings among researchers, and shared important observations from interviews in sporadic briefings delivered orally or via electronic mail, communication that Belk et al. (1988)

call “memoing.” In addition, we collaborated in the construction of semiotic maps, including reviewing one another’s draft maps. In a few cases, two researchers simultaneously mapped the same household and then compared the results to arrive at a consensus. Since semiotic maps require significant interpretation of the part of the researcher, review by others is an important step to insure that key meanings have not been excluded or misrepresented. Neuman (2000) notes that this type of oversight, combined with audio recordings that can be replayed to confirm actual interview content, ensures researcher integrity and increases the robustness of a qualitative study’s results.

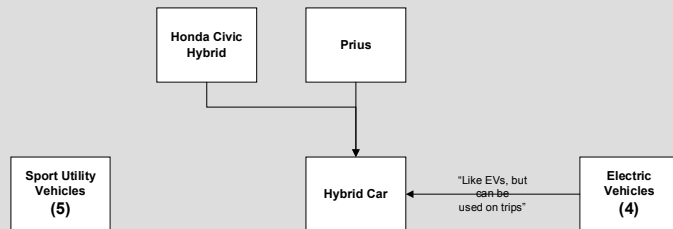
Box 3-1: Creating the Semiotic Map

1. Each semiotic map begins with a household, in this case a husband and wife who owned a 2004 Toyota Prius. The household's HEV model always appears at the top of the semiotic map (1). For this household, the Prius represents a certain type of vehicle: a Hybrid Car (2). Hybrid Car is a category of vehicles, and this household notes that the Hybrid Car category includes another vehicle, the Honda Civic Hybrid (3). One of the first observations that we made in this study is that there is disagreement among households about which vehicles fit in the Hybrid Car category. Does a hybrid SUV, for example, mean the same things as a Prius? Households may agree that both vehicles use the same hybrid powertrain technology, but they may disagree about whether the two vehicles represent the same ideas.

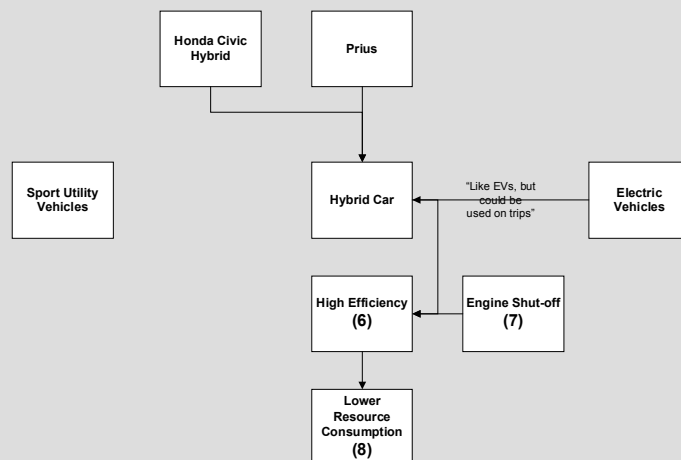


2. During the interview, the ways the household thinks about their HEV emerge. One of the comparisons they make is with electric vehicles (4). The husband had a friend who drove an electric vehicle several years earlier, and as a result he has some familiarity with BEVs. He explains

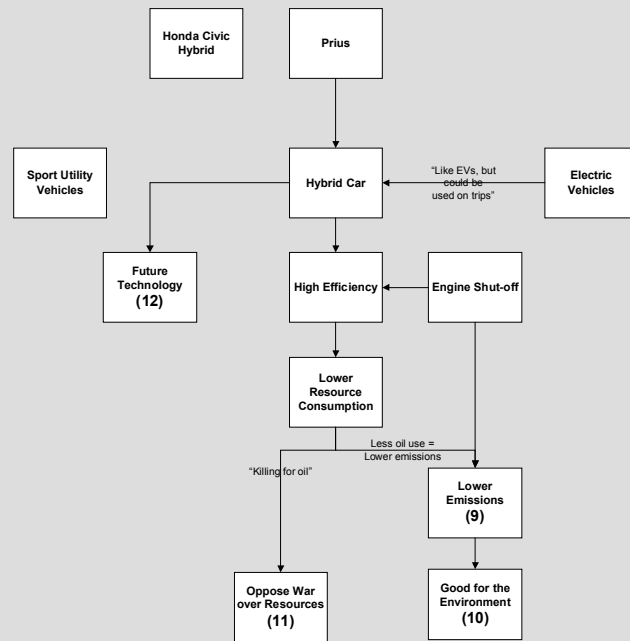
that hybrid cars are “like EVs, but can be used on [long] trips.” This comparison tells us that the participant may be transferring meanings from electric vehicles to HEVs. If he sees BEVs as a symbol of environmental concern, he may also see HEVs as symbolizing the same idea. During the interview, the household also brings up other types of vehicles. This household discussed SUVs (5), vehicles that they strongly disliked. The husband explained that SUVs were the opposite of his Prius, both in physical characteristics as well as in the statement they made. SUVs, he explained, were driven by arrogant, self-centered people, and the vehicles themselves symbolized these concepts. This couple did not transfer meanings from the SUV to their HEV; instead, they defined the meanings of their HEV in contrast to those of the SUV.



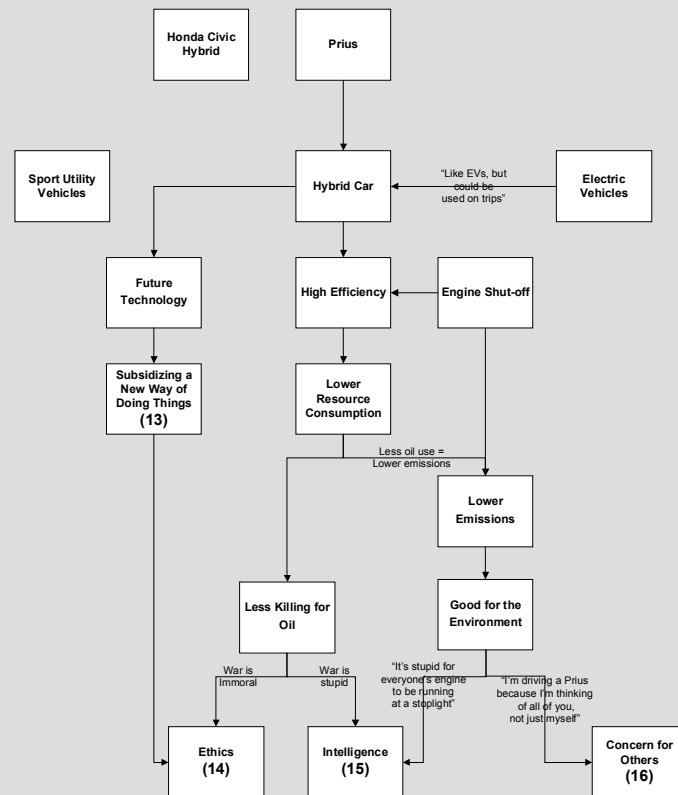
3. As the participants talk more about their HEV, key concepts continue to emerge. To this household, the HEV symbolizes high efficiency (6). Certain vehicle features can be symbolic, and participants often discuss what these features mean to them. For this household, the Prius' engine shut-off feature (7) was important. The husband explained that sitting in traffic with the motor running was wasteful and stupid. For him, the engine shut-off feature represented a smart way to conserve resources. The couple talked a fair amount about natural resources. Their HEV's high efficiency appealed to them because it allowed lower resource consumption (8).



4. The idea of using fewer resources is not an end in itself: the household links it to two other ideas. One is the idea of doing something that is good for the environment (10) by burning less fuel, and thus generating fewer emissions (9) with their HEV. The other idea is opposing the Iraq conflict, which the couple believe is a war that is being waged to secure oil supplies (11). Apart from these ideas, another concept emerged. The couple was intrigued by the futuristic technology (12) in their Prius, particularly the navigation system. This is common among households in this study: features found in HEVs that have nothing to do with the hybrid drivetrain, such as Bluetooth networking or GPS-based navigation systems, are nonetheless seen as part of the high-technology package and are meaningful for drivers. When this couple saw the navigation system in the Prius for the first time, the husband thought to himself: “the future is here!” So for this household, three important denotations were connected to the HEV: doing something good for the environment, opposing a war over resources, and using future technology. All three of these ideas are fairly obvious ideas to connect to an HEV, but additional exploration is needed to understand why these meanings were important to this particular household.



5. The final connotations are those symbolic meanings that are linked closely with owners' identities. For this household, buying a Prius was about more than just making a statement about the environment, the Iraq war, or technology. The idea of doing something good for the environment connected to two connotations: intelligence (15) and concern for others (16). This couple viewed themselves as people who worked to improve the welfare of others, including people they didn't know. For example, the husband discussed his volunteer activities, including a recent trip around the country testing water supplies for contamination. The wife explained that their Prius made a statement about her attitude toward other people: “I'm driving a Prius because I'm thinking of all of you, not



just myself.” This household also viewed themselves as thoughtful, intelligent people who made smart choices. For them, intelligent people recognized that oil use caused pollution and international conflict, and intelligent people looked for solutions to this problem. People who were selfish and stupid ignored the problems that oil use causes, and continued driving their large SUVs as if no problem existed and as if no one’s well-being mattered but their own. Finally, HEV technology had a personal meaning to this couple as well. Like many households, they talked about hybrid technology but were not experts or automotive technology enthusiasts. Driving a car with futuristic technology connected with the idea of subsidizing a new, better way of doing things (13). This new way of doing things was a change from a typical household’s heavy petroleum-dependence, and this couple viewed supporting this type of change as a moral issue. The couple recognized that their Prius might not prove to be the most economical vehicle choice, particularly if the batteries didn’t last for the life of the car. But they felt they had an ethical obligation to be among the first adopters, particularly since the HEV could help prevent immoral wars.

Case Comparison

In case comparison, researchers examine the similarities and contrasts between households. This includes identifying theses, which are themes that appear across interviews (McCracken 1988b). For example, the idea of the HEV as a symbol of opposing war surfaced in discussions with several households; some even used the same descriptions and terminology, such as the phrase “killing for oil.” Case analysis of an individual interview occurs relatively quickly after the interview is complete, and while the researchers are still conducting additional interviews. This means that when we identify a theme in one interview, we can probe for this theme in future interviews, an example of constant comparative method (Silverman 2001). In this way, theme identification and thesis identification occur together, and significant iteration occurs between the case analysis and case comparison steps. Using the constant comparative method, we look for cases with similar themes, but are also forced to examine those cases whose themes do not match with other interviews. Silverman (2001) refers to this process as divergent case analysis, and it is an important step in the modification of theses. For example, in this study one participant expressed his opposition to the war in Iraq, but connected this to the idea of ending the exploitation of Americans by Middle Eastern oil

producers. In our case comparison, we had to determine whether this participant saw his HEV as a symbol of opposing war like other households did, or whether a different theme was appearing in his interview. As it turned out, his interview was a divergent case, and it led us to develop the theme “reducing support for oil producers” that could then be sought in other interviews.

Silverman (2001) points out that constant comparative method and divergent case analysis are techniques that ensure that data analysis in qualitative studies remains robust. Silverman also identifies a third technique, comprehensive data treatment, that requires researchers to assess whether their hypotheses fit with all study data, rather than just a few key pieces. One risk of ethnographic interviewing is that it yields so much data that researchers can selectively apply pieces of data to support hypotheses that may not be as strong when a more comprehensive set of data is examined. Ethnographic interviews also yield rich stories, some of which are highly entertaining. But researchers must be cautious not to include only the most entertaining anecdotes in the description of their research. Ultimately, researchers’ hypotheses may not be supported by every piece of interview data. However, the process of examining data comprehensively and scrutinizing divergent cases encourages us to develop the best conclusions possible from our interview results.

Interview Methods: Phase III

Phase III applied the same basic approach as the first two phases of the study to examine PHEVs. However, a different set of topics were explored in the interview. Unlike HEVs, PHEVs are not yet a commercialized product and therefore cannot be purchased like

normal vehicles. In addition, most PHEVs are owned by an organization (such as an electric utility, local government, or non-profit group) that allows its employees to use the vehicle. So while Phases I and II focused on the HEV purchase, Phase III drivers did not have a purchase event to discuss. Therefore, Phase III interviews focused on participants' use of the PHEV and their perceptions of its advantages and disadvantages. Since the PHEV is such a new technology and so few PHEVs are in use, many fundamental questions exist regarding how drivers use and recharge their vehicles. The goal of Phase III, therefore, was to conduct a general exploration of important issues from the perspective of the user. Unlike Phases I and II which focused heavily on symbolic meaning and identity, Phase III examined a broader set of topics, of which symbolic meaning was a part. Part of the reason for this shift in focus is that since PHEVs are so new, drivers are still evaluating both the functionality and symbolic meaning of the vehicles. We did not expect to find well-defined meaning attached to PHEVs, but instead looked for early indications of what meanings might be associated with PHEVs and what features might be perceived as symbolic.

The following topics were discussed in all Phase III interviews:

- 1. *Participant Background:*** Information on participant's demographics, occupation, current vehicle, and experience with advanced-technology vehicles
- 2. *PHEV Use:*** Description of where, when, and how participant uses PHEV as well as discussion of driving experience
- 3. *PHEV Refueling/Recharging:*** Description of when, where, and how participant fuels and charges PHEV, as well as participant's reaction to the recharging process
- 4. *PHEV Benefits/Drawbacks:*** Discussion of how participant thinks about PHEV, how he/she thinks others view PHEV, and the benefits and drawbacks he/she associates with the vehicle

The unique characteristics of the PHEV and its users dictated that different techniques be used in the participant selection and interview steps. Using information provided by the California Cars Initiative (CalCars) and by PHEV users themselves, we identified a population of 25 PHEVs in North America. A request for participation was sent to all vehicle owners, 15 of whom agreed to participate in this study. Data were then collected through semi-structured interviews. Since several vehicles had more than one user, a total of 23 interviews were performed for the sample of 15 PHEVs. Unlike earlier phases where respondents were geographically concentrated, Phase III participants were located in various cities nationwide. Thus, roughly three-quarters of interviews were conducted in-person, and the remaining interviews were by telephone. In general, Phase III interviews were shorter than those in the first phases, lasting between 30 minutes and 2 hours. Although not all interviews in Phase III were audio recorded, we prepared a summary of each interview that was similar to the transcription that was used in earlier phases. The case analysis and case comparison steps in Phase III were unchanged from earlier phases.

Reporting Results

Ethnographic research yields an abundant amount of information about interview subjects. As participants tell the stories of their car purchases, they include hundreds of details that could not be captured even by the most comprehensive written survey. At first glance, some of this information may seem tangential to the purchase, but it provides valuable context that orients the HEV purchase within the larger milieu of participants' lives and self-identities. With the data collected in this study, we are able to construct rich, detailed stories of households. Transportation research traditionally does not include

this type of thick description in its findings. Transportation researchers know, of course, that behavioral studies like this one are rooted in data from real people. But it is often assumed that this data only becomes usable once it has been properly cleansed, codified, and aggregated. Findings then reflect this data treatment: they discuss overall features of the sample, not specifics about individual subjects.

This study presents its findings in both ways, by providing thick description about particular households and by offering more general analysis of the entire sample. Inclusion of stories in this research report may strike some readers as unscientific, but it fits with a trend in postmodern social research. Fontana (1994) notes that social researchers used to emulate their colleagues in the natural sciences when presenting research results. However, a growing number of studies have presented interview findings using a literary style more commonly applied in the humanities. This report adopts that literary style when telling the stories of particular households HEV purchases, and shifts to a more “scientific” tone when analyzing those purchases. The blend of these two distinct writing styles reflects the dual objectives of this study: to offer rich, authentic portrayals of real people who buy HEVs, and to extract findings from their purchases that can be used to better understand how and why people buy HEVs.

CHAPTER 4: THE SYMBOLIC MEANINGS OF HYBRIDS

This chapter examines the symbolic meanings that HEV owners attached to their HEVs. To answer the question of what the HEV means this chapter begins with discussion of four households, each of whom purchased a different HEV model. This is followed by analysis of the comprehensive set of symbolic meanings that were important to this study's households in their HEV purchases. These meanings include denotations that are commonly associated with HEVs (such as preserving the environment or adopting new technology) as well as deeper, more idiosyncratic connotative meanings (such as ethics, intelligence, independence, and uniqueness.) This chapter demonstrates that both types of meanings are important to buyers, and both must be understood in order to assess the role of symbolic meaning in the HEV purchase.

While the goal of this study was to explore symbolic meanings that motivated HEV purchases, many households also were aware of negative meanings in their HEVs. This chapter outlines some of the negative denotations and connotations households perceived in their HEVs, and provides examples to illustrate how households coped with these negative meanings.

An Introduction to Four HEV Buyers

This section discusses four HEV purchases. The four households, two from Phase I and two from Phase II, were chosen because they illustrate the wide variety of meanings that households attached to their HEVs. Information about each household is presented in two ways. In the right column, a story about the household's HEV appears in a literary style,

providing an account of the household's HEV purchase with minimal analysis. I recommend that the reader begin with these stories since they give general introductions to household members and the meanings they attached to their HEVs. The reader can then proceed to the left column, which contains a technical analysis of the symbolic meanings identified in each household's interview. This analysis explains the household's semiotic map that appears at the end of each section. Described in detail in Chapter 2, a semiotic map diagrams the connections between a signifier (the household's HEV) and its signified concepts, which include denotations (socially-shared meanings) and connotations (personal, idiosyncratic meanings).

The information here represents my attempt to authentically portray these four households. I have included many instances of respondents' own language and terminology in the analysis: all words and phrases that appear in quotations in this chapter are direct quotes from households. To protect participants' identities, the names used here are aliases, but otherwise the details are unchanged. While we learned a great deal about our households in this study, it is important to note that there is much we do not know. We were able to generate detailed semiotic maps from each interview, but we are also cognizant of Korzybski's (1994, p. 58) warning that "a map is not the territory." Our maps isolate the symbolic meaning of HEVs, but do not fully depict meanings of other vehicles (such as SUVs and BEVs), of vehicle types (such as economy cars), or of automobiles in general. The semiotic maps here can be seen as simplified representations of a small area within the semiotic terrain occupied by the study's households. In Chapter 6, this area is broadened somewhat to encompass a larger set of meanings and signifiers.

Dave Nelson: Honda Civic Hybrid

The semiotic map created from Dave Nelson's interview is shown in Figure 4-1. At the top of the map is Dave's HEV, a Honda Civic Hybrid. One of the reasons Dave was attracted to the Civic Hybrid was that it looked like a regular Honda Civic, a car he and his friends liked. Dave also was familiar with the Toyota Prius. While he put the Prius into the same "hybrid" category as his Civic, he didn't care for the Prius' "funky" styling and didn't consider it during his purchase. Dave also neglected to consider the conventional Civic, even though it looked nearly identical to the hybrid version, had a lower purchase price, and was available at the dealership where he shopped.

Dave associated hybrids with two main ideas: using less gasoline and incorporating new technology. Like many HEV buyers, Dave thought the HEV's

Box 4-1: Dave Nelson's HEV

Dave Nelson, a 24-year-old Berkeley resident, bought his Honda Civic Hybrid in December 2003. At the time, Dave was just a few years out of college, but already was laying the foundation for a successful career in real estate. During the week, Dave managed an apartment complex, and on the weekends he worked as a real estate agent. Dave had only sold a few homes, but he was determined to attract more clients and establish himself in the growing San Francisco-area property market. Dave also was excited about investing in real estate. He and a friend had recently purchased a Bay Area home that they planned to refurbish and use as a rental property. For Dave, this was the first of many homes he hoped to buy or develop in the future. Ultimately, Dave envisioned starting a successful real estate development firm that would let him work with his father, who already owned a small contracting business in central California. Because of his ambitious investment plans, Dave was careful with his money. He had set a goal for himself to save \$50,000 within a few years, and was moderating his spending in order to reach it.

Since Dave had bought a used Volkswagen Passat just a year earlier, he wasn't really in the market for a new car at the time of his hybrid purchase. But one weekend Dave was waiting for service on his Passat and walked next door to a Honda dealership to pass the time. Once on the lot, he spotted a gray Civic Hybrid and was attracted to the car's unique color. Dave already knew something about hybrids since he had previously read an article about the Toyota Prius in *Consumer Reports*. While he disliked the appearance of the Prius, Dave was intrigued by the idea of using less gasoline and saving money. Standing in front of the Civic Hybrid at the dealership, Dave was suddenly interested. He liked the fact that this hybrid looked just like the regular Civic and not "funky" or odd like the Prius. As the salesman talked about the hybrid's gas savings and available federal tax credit, Dave thought about what a "good investment" the Civic Hybrid would be. After taking a test drive and talking further with the salesman, Dave made a "pretty spontaneous decision" to buy the car.

technology was “cool” but didn’t consider himself an expert in how it worked. “I guess it relies on these batteries...and it’s all computerized” he explained. While the new technology was interesting, Dave was motivated more by the idea of using less gasoline. Less gas consumption connected with two denotations: being safe for the environment and saving money. Dave acknowledged that concern for the environment wasn’t really a major factor in his purchase. Dave knew that many hybrid buyers were environmentally-minded, but he didn’t really see himself that way. Dave liked the outdoors, and explained that he had “nothing against the environment,” but he didn’t feel particularly strongly about environmental issues.

Dave felt more strongly about saving

money, and about making smart business decisions in general. To Dave, buying an HEV that saved money on gasoline connected with two connotations. The first was

Dave saw numerous benefits to owning an HEV. He loved the idea of driving a car that was “half-electric,” and his friends liked this “cool technology” as well. Dave was pleased that the hybrid polluted less, making it more “safe for the environment” than a conventional car. But neither new technology nor environmentalism were the main reasons for Dave’s purchase. For Dave, the hybrid was mostly about saving money. Exactly how much money the car would save him was unclear since Dave hadn’t made any calculations prior to his purchase, nor did he check the pricing or fuel economy rating of the conventional Civic. But the Civic Hybrid was rated at around 45MPG, about twice the mileage he obtained in his Passat. Any car with mileage that high seemed likely to save a substantial amount. Plus, as his real estate work expanded Dave expected to be driving more, which would allow his hybrid to generate more savings. In addition, the Civic Hybrid was a Honda: a brand Dave felt was known for its reliability and low cost of ownership.

Dave’s professional life was top of mind when he made his hybrid purchase. The Civic Hybrid seemed like an excellent choice for transporting his real estate clients. Not only was the car comfortable and roomy: it also sent the right message about him. The Civic Hybrid told clients that Dave was serious about his business, an “organized person” who could get things done. The car also demonstrated that Dave was “efficient” with money, and a dealmaker with strong financial sense. To Dave, the Civic Hybrid represented a “smart decision,” the type of sound choice a successful businessperson would make. This meaning was confirmed when Dave traveled to his parents’ home for the Christmas holiday just a few weeks after his purchase. As his extended family crowded around his new vehicle, Dave explained how the hybrid powertrain worked and the high gas mileage it achieved. As he finished, his father nodded approvingly and declared that the new car was “a smart buy.” Others agreed, and Dave knew he had made the right choice in buying a hybrid car.

intelligence, and the second was practicality. Dave described his Honda Civic Hybrid as a “smart buy” and a “good investment.” Dave explained that his HEV fit well with his expectations about his future career. Not only would it save him money when he was driving from property to property; it would also communicate to clients and business partners that he was someone who knew how to manage his money, an “organized person” who made sound business decisions.

For Dave, the idea of his HEV as a practical choice was enhanced by the fact that it was a Honda, a brand that Dave knew to be reliable. His previous vehicles had required so much service that Dave had developed a personal relationship with his mechanic. Buying a Honda would mean spending less money maintaining his vehicles, making the HEV purchase even more practical.

Dave’s purchase is typical of HEV buyers in this study who associate their HEVs with saving money. Dave did not conduct any financial analysis of the cost savings that would be generated by his HEV, nor does he track his ongoing fuel expenses. Dave also made his purchase quickly without much prior analysis HEV pricing, and thus paid close to MSRP at a time when other Honda Civic Hybrid buyers were receiving discounts on their vehicles. Further, Dave considered only the hybrid version of the Honda Civic, even though he was aware of the conventional Honda Civic and could have easily evaluated it at the dealership where he made his purchase. Finally, Dave rejected another hybrid vehicle, the Toyota Prius, for reasons unrelated to saving money.

An accountant might look at Dave's purchase and decide that he made a hasty, careless decision. From a strict financial perspective, this may be true. However, Dave was motivated by the symbolic meaning of cost savings in his HEV rather than by the actual quantifiable savings it generated. Dave bought his HEV for the connotations of intelligence and practicality that were connected to cost savings. He purchased an idea of himself as a smart, organized person who could identify good investments. These meanings were important in Dave's development of a self-narrative that characterized him as a promising young businessperson with a bright future in real estate. Over the long term, Dave probably would have spent less money by purchasing a conventional Honda Civic, but it would not have provided access to the same symbolic meanings and would not have enabled the same identity that was made possible by the hybrid version.

Dave's purchase also demonstrates that not all HEV buyers are motivated by environmental concerns, and that HEVs can be seen as more than just "green" vehicles. Dave was aware that there were environmental meanings attached to his HEV, and in the interview he discussed whether these meanings fit with his ideas of who he was. In the end, there was not a strong connection between environmental meanings and Dave's identity, nor were environmental meanings a major considerations in his purchase.

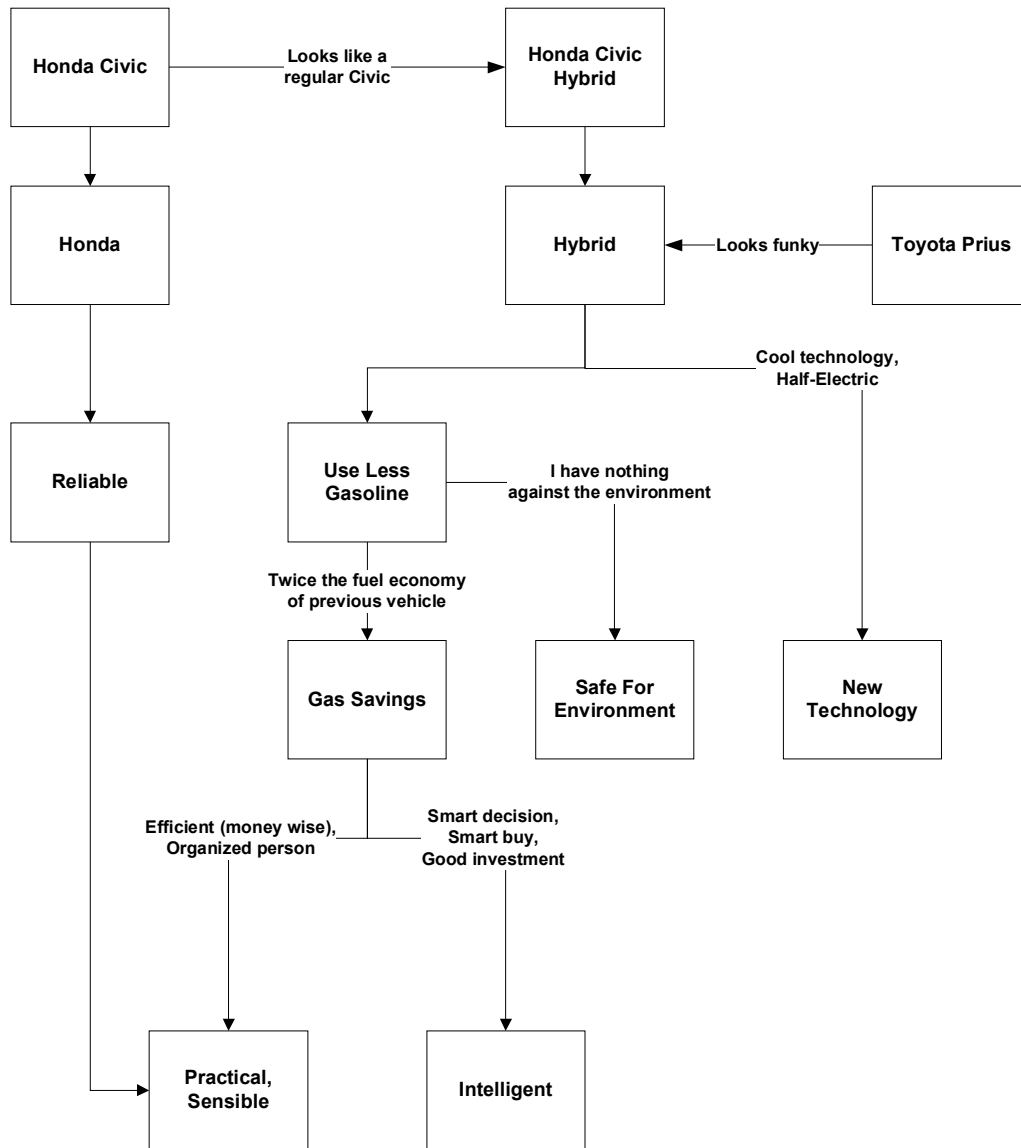


Figure 4-1: Semiotic Map for Dave Nelson

Mike and Ellen Bridger: Toyota Prius

Mike and Ellen Bridger's semiotic map is outlined in Figure 4-2. The Bridgers' Generation II Prius is shown at the top of the map. It is included in a "hybrid" category along with the Honda Civic Hybrid and Generation I Prius. Mike had reservations about the Generation I Prius: although it was an HEV, it strongly resembled a "wimpy" economy car. Thus, the Generation I Prius also is connected to the "economy car" category.

For the Bridgers, a hybrid was associated with two ideas: "low emissions" and "high mileage"⁸ Low emissions connected to less air pollution and lower global warming impacts, and thus to the denotation that HEVs were "good for the environment." Particularly for Ellen,

Box 4-2: The Bridgers' HEV

In the spring of 2003 Ellen Bridger, a 63-year old travel agent, had an accident in her Toyota Celica convertible. Ellen was fine, but her car was totaled, and she began discussing a replacement with her husband Mike, a 65-year old retired state employee. Three years earlier, the Bridgers had purchased a full-sized Toyota pickup truck with a powerful V8 engine. They liked having the truck for hauling, but both Ellen and Mike were feeling guilty about having such a big "wasteful car" that "suck[ed] gas." They decided their next vehicle would use less gasoline, and since they had seen hybrids at their church, they settled on a hybrid as the best choice. As they began to look at hybrid models, the couple gravitated toward a Toyota. Years earlier, a bad experience with a Chevrolet sedan drove Mike away from the domestic auto brands, and the Bridgers had been loyal Toyota buyers ever since. But as Mike looked at the 2003 (Generation I) Prius, he had reservations. Mike thought the Prius was ugly, and felt it resembled the Echo, a "wimpy little car" at the bottom of Toyota's lineup. Mike wanted a car that used less gas, but he didn't want a tiny, stripped-down econobox.

The Bridgers continued their search, looking at Honda hybrids as well. The two-passenger Insight struck Mike as just as bad as the Prius: it was small, "ugly, and inadequate." The larger Honda Civic Hybrid looked much better, but Mike noted that Honda's warranty was less extensive than the warranty offered by Toyota. Unsure what to do, Mike thought through his options. The appearance of the Prius bothered him, but its ten-year battery warranty meant that he was less likely to spend thousands of dollars on a replacement hybrid battery pack. Plus, it was a Toyota, a brand Mike knew was reliable and durable. After Mike talked with Ellen, the couple made their choice: they would buy the Generation I Prius despite Mike's reservations about its looks.

⁸ Like many households in this study, the Bridgers use the term "mileage" to refer to gas mileage (fuel economy.) Thus, when they appear in this chapter, the terms "low mileage" and "high mileage" refer to low and high fuel economy rather than to the number of miles that a vehicle has been driven.

high fuel economy also was associated with the environment since using less oil meant less need for drilling in environmentally-sensitive areas.

The Bridgers linked doing something good for the environment with the idea of acting on their beliefs: “anything I buy, I’m supporting some kind of an idea” Ellen explained. Ultimately, the couple viewed their HEV as symbolizing participation in a larger movement to improve the community and world around them. While they talked often about “the technology” in their vehicle, neither Mike nor Ellen was an expert in hybrid powertrains. Supporting “the technology” meant supporting the idea that people could work together to solve bigger issues like global warming. Mike and Ellen believed everyone should participate, and they felt some responsibility to educate others about

Soon afterwards, Mike talked with a friend about their plans. The friend, a car enthusiast, told Mike about a redesigned (Generation II) Prius that was due to arrive in the next model year. Mike was excited, and wondered if the new Prius would look better than the current model. An article in *Money* magazine confirmed that it would. As Mike looked at the photograph of the 2004 Prius, he knew that it was the hybrid he wanted.

But soon afterwards when Mike called dealerships to check on availability, he learned that the wait for the new Prius would be seven months. Mike and Ellen each were used to having a vehicle, but for the next seven months the Bridgers shared the Toyota pickup as they awaited the arrival of their new HEV. Surviving with just one household vehicle was not always easy, but the Prius was the only new vehicle the Bridgers wanted, and they felt it was worth the wait to own one.

A few days after Christmas, the dealership called and told the Bridgers that a Prius was available. The vehicle had most of the options the couple had requested, and they were pleased that the purchase could be completed before the end of the year when the existing federal tax incentives for hybrid cars were due to expire. Neither Mike nor Ellen focused on the financial aspects of the hybrid. To the Bridgers, people who tried to calculate whether hybrids saved money in the long term didn’t seem to understand what they vehicles were really about. But the tax incentive was a nice perk, and it seemed sensible to get it if they could.

What mattered more to the Bridgers was the hybrid’s environmental credentials. Both Ellen and Mike were increasingly worried about the air pollution and greenhouse gas emissions. Ellen in particular felt strongly about environmental issues (“I’m concerned about our earth” she explained) and viewed buying a hybrid as an indication that she was doing something good for the ecosystem.

Mike agreed, although he wasn’t completely comfortable with the Prius’ pro-environmental message. Mike was no liberal “tree-hugger.” He voted Republican, held moderate political views, and supported a reasoned assessment of environmental issues. In particular, Mike thought it was important to balance environmental goals with

HEVs. Mike felt that automakers had responsibility to participate as well, and voiced his frustration with domestic companies that seemed to have fallen behind in developing hybrid vehicles. Mike explained that the idea of high fuel economy also connected to another important denotation: reducing support for Middle Eastern oil producers. Mike saw using less oil as a long-term solution to the problems in the Middle East, and as a way to reduce the vulnerability of Americans.

The brand of the HEV was also important to the Bridgers. Mike talked at length about the bad experience he had with a previous vehicle: a 1977 Chevrolet Caprice. The Chevrolet had

required so many repairs that Mike swore he would never buy another domestic automobile, and he and Ellen had purchased Toyota vehicles ever since. For the Bridgers, Toyota vehicles symbolized reliability and durability, characteristics that were particularly important when purchasing an HEV: a new type of automobile that used

other objectives, like using less foreign oil. To Mike, world oil markets seemed to be rigged by major Arab producers, and gasoline prices in the U.S. seemed to fluctuate based on nothing more than “how hard OPEC decides to screw us.” Mike saw clear links between petroleum revenue and instability in the Middle East, citing Saddam Hussein as a corrupt leader who funded violent acts with oil profits. He also linked Middle Eastern oil revenue with global terrorism: “Look what Osama Bin Laden did with his money” Mike explained. For Mike, the Prius was not just as a symbol of the environment, but also as a symbol of national independence from countries that were hostile toward America. Buying a Prius represented an important step toward defunding the “oil sheiks,” stemming violence in the Middle East, and reducing the vulnerability of Americans.

Mike and Ellen also saw their Prius as a symbol of involvement in their community. The couple first learned about hybrids at their church, where a growing number of congregants owned hybrid vehicles. In the months following their purchase, Tony and Ellen talked with numerous people about their hybrid, including strangers who stopped in front of their house to inquire about the car. Tony and Ellen enjoyed educating others about hybrids, and both hoped that more people would purchase the vehicles. Mike also wanted to see more automakers produce hybrid vehicles, and was frustrated with the domestic companies who seemed slow in bringing their own hybrid offerings to market. For Mike and Ellen, having others participate was important. They believed issues like global warming and reducing dependence of foreign oil could be resolved, but only through an effort that had widespread support. In buying an HEV, the Bridgers felt they were doing their part by “supporting the new technology,” and they hoped others would as well.

advanced technology that could prove expensive to repair. During their purchase, the potential cost of replacing the traction batteries or other hybrid components were on Mike's mind, and the fact that the Prius was linked to the Toyota brand (and its positive meanings) was reassuring.

Mike and Ellen also talked about the symbolic meanings of another vehicle: their full-sized pickup truck. Because of its low fuel economy, the Bridgers referred to the truck as "our wasteful car" and "the gas-guzzler on the other side of [the] garage." Mike in particular liked having the ability to haul cargo in the truck, but both he and Ellen were feeling guilty about the truck's high fuel consumption. In the interview, they juxtaposed the truck with their HEV, explaining that owning the HEV made them feel less guilty about having the truck. Since we did not explore all of the symbolic meanings associated with the pickup truck, the Bridgers' map is (to some extent) incomplete. However, the couple's comments did indicate that the "low mileage" truck held meanings that were opposite those of their high-fuel-efficiency HEV. It may seem incongruous that a household would own vehicles with opposing meanings, but the Bridgers provide an example of how households manage a complex set of vehicles to enrich and improve both the functionality and meaning of their vehicles and thus their lives.

The Bridgers demonstrate several behaviors that are appear in other HEV-owning households. One is the perception of light trucks (including pickup trucks and SUVs) as having their own set of symbolic meanings that are opposite of the meanings in HEVs. Another is the distinction that is made between HEVs and economy cars, such as the

Toyota Echo. To owners like the Bridgers, HEVs have very different symbolic meanings from other vehicles, even if those vehicles are similar to HEVs in size, fuel economy, or appearance. Chapter 6 provides additional detail on the meanings of other types of vehicles and the relationship they have with HEVs.

The Bridgers demonstrate how households can struggle to interpret a vehicle's meaning. Mike perceived the Generation I Prius as part of two very different vehicle categories, and the resulting mismatch of meanings left him conflicted in his opinion of the vehicle. On the one hand, the Generation I Prius was a hybrid, so it accessed important denotations like preserving the environment and giving less support to Middle Eastern oil producers. But it also was an economy car, which meant it was underpowered, ugly, and uncomfortable. For Mike, the two sets of meanings did not fit well together and made him reluctant to purchase a Generation I Prius.

The Bridgers also illustrate how households can seek combinations of meanings in their HEVs. Both Mike and Ellen wanted a "green" vehicle, but for Mike in particular a balance of meanings was important. Mike was worried that the Prius could portray him as a radical environmentalist rather than the sensible, environmentally-aware Republican he perceived himself to be. For him, it was important that the HEV have two denotations: environmental preservation and independence from foreign oil. Mike's desire to balance these ideas became evident when he and Ellen 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, Mike espoused what he saw as a more pragmatic approach, noting that oil from ANWR would reduce U.S. dependence on OPEC and probably could be achieved without spoiling the environment. Mike believed in balancing the environment and national independence, and he saw his Prius as a symbol of the balance between these two ideas.

Finally, the Bridgers counteract the stereotype of HEV buyers as technophiles. They mentioned their HEV's "technology" repeatedly, but like many HEV buyers, they shared little detail about how the hybrid powertrain in their Prius actually worked. When they did mention specific technological features, they focused on non-powertrain elements such as the keyless entry. This is common among HEV 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 were not trying to portray themselves as technology-savvy. Instead, they were communicating the idea of themselves as people who act on their beliefs and encourage others to do the same.



Figure 4-2: Semiotic Map for Mike and Ellen Bridger

Tony Garcia: Ford Escape Hybrid

The semiotic map for Tony Garcia

appears in Figure 4-3. At the top of the map is Tony's Ford Escape Hybrid, which was part of a "hybrid" category that also included the Honda Civic Hybrid (the couple's other vehicle).

Tony liked HEV models that looked like their conventional counterparts, and noted that one reason he purchased his Ford Escape Hybrid was that it looked like a "normal car," nearly identical to the non-hybrid Escape he owned previously.

For Tony, the Escape Hybrid was connected to two ideas: new technology and less gasoline use. Since Tony was a software engineer who worked at a high-technology company, it seemed natural that he should own a car with "leading-edge technology." He likened his Escape Hybrid to other high-technology

Box 4-3: Tony Garcia's HEV

Tony Garcia and his wife Sue already owned one hybrid when Tony began car shopping in the fall of 2004. Just a few months earlier, the couple traded Sue's Ford Explorer for a Honda Civic Hybrid after getting "fed up" with the Explorer's low fuel economy. Tony, a 42-year-old software engineer, liked the idea of spending less money on gasoline, and was also excited by the advanced technology in the Civic Hybrid. "I liked the new technology" he recalls, "I kind of liked being one of the first ones to have the Honda Civic Hybrid." Sue wasn't so sure: she had always thought of herself as a "truck person" and wanted a vehicle that could comfortably transport their two teenaged boys and their friends. But Sue saw the practical advantages of owning a smaller car, and the family still had Tony's Ford F-150 pickup truck when they needed a bigger vehicle. Plus, Tony often rode to work on his Harley-Davidson motorcycle, so Sue had frequent access to the pickup when she needed it.

A few months later in October 2004, Tony started thinking about replacing his pickup. Tony tended to buy a new vehicle every few years, and he felt ready for something new after driving the F-150 for two years. He liked his full-sized pickup, but was growing increasingly concerned about gasoline prices, which had risen the previous summer and remained at about \$2.00 per gallon. Tony wanted another Ford truck, so he looked at the Escape, Ford's most fuel-efficient SUV. After test driving a few models, he decided on a loaded model with two-wheel drive and a V6 engine. Tony wanted better fuel economy, but he also wanted a well-equipped truck. A smaller, more fuel-efficient 4-cylinder engine was also available in the Escape, but Tony didn't consider it since it was only available in base models that had few amenities.

Tony was also interested in the hybrid version of the Escape, but was disappointed to learn that demand was so high for the Escape Hybrid that buyers had to purchase whatever vehicle their dealer had available, even if it lacked the features they wanted. Tony was also turned off by the markup his dealer was putting on the Escape hybrid, and by the fact that he'd have to wait weeks

products he owned, such as his Apple iPod and RIM Blackberry. He also explained that hybrid technology made a vehicle somewhat unique. Tony liked unique vehicles, and had purchased his previous car (a Harley-Davidson edition Ford F-150 pickup truck) mainly because it was an unusual, limited edition vehicle that really stood out. Strangers had often approached him to ask about his pickup truck, just as they approached him now to ask about the Escape Hybrid.

For Tony, using less gasoline connected with the connotation of saving money. Like Dave Nelson, Tony didn't perform any calculations to estimate his fuel cost savings, nor did he track ongoing fuel expenses. But he noted that the Escape Hybrid had the best fuel economy of any SUV, and he guessed that he was getting double the fuel economy he had

for the vehicle. For Tony, a conventional Escape with a V6 engine and all the options seemed like the best choice, and he made his purchase.

A year later, Tony was questioning whether he had made the right decision. He liked his Escape, but was disappointed with the gas mileage. While the Escape was supposed to attain between 20-25 MPG, Tony was often getting just 16MPG, the same mileage he remembered experiencing in Sue's Explorer. Tony was frustrated, and began researching the Escape Hybrid online. Sue suggested he also look at the Ford Mustang, but Tony was focused on a hybrid. He liked the fact the Escape Hybrid looked similar to the conventional version and offered the same amenities. Like the Civic Hybrid, the Escape Hybrid was "like a normal car in many ways." Tony also was pleased when he checked with his dealer and learned that Escape Hybrid prices had come down below MSRP. After test driving the Escape Hybrid, Tony traded in his conventional Escape for a hybrid version with the same amenities.

For Tony, the HEV's gas savings were its most attractive feature. Tony wasn't sure how much he and Sue spent on gasoline each month, nor did he conduct any financial analysis comparing the Escape Hybrid with the conventional Escape. But Tony was convinced he was saving money. The Escape Hybrid had the best gas mileage rating of any SUV, and he estimated that his real-world mileage was twice that of his previous Escape. Part of the mileage gain came from the driving techniques Tony researched online. While he had never thought to drive his conventional Escape differently to increase gas mileage, Tony drove more gently in his hybrid, accelerating slowly and moderating his speed in order to keep the vehicle in all-electric mode. Tony explained that the high fuel economy that resulted translated into savings at the gas pump. Skeptical friends had told Tony that his hybrid would never pay for itself, and Tony acknowledged that they might be right. But for Tony, the Escape Hybrid balanced two important factors. It allowed him to drive the kind of car he wanted: an attractive, comfortable vehicle with "creature comforts." And it also saved him some money on fuel, making it a more practical choice than the other trucks he and Sue had owned in the past.

experienced in the conventional Escape. Tony connected saving money with the connotation of practicality. He wasn't sure how much money his HEV saved him, but he explained that "I just always try to look for ways to save if we can."

As Tony was getting older, he was thinking more about setting aside money for his children's education and for his own retirement. But Tony's inclination to save conflicted with his desire to buy a new vehicle every few years. It also seemed incompatible with his taste for expensive toys, including the \$20,000 motorcycle he had purchased just two years earlier. Tony explained that unlike his Escape Hybrid, the Harley-Davidson

Tony was also interested in the Escape's advanced technology. As a software engineer, Tony was used to working with technology products and with people who recognized the value of technological innovations. Tony saw his Escape Hybrid as a bit like his iPod and Blackberry: a high-technology device that identified him as an innovator. This was important because it set Tony apart, making him a little different from most people. Tony explained that he liked vehicles that made him feel unique. His previous vehicle was not just a regular pickup truck: it was a limited edition Harley-Davidson-styled F-150, a rare vehicle that often attracted the attention of onlookers. While the F-150 didn't use high technology, like the Escape Hybrid it signaled to others that Tony was a unique individual.

Another signal the Escape Hybrid sent was about the environment, and this sometimes made Tony uncomfortable. Tony didn't buy his Escape Hybrid because he wanted to help the environment. However, he recognized that all hybrids had an "environmental reputation," and he was concerned about the conclusions other people might draw about him when they saw him driving a hybrid vehicle. Tony remembered when friends in the local Harley-Davidson riders club heard he had a hybrid and accused him of being a "liberal" and a "treehugger." Like his fellow riders, Tony had conservative political views, and identified more with the "bad guy" biker image than with the do-gooder image of the stereotypical hybrid owner. Tony hadn't yet figured out how to communicate that his hybrid was about being practical, not environmentally-minded, but he had some ideas. One thought was to put a Harley-Davidson decal on the back of his Escape Hybrid to let everyone know that while he drove an HEV, he was still a biker at heart.

motorcycle was his "impractical vehicle" (although, Tony noted, the motorcycle did at least achieve decent fuel economy.) Further, Tony felt that the connotation of practicality that he attached to the Escape Hybrid balanced some of the less practical aspects of his own decision-making. He knew it was expensive to buy a new car regularly, especially a car that was loaded with options. But he really liked new vehicles, and the fact that his

latest one was a practical HEV made the purchase more acceptable in his own mind.

Tony explained that the HEV purchase was the “best of both worlds”: the HEV saved money in the long run, plus he got to have a new vehicle that he wanted.

The Garcias’ purchase illustrates two important points about HEV owners who are motivated by saving money. First, like Dave Nelson, Tony Garcia acted on symbols of cost savings rather than financial calculations. Tony was unsure whether the HEV would “pay for itself” over time, and never really made the effort to find out. If he had, he might have discovered that his tendency to turn vehicles over every few years would make achieving payback difficult. Second, Tony was motivated by a number of factors, including the symbolic meaning of saving money. Tony also really wanted a new vehicle, and wanted that vehicle to be a truck that, he explained, fit with his image of himself as a “Harley guy” who “like[s] SUVs and trucks.” Certainly there were other vehicle options available to Tony, many of which would have had lower purchase prices and smaller ongoing fuel costs than his Escape Hybrid. But it is unlikely that any of those vehicles would have provided Tony with a combination of symbolic meanings that fit so well with his own idea of who he was.

Tony Garcia also provides an interesting lesson about driving behavior. After buying his Escape Hybrid, Tony was interested in learning how to maximize his fuel economy by changing his driving habits. He consulted numerous websites and exchanged online messages with “hypermilers” who knew how to extract the highest fuel economy from HEVs. After applying the techniques, Tony was averaging 34-35 MPG in his Escape

Hybrid, slightly exceeding the EPA combined rating for the vehicle. Tony was proud of the fuel economy he'd achieved, and shared it with others in both online and offline conversations. Interestingly, Tony never tried driving his conventional Escape differently in order to increase its fuel economy. Part of the reason may have been that the non-hybrid model did not provide the same type of clear, detailed information about gas mileage that the hybrid version showed. But another reason may have been that Tony did not associate the symbolic meaning of saving money with the non-hybrid Escape, and therefore driving more conservatively did not seem to fit with the vehicle. Other households have expressed this idea: even when they are aware of how to drive in order to maximize MPG, some drivers only use these techniques when they are in an HEV. Tony's Escape Hybrid purchase provides one example of product as stimuli: it was not until Tony purchased an HEV that he thought about changing his driving behavior.

Like Mike Bridger, Tony Garcia was also aware of negative meanings associated with his HEV. Since the negative meanings were not fully explored in the interview, they are not shown in the Garcias' semiotic map. Mainly, these meanings related to the HEV's connection with the environment. In particular, Tony was concerned that his motorcycle-riding friends would think of him as a "liberal" and a "tree-hugger." Not only did this misrepresent Tony's political and environmental views; it also threatened his identity as a "Harley guy" and his participation in an important lifestyle sector. Tony's solution to put a Harley-Davidson sticker on the back of his HEV illustrates the type of behavior that HEV owners engage in to create the right mix of symbolic meaning in their vehicles. The sticker was meant to express far more than Tony's enthusiasm for a particular motorcycle

brand: it was his way of unifying two disparate sets of symbolic meanings and clarifying which were most applicable to him.

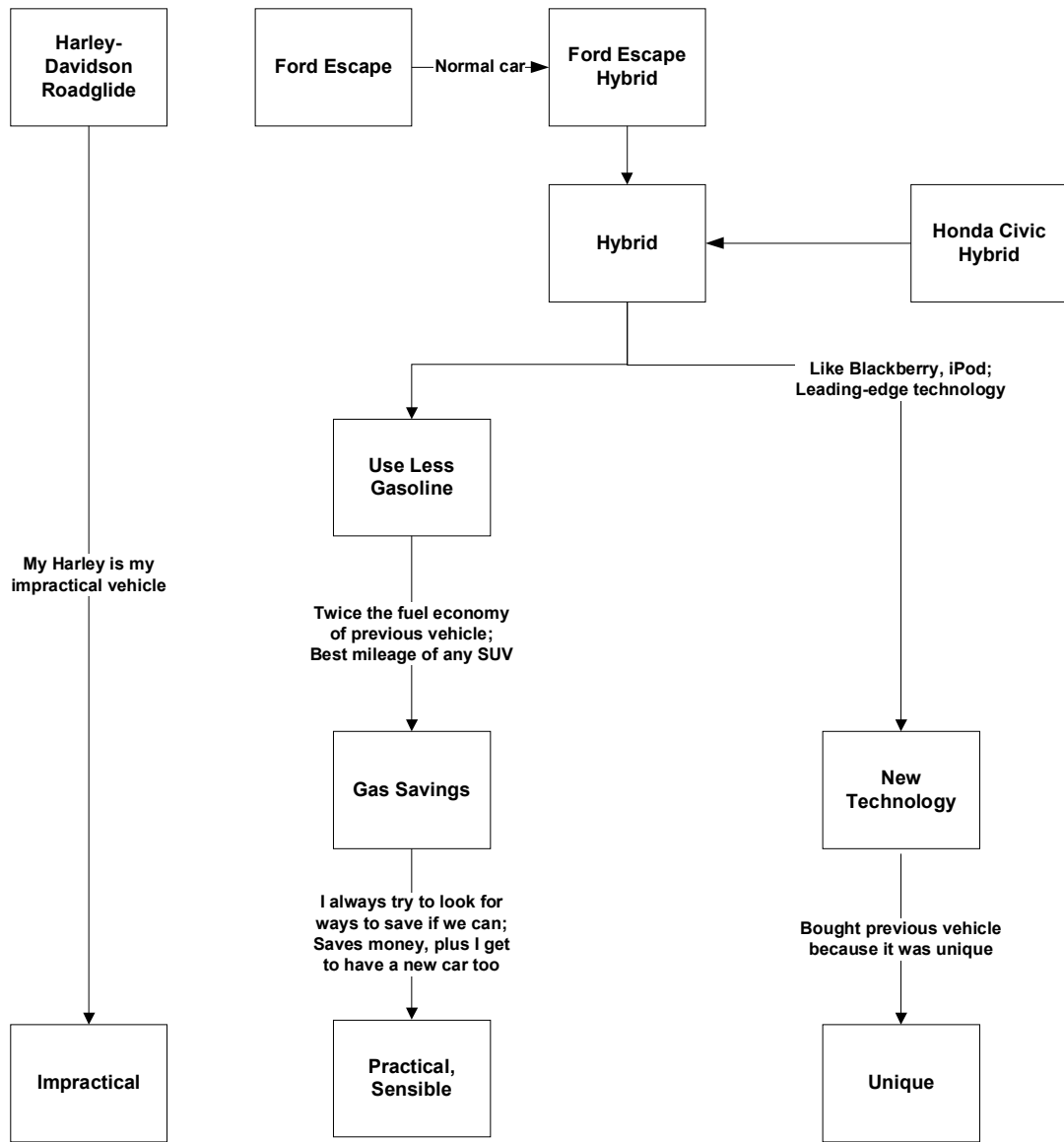


Figure 4-3: Semiotic Map for Tony and Sue Garcia

Alice Murphy: Toyota Camry Hybrid

Alice Murphy's semiotic map is shown in Figure 4-4. Alice's HEV, a Toyota Camry Hybrid, appears at the top of her map and was part of the "hybrid" category of vehicles. Alice noted that other cars, including the Toyota Prius and Honda Insight, also were in the hybrid category. However, Alice saw substantial differences between older, high-fuel-economy HEVs like the Prius and her Camry Hybrid. For Alice, the Prius was "strange looking" and didn't drive as well as vehicles she was accustomed to. While she saw the Prius and Insight as hybrids, they also were "weird small cars" that Alice would never consider owning. The Camry Hybrid, in contrast, looked and drove like the non-hybrid Camry she had owned previously.

For Alice, a hybrid vehicle connected

Box 4-4: Alice Murphy's HEV

Alice Murphy, a 55-year-old teacher from Sacramento, was no stranger to hybrids when she purchased her Toyota Camry Hybrid in the fall of 2006. Alice had learned about hybrids from a friend five years earlier, and was intrigued by the idea of a car that could help the environment. Alice generally didn't spend much time thinking about cars, but after talking with her friend in 2001, she visited a local Toyota dealership to investigate. At the time, hybrids were rare, and many buyers had difficulty finding dealers with hybrids in stock. Alice's salesperson not only had Toyota Prius on his lot; he even offered to let her drive it for a week. Alice was excited. But once she was behind the wheel of the new vehicle, she began to rethink her interest in hybrid technology. The Prius was ugly and odd-looking, and so small it reminded her of a "toy car." It also didn't drive well or feel as solid as her Toyota Camry, and she wondered whether it would be safe in a crash. Alice consulted a friend who was knowledgeable about cars and he warned her that hybrid technology was unproven and still unfamiliar to many mechanics. By the time her week-long test drive was over, Alice had decided against buying the Prius, opting instead to replace her Camry with a newer, slightly-used conventional Camry.

Over the next five years, Alice grew increasingly concerned about the environment. The Bush Administration seemed to be doing little to protect the country's natural resources, and Alice was feeling guilty about her own energy use. As a girl, she remembered her parents doing simple things to conserve water and energy, such as putting a brick into the tank of each toilet in their home. As an adult, she felt it was time do her small part to help the environment. In the fall of 2006, Alice brought her Camry to the dealership for service and noticed a new Camry Hybrid in the showroom. It was so much more attractive than the Prius she had driven years earlier, and a test drive confirmed that it was as powerful and comfortable as her conventional Camry. Alice was thrilled. Hybrids were not "weird little cars" anymore; now they were for people like her, who cared about the environment but also

with two ideas. The first was new technology. Alice had very limited knowledge of the hybrid system in her HEV: “as long as it goes when I want it to go, that’s the main thing I’m concerned about” she explained. She did talk about specific technology features, but they were features like pushbutton start and Bluetooth networking that were not part of the hybrid powertrain. For Alice, the new technology in her Camry Hybrid connected to the connotation of individuality. Because it incorporated advanced technology, her HEV was distinguished from other Toyota Camrys she saw on the road each day, and this distinction made her a unique individual. As Alice explained, “[I] don’t want to be like everybody else...I like to be a little different.”

Alice also connected “hybrid” with the idea of using less gasoline. Unlike most

wanted a bigger car with better performance and amenities. Alice had not planned to buy another car for several more years, but she simply had to own a Camry Hybrid.

For Alice, owning a hybrid was not about calculating individual environmental impact. After driving her Camry Hybrid for a month, she still wasn’t sure exactly what kind of mileage the car attained, probably because she ignored its fuel economy display as she drove. But to her, the choice to own a hybrid represented a contribution to a collective effort. She likened energy use to littering: in the past, everyone threw trash on the ground, and as a result many natural areas were a mess. But as more people stopped littering, conditions improved. Alice thought the same thing could happen with hybrids. Currently Americans were destroying the environment with their gas guzzlers. But if everyone drove a hybrid and used less gasoline, the air would be cleaner and less environmental damage would occur during oil extraction. By working together and making small changes in the types of vehicles they drove, everyone could make a difference in the ecosystem.

Alice also thought using less gasoline meant that there would be changes in how the United States interacted with other countries. One benefit would be less reliance on oil-rich nations that currently exerted significant influence in world affairs. The other would be fewer wars, which Alice believed were often fought to secure supplies of petroleum. Today, the U.S. seemed to do whatever was necessary in order to satisfy its thirst for oil. Alice hoped that in the future, a United States that consumed less gasoline would be better able to conduct itself ethically on the world stage.

Alice also was intrigued by new technology in her Camry Hybrid. She knew that the hybrid system mixed electric and gasoline power, and that some energy was recaptured each time she stepped on the brakes. But Alice was no technophile. She was content to have just a basic understanding of the Camry Hybrid powertrain, and admitted that even some of the non-hybrid features (such as Bluetooth networking, which she described as “the Bluetooth thing”) were currently beyond her understanding. What was most interesting for Alice about the new technology was not how it worked, but rather that it made her car distinctive. The Camry was such a

HEV owners, Alice didn't know what her fuel economy was. She did, however, have a sense that she made fewer trips to the gas station than when she had owned her conventional Camry. She also liked

popular vehicle that it seemed to Alice like every second car on the road looked just like hers. The fact that her Camry used hybrid technology made it unique and, by extension, made her a little different from other Camry drivers. "[I] don't want to be like everyone else" she explained, "I like to be a little different."

the idea that using less gasoline meant polluting less and causing less ecological damage from petroleum exploration. For Alice, using less gasoline connected to the denotation of saving the environment. Like many HEV owners, Alice had limited knowledge of environmental solutions and did not articulate specific environmental objectives. But like the Bridgers, Alice connected the idea of saving the environment with the connotation of community involvement. She explained that air pollution and resource use were problems that could be solved through widespread participation. "If every person drove a car that was a hybrid and used less gas" she explained. "it would make a big difference." For Alice, the HEV represented "doing her part" in the collective effort to resolve global environmental issues.

Alice also connected her HEV's reduced gasoline use to the denotation of opposing war. Unlike some HEV owners who were particularly upset by the Iraq war, Alice focused on U.S. foreign policy in general. She blamed America's oil "addiction" for recent wars and also for America's unethical exploitation of other countries. Alice linked using less gasoline to opposing war and also to opposing "dishonest" foreign policy. Ultimately, Alice linked her HEV to the connotation of ethics. She hoped reducing U.S. dependence

on oil would lead to more honest international diplomacy and fairer treatment of other countries.

Alice's interview reveals the complexity that consumers face when evaluating environmental issues. Like many owners in this study, Alice had low environmental knowledge. During the interview, she discussed her other environmentally-friendly practices, such as heating her house with a wood-burning fireplace. Firewood may be considered a renewable resource, but burning it constantly in a residential fireplace is likely to generate large amounts of criteria pollutants that impact local air quality for her family and neighbors. So on one hand, Alice was using less non-renewable fossil fuel, but on the other she was fouling the air. Alice was not aware of this tradeoff, but it demonstrates how difficult it can be for people to understand the true environmental impacts of their behavior.

For consumers like Alice, the HEV is a summarizing symbol that is used to cope with the complexity of environmental issues. Not only is it hard to develop environmental expertise, but consumers must also navigate conflicting findings from the expert systems that evaluate environmental issues. Rather than relying on analysis alone, individuals can purchase an HEV and have access to the idea that they are doing something about environmental problems. This does not mean that HEV owners are disingenuous or lazy. In fact, many feel tremendous urgency around the environmental problems and are determined to do something to help. By purchasing an HEV, individuals like Alice Murphy are taking what they perceive to be an important step in the preservation of the

natural environment. Their assessment is based partly on reasoned analysis of the problem, but also on symbolic meanings that identify HEV ownership as a pro-environmental action.

Alice also demonstrates that not all HEV buyers are technology-savvy consumers. Like many HEV owners, Alice is excited by the technology in her HEV. But she knows relatively little about how the vehicle's powertrain actually functions, and acknowledges that she is not interested in learning more of the technical details. For Alice, the technology is important not just for what it does, but also for what it means. In fact, she talks far more about the symbolic meanings of hybrid technology than she does about specific features and functionality.

Finally, Alice sees major differences between her Camry Hybrid and efficiency-tuned HEVs like the Prius. This is particularly common among the HEV owners we interviewed in Phase II; that is, those owners who purchased larger, less-fuel-efficient HEVs than buyers in Phase I. Owners like Alice are reinterpreting the symbolic meanings of HEVs by selectively transferring meanings from efficiency-tuned HEVs. For example, Alice sees her Camry Hybrid as a symbol of saving the environment just like the Toyota Prius, but does not assign the Camry Hybrid to the category of "weird small cars."

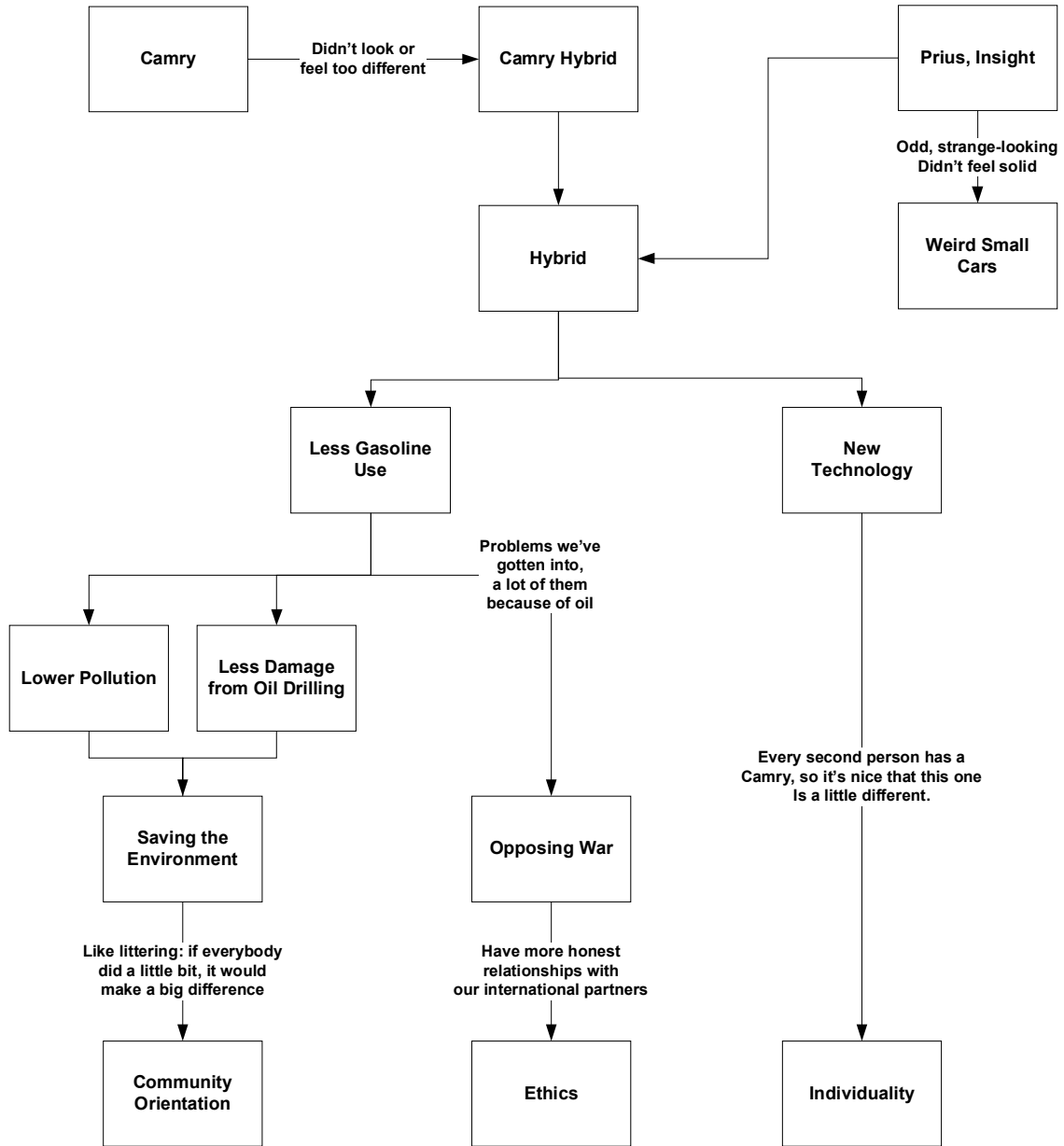


Figure 4-4: Semiotic Map for Alice Murphy

The Meanings

The 45 HEV owners in this study purchased a variety of HEV models, but they attached the same basic symbolic meanings to their HEVs. Across these households, five denotations emerged that had major influence on HEV purchases. These denotations are listed in the top row of Figure 4-5. Associated with each denotation is between one and four connotations, shown in the bottom row of Figure 4-5. 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 Figure 4-5. Further, households were not always influenced by the same connotations, even if they agreed on the denotations. For example, two households may both view managing personal finances as the most important meaning of the HEV, but one household may emphasize the ethics connotation while the other stresses intelligence/awareness. Finally, Figure 4-5 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.

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

Figure 4-5: The Meanings of HEVs Among the Sample Households

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 didn't 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 characterized the HEV as providing benefits to a group that is larger than the HEV owner, and described 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 owners like Mike and Ellen Bridger, the HEV symbolizes a community orientation. These 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 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.

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 U.S. military action in the Middle East. Not all saw themselves as pacifists who opposed war in general, but many questioned the current war's underlying causes. Some characterized the U.S. invasion of Iraq in March 2003 as "killing for gasoline," the latest example of the United States 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 sense of right and wrong of these HEV owners.

Manage Personal Finances

Whether HEVs save their owners money has been widely discussed in the popular press (for example, see Valdes-Dapena 2005 and *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 45 households in Phases I and II, only one who emphasized the

denotation of managing personal finances conducted a comparative cost analysis before purchasing an 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.

Managing personal finances was linked by HEV owners 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 that there was a carefully-considered 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 HEV 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 HEV not only symbolized managing personal finances; it also identified her as more mature than her peers. Another young buyer agreed. After buying an HEV, 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.

Reduce Support for Oil Producers

HEVs also symbolize reducing support for oil producers: multinational energy companies and the governments of oil-producing nations, especially 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

United States, 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 denotation of reducing support for oil producers: 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 fewer trips (and 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 United States 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.

Embrace New Technology

Finally, many owners were motivated by their perception that HEVs are new, advanced technology vehicles. However, even most of these HEV owners had only 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, the Toyota Prius’ smart keyless entry system, or the Honda Accord Hybrid’s navigation 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 an HEV 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 \$3,000 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.

Negative Meanings

Many households in Phases I and II acknowledged that the meanings of their HEVs were not entirely positive. HEV owners also discussed negative meanings and the measures they took to cope with them. For example, HEVs have strong environmental meanings, some of which are negative. Households like the Garcias were concerned that an HEV would convey liberal political views that they did not share, or portray them as radical environmentalists. One household shared a story about a parking attendant at a sporting event who shook his head with disapproval when he saw their Prius, seeming to dismiss them as “a couple of damn tree-huggers.” Another household discussed their hesitancy to purchase a Toyota Camry Hybrid because of the liberal political statement hybrids made: “we don’t want to make any kind of statement...we avoid very strong appearances” the household explained. A few households also mentioned that the HEV could indicate an owner who was self-righteous or self-absorbed. One Escape Hybrid owner explained that HEV drivers were “known” to drive slowly, deliberately ignoring the inconvenience they caused other drivers. To avoid others attaching this negative meaning to his HEV, he

stopped using some of the “hypermiling” techniques he had learned on the Internet and resumed driving at the speed of traffic.

Households also mentioned negative financial meanings that could be attached to hybrids. Articles in the popular press have examined whether buying an HEV is a sound financial decision, and some authors have concluded that buyers are ignoring economics in order to make a social statement (for example, see Valdes-Dapena 2005). HEV owners talk about seeing these articles, and about challenges from friends and coworkers who question whether buying an HEV is a smart decision. One HEV owner remembered how a group of his work colleagues read a *Consumer Reports* article that projected long payback periods for hybrid technology, and then teased him about making a bad decision in buying his Honda Accord Hybrid. The HEV owner described the encounter as light-hearted, but it did make him wonder whether his HEV was the “smart choice” he had previously thought it was.

Other households mentioned concerns about whether hybrid technology might actually be harmful rather than beneficial. When hybrids were first introduced, press articles warned that emergency personnel responding to an accident involving an HEV could be injured by the high voltage wires inside the vehicle (for example, see Schneider 2003). One Prius owner had seen these articles and was worried. The idea that his HEV could threaten well-intentioned rescuers directly opposed another meaning he saw in his vehicle: the connotation of caring about other people. Several households also mentioned negative meanings that challenged the HEV’s environmental denotation. One owner had heard that

disposal of his Honda Insight's batteries could cause enough environmental harm to outweigh the other environmental benefits of the vehicle. He hadn't yet researched the issue, but since he had purchased an HEV partly for its connection with environmental meanings, he was concerned about any idea that challenged this association.

In general, this study focused more on the positive meanings that inspired the HEV purchase rather than the negative meanings that opposed it. Therefore, it is likely that more negative meanings exist than those identified here. In fact, each of the five denotations identified in this study may have negative meanings associated with it. HEV buyers who are trying to preserve the environment can be cast as crazy radicals, just as buyers who are interested in new technology can be seen as socially-challenged geeks. But just because a negative meaning exists, that doesn't mean that it matters to every HEV buyer. In addition, since connotations involve individual interpretation, a meaning that is negative to some may not be so for others. One example is the connotation of geekiness. Numerous households connected the idea of being a geek with driving a hybrid; as one couple explained, "geeky people" were the stereotypical hybrid buyers. Calling someone a geek may not sound like a compliment, but some HEV buyers seemed to embrace the term. One Ford Escape Hybrid buyer explained how he loved the "geek factor" of his HEV, and another referred to his Toyota Prius as "geek-a-rific." In addition, one young woman explained that her friends loved the technology in her Honda Civic Hybrid because all of them were "computer geeks." So while the connotation of geekiness may be viewed as negative by some, others view it as a neutral (or even positive) meaning.

Since many buyers decided to purchase HEVs in spite of negative meanings, it is likely that these negative meanings were seen as less important than the positive ones.

However, this study did not attempt to judge the strength of particular meanings in relation to one another. The examples provided in this chapter provide some illustration of how households cope with the negative meanings that are attached to their vehicles.

One technique owners use is they divide HEVs into categories and assign negative meanings to other HEV models that are not in the same category as their own vehicle.

This is how Alice Murphy managed to disassociate her Camry Hybrid from the idea that hybrids were small, strange-looking machines for odd people. Another strategy is for the HEV owner to modify the vehicle in some way, like Tony Garcia who contemplated putting a meaning-laden Harley-Davidson emblem on his HEV. Other households alter their behavior, like the owner cited above who stopped driving slowly to counteract the image of himself as a smug, self-absorbed environmental zealot. Another way households may have coped with negative meanings was to talk with others about their HEVs. Phase I households were particularly active in talking with others about their vehicles, but many Phase II owners also acknowledged interacting with other HEV owners as well as friends, colleagues, and strangers who were interested in learning about HEVs. HEV owners' communication was a way to bring others into the HEV fold as well as a technique for individual self-expression. But it was also a way for owners to maintain control of what HEVs meant: to ensure that their voices were heard in the noisy public discourse that surrounded a new type of vehicle.

The Role of Meaning

HEV owners in 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). (Two of these stories are examined in greater detail in the next chapter.) 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, personal and 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, 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 may evolve and new meanings may emerge. New meanings may also develop as HEVs gain popularity in markets outside of the United States. In this study, new meanings did not appear between Phase I and Phase II: owners in both phases attached the same symbolic meaning to their vehicles. However, in the future it is possible that new buyers will be motivated by novel meanings that were not recognized by earlier buyers. To some extent, this has already occurred. HEVs were originally cast as clean air and energy conservation tools for liberal environmentalists, but have been redefined by neo-conservative nationalists as symbols of combating U.S. dependence on foreign oil (Bryce, 2005).

CHAPTER 5: HEVs - PRODUCTS AS SELF-CREATION

This chapter takes a closer look at two households, one from each of the study's first two phases. It not only identifies the symbolic meanings these households attached to their HEVs, but also explores how these meanings were used by members of the households in the development of their self-identities, and in influencing the larger social systems around them. This chapter applies the Products as Self-Creation approach (described in detail in Chapter 2) to both households, using theory and terminology from Giddens (1991) and Csikszentmihalyi and Rochberg-Halton (1981).

In particular, the chapter demonstrates how each owner incorporated the HEV into his/her self-narrative. According to Giddens (1991, p. 54) modern life involves a process of constant self-definition. At the core of an individual's identity is his self-narrative, an "ongoing 'story' of the self" that must be consistently developed and maintained. For the two households in this chapter, the HEV provided symbolic meanings that were used to define and express who owners were. The chapter also explores some of the challenges owners faced in self-narrative development, including their attempts to integrate disparate (sometimes conflicting) portions of their identities. In addition, this chapter provides examples of what Giddens (1991) calls regimes (individual behaviors that reveal aspects of self-identity) and shows how the HEV fits into each owner's lifestyle (an integrated collection of behaviors that portray a particular self-narrative).

The chapter also examines how the symbolic meanings of HEVs relate to owners' concerns about topics larger than themselves, including social change. Both households

in this chapter show an awareness of life politics, defined by Giddens (1991) as the consequences that an individual's lifestyle decisions have on others. For these households, the HEV purchase was perceived as a way to positively impact others at both a local and a global level. Households' objectives are discussed using Csikszentmihalyi and Rochberg-Halton's (1981) system of individual, social, and cosmic goals. As Csikszentmihalyi and Rochberg-Halton define them, individual goals relate to the individual's wants or needs, while social and cosmic goals address progressively larger spheres outside of the individual. Social goals encompass objectives of those within an individual's social networks, while cosmic goals relate to the "larger harmony of things" (Csikszentmihalyi and Rochberg-Halton, p. 192).

Discussion of each household begins with background and analysis of the semiotic map. Then, the Products as Self-Creation approach is applied. This approach has two parts: Project of the Self (which involves self-definition) and Project of Culture (which involves definition of social systems). Each part is examined for the household to show the HEV's role in the two projects. As in the previous chapter, any word or phrase that appears in quotations is a direct quote from respondents. However, the reader should note that this chapter views households through the lens of theory and therefore includes significant interpretation by the researcher. Households did not explain their own behavior in terms of lifestyle, life politics, or cosmic goals, nor was this terminology ever introduced in the interviews.

The Halls

Interviewed in the winter of 2005, Richard and Diane Hall are professionals in their 40s with three school-aged children. At the time they purchased their Toyota Prius in 2001, the family was living in the San Francisco area where Richard was working as an executive at a technology company. Each day, Richard drove his BMW 5-series 70 miles in his roundtrip commute. Concerned about the environmental impact of his driving, he tried various alternatives including carpooling and riding a local commuter train, but found they were far less convenient than driving. A self-proclaimed “car guy,” Richard loved having a fast car with a big engine. But his BMW used a lot of gasoline, and Richard was getting “grossed out” sitting in traffic every day. He and Diane had been raised with strong environmental values, and he felt he should be doing something about petroleum use and emissions.

When he read about HEVs in *Motor Trend* magazine, Richard got excited and quickly went to a dealership to see the new vehicles. The first HEV he drove was the Honda Insight. Richard was captivated by the vehicle’s advanced technology, but he wasn’t impressed by the size or styling of the two-seater. Soon afterwards, Richard drove the (Generation I) Toyota Prius and knew it was a better fit. Nonetheless, Richard was unsure if an HEV was the right choice. He liked its environmental credentials and its high-technology features. But unlike the BMW, the HEV didn’t seem to Richard to be much of a driving enthusiast’s car, nor did it tell the world that he was a highly successful professional. Richard was torn between buying the HEV or replacing his BMW with another luxury performance sedan. Finally, after talking with Diane, Richard decided on

the Prius. He was sorry to give up a “cool car” like the BMW, but the Prius was exciting because it was so different from any vehicle he had ever owned.

The semiotic map for the Halls is shown in Figure 5-1. 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. For them, the hybrid vehicle category cannot include large SUVs (even those with hybrid powertrains) because of the strong negative symbolic meanings the Halls 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.

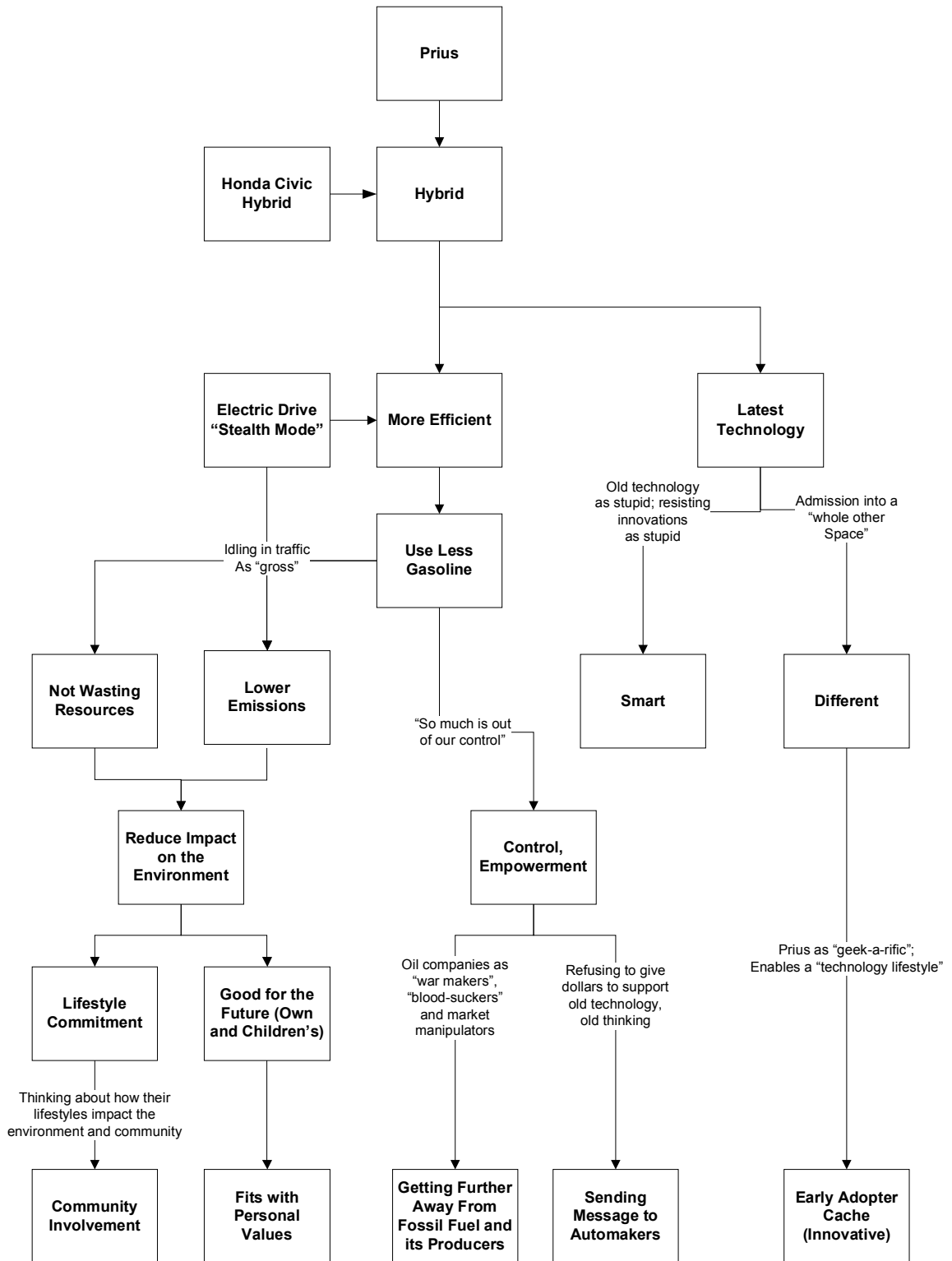


Figure 5-1: Semiotic Map for Richard and Diane Hall

The Halls explained that their Prius was different from a conventional car in two ways: it was more efficient and more advanced. These ideas were represented by the silent, all-electric acceleration (a feature they nicknamed “stealth mode”). Each time their Prius operated in electric mode, it affirmed the ideas of higher efficiency and technological superiority. But high efficiency was not important for its own sake; it resulted in less waste and more frugal use of fuel, which led 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 fit with a “lifestyle” that Richard and Diane had been gradually embracing during the past few years. This lifestyle involved thinking more about the impact their lives had on others. Increasingly, the Halls asked 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.

The Halls also linked higher efficiency 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 meant shifting the balance of power back to the consumer. They felt they were making less of a contribution to the oil companies, who they perceived as dishonest

warmongers. The Halls also believed that their HEV purchase made a statement to automakers, rewarding those companies who manufactured environmentally-sensitive products and reprimanding those who did not yet offer hybrid models.

Being ahead of others (especially peers at work) in a new technology also played a central role for Richard. During his test drive of the Prius, Richard characterized it 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 more efficient than conventional vehicles, and Richard was confident that hybrid technology eventually would be used in all automobiles. To Richard, companies that resisted the move to hybrids were stupid since they were resisting the inevitable spread of a better technology. 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 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 (English-Lueck 2002). 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, as long as it didn't 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. For Richard, it was important to continue showing that he was 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.

The Halls' Project of the Self

The story of Richard and Diane Hall's HEV purchase illustrates that the Halls were influenced by three denotations (preserving the environment, reducing support to oil producers, and embracing new technology) that linked to four connotations (community orientation, ethics, individuality, and advocacy.) In buying an HEV, the Halls were attempting to portray themselves in a certain way: as ethical, environmentally-aware people who cared about their community, as smart leaders who understood the potential of new technologies before others did, as independent, empowered consumers who were

not controlled by corporations. The Halls were aware that part of their HEV purchase was motivated by the desire to express who they were. Richard explained that while he had originally wanted a Honda vehicle, he was disappointed in the Honda Civic Hybrid since it looked just like the conventional model and did not “make a statement” like the Toyota Prius did. “This is a hybrid” Richard explained, referring to the Prius, “I want everyone to know that.” For the Halls, an HEV needed to have the right symbolic meanings as well as the ability to communicate them clearly.

The Halls also recognized that their HEV made a comprehensive statement about their self-identities. Neither talked about identity or self-narrative, and questions that were posed to Richard and Diane during the interview did not attempt to elicit these terms. However, without prompting Richard mentioned the word “lifestyle” repeatedly, describing the Prius as a “lifestyle commitment” and an expression of its owner’s “lifestyle decision.” It is not clear whether Richard’s definition of lifestyle matched exactly with that offered by Giddens (1991), but Richard’s use of the term implies that he viewed the Prius as making a broader statement about who he was and how he lived rather than communicating only about his environmental beliefs.

Richard in particular also showed evidence of reflexive identity construction, often assessing and defining himself using frameworks acquired from his professional work in technology marketing. For example, Richard identified himself as a “LOHAS consumer,” a reference to the Lifestyles of Health and Sustainability market segment identified by the Natural Marketing Institute (2006). Richard also characterized himself as an “early

adopter,” placing himself in a particular segment within Rogers’ (1983) diffusion of innovation framework. Neither of these frameworks were explored deeply in the interview, but they illustrate that Richard had previously contemplated at least two aspects of his identity: his support for sustainable, environmentally-sound consumption and his interest in new technology.

Regimes and Lifestyle

For the Halls, the HEV was one of a number of purchases that the couple had made that had been written into their self-narratives. Diane mentioned that years earlier they had begun to buy fair-trade coffee, the first consumer decision she could recall that connected with the ideas of community improvement and expression of personal values. Since that time, she made one change each year to the products she purchased for the family. As a result, her children had begun drinking organic milk, the family was eating more organic produce, and Diane was contemplating adding fair-trade chocolate to the list of consumption changes. Like the HEV, these products accessed the idea of environmental preservation and its associated connotations. They also touched on the ideas of control and empowerment since Diane felt that buying these foods gave less support to exploitative corporations within the agriculture and food industries. The same was true of the solar panels that Richard had installed in their Bay Area home. For him, photovoltaic roof panels did more than just lower his energy bills; they represented an identity transition that took Richard “over the line and into whole other space” just as his HEV purchase did.

Use of all of these products, from the fair-trade coffee to the HEV, were regimes (Giddens 1991) that the Halls used to define who they were and who they wanted to be. Richard explained how the couple's awareness of environmental and social issues had gradually been increasing, and how the products they purchased reflected this new awareness. But Richard and Diane's regimes were not limited to consumer goods purchases. Other behaviors also tied into the ideas such as preserving the environment, building community, expressing personal values, and gaining independence from corporations. Diane, for example, had become more involved in her children's school, taking a leadership role on the implementation of a recycling program. Before purchasing his HEV, Richard had been seeking a commuting solution that used less fuel, and had tried (with little success) using a carpool and a commuter train. Perhaps the most radical change, however, was the couple's departure from California in 2003. The transition involved Richard's early retirement from his position at a Bay Area technology company, and a professional repositioning from technology executive to investor in alternative energy. The area where Richard and Diane relocated was selected at least in part because Richard felt it was a promising region for companies developing new technologies for wind, geothermal, and solar electricity generation.

Once in their new home, however, Richard and Diane found themselves in a dramatically different culture than that of the San Francisco Bay Area. Somewhat to their dismay, the Halls discovered that they had moved to the "wild west," a place where people valued private property, owned guns, and drove Hummers. The new area may have fit with Richard's investment plans, but it was not a setting that fit with key pieces of the couple's

self-narratives, including the ideas of environmentalism and community orientation. To ensure that these parts of their identities persisted, the Halls engaged in more community activism that they had previously in the Bay Area. Both became heavily involved in state politics, working to build support for Democratic candidates in the 2004 elections.

Richard and Diane also joined a local group that opposed development of a wilderness area near their new home. In addition, Richard was eager to install solar panels on their house in part because of his interest in the technology, but also as a signal of his family's environmental, social, and political views.

As Giddens (1991) theorizes, the Halls were not simply defining who they were in the present. Richard and Diane were looking backward to who they had been in the past and connecting elements of their past self-narratives with a story about themselves in the present and the future. Both had been raised in the Pacific Northwest, which they characterized as a culture of environmentalism, community orientation, and strong personal ethics. After moving to the Bay Area, the couple maintained these elements of their identities, but they were muted somewhat by other parts of their narratives. Richard, for example, had been a car enthusiast since he was young, and wanted a vehicle that reflected this interest. In the Bay Area he also experienced a fair amount of financial success in his career, and wanted to communicate this image. Richard also liked spending time outdoors, and in particular was an avid mountain biker. The BMW 5-series station wagon that Richard owned prior to the Prius connected well with these three elements of identity: it was a luxury sports car with room for Richard's bike and outdoor gear. But its low gas mileage conflicted with Richard's idea of himself as someone who cared about

the environment. As Richard sat in traffic one day during his 70-mile round trip commute, the discontinuity between his self-narrative and the regime of BMW use became too powerful to ignore. Richard was “grossed out” and needed to act, and began exploring alternatives to commuting in the BMW.

It is telling that Richard did not begin with the idea of selling the BMW. Instead, he originally aimed to keep the BMW but commute to work by other means. Traveling to work in a carpool or on a commuter train gave Richard a new regime that expressed the environmentalist dimensions of his self-narrative, but still let him maintain access to the meanings in the BMW. Unfortunately, the new commuting methods proved impractical, and Richard resumed using his BMW for travel to the office. Later Richard would end the regime of BMW ownership, but not without a struggle. During the HEV purchase, Richard’s choice set included another BMW 5-series as well as a Lexus GS, two expensive luxury sport sedans. Including these two vehicles in a shopping list with the Toyota Prius may seem incongruous, but it demonstrates the conflict Richard experienced as he decided which aspects of identity to portray with his next vehicle. The Lexus and the BMW maintained the elements of successful executive and auto enthusiast in Richard’s self-narrative, while the Prius offered the new element of ethical, community-oriented person. Ultimately, Richard chose to highlight the latter meanings through the regime of Prius ownership.

However, as Giddens (1991) indicates, Richard did not simply rewrite his self-narrative through an auto purchase. Instead, the new regime of HEV ownership had to be

integrated with existing components of Richard's self in a "coherent and rewarding sense of identity" (Giddens 1991, p. 75). Richard as environmentalist had to somehow fit together with Richard as automobile enthusiast. This integration effort is what led Richard to add performance tires and a bicycle rack to his Prius, and to drive it as fast as possible. Richard was aware that both the modifications to his Prius and his high-speed driving were detrimental to his fuel economy, and that using more fuel reduced the environmental benefits of his vehicle. But the combination of these regimes allowed Richard to arrive at a union of symbolic meanings that integrated the numerous and disparate elements of his self-narrative. In this way, Richard's Prius was as much an identity solution as it was an environmental solution. This is a critical point in understanding the commercial success of the HEV. It is not simply that the vehicle provides buyers with access to environmental meanings, but also that it permits combinations of meanings that connect with numerous elements of owners' identities.

For Richard, the HEV signaled his environmental awareness, but also portrayed him as a technology visionary and, to some extent, allowed him to retain his connection with the ideas of himself as an automobile enthusiast and avid mountain biker. In fact, it was these other meanings Richard attached to his HEV that made him more comfortable with the environmental meaning in his Prius. Like many HEV owners, Richard felt strongly about the environment, but did not want to be perceived as a "tree-hugger" who focused on the environment and nothing else. Since his identity was multifaceted, his vehicle needed to be as well. In fact, Richard's earlier rejection of the Honda Insight may have been due to his inability to attach diverse meanings to that vehicle. Richard wasn't sure exactly why

he had disliked the Insight. It seemed small, impractical and, most importantly, had an “experimental” look that disagreed with him on an “emotional” level. Certainly the Insight would have been sufficient for single-occupant commuting, which was Richard’s primary use of his vehicle when the family lived in the Bay Area. However, given the small size and performance limitations of the Insight, it would have been more difficult to attach a bicycle rack to the vehicle or drive it like an enthusiast’s car. Both of these regimes, carrying bicycles and driving fast, bridged to narrative elements that could not easily be attached to the Insight.

Richard’s manipulation of the meanings attached to his HEV provides an example of the recognition and perception processes described by Csikszentmihalyi and Rochberg-Halton (1981). Richard recognizes the environmental meanings that are attached to his Prius, and understands that these meanings are both positive (thoughtful, community-oriented person) and negative (environmental zealot). By combining the HEV’s environmental meanings with a larger set of meanings that include high technology and resistance to corporate influence, Richard devises a unique perception of what his HEV symbolizes. Part of his perception process involves adding new meanings that others may not typically attach to an HEV, such as the idea of being an automobile enthusiast. The other part of Richard’s perception involves a reinterpretation of existing meaning to fit more closely with his self-narrative. Thus, Richard does not view himself as a “tree-hugger” because he owns an HEV. That negative meaning has been detached from his vehicle because it was incompatible with other meanings that Richard introduced.

Giddens (1991) states that self-narrative development is an ongoing process: that identity is never really solved. In fact, this is exactly what Richard revealed as he discussed his HEV purchase four years after it had occurred. Since buying the HEV, Richard continually had questioned whether the car made the right statement about who he was, in part because even with performance tires and fast driving, it only imperfectly fit with his idea of himself as a “car guy.” In addition, he had never been able to connect his Prius with the idea of himself as a financially-successful business executive. Occasionally, Richard still had a strong desire for “a damn hot looking car that went really fast.” At the same time, he was pleased that the Prius was compatible with a set of “values” that were important to him. Richard’s internal conflict illustrates how difficult it can be to integrate all the elements of one’s identity, and to reflect them in a single regime. It also demonstrates that, as Giddens suggests, individuals constantly reassess the elements within their self-narratives and their compatibility with current regimes. In Richard’s case, he planned to investigate recently-released HEV models, including the Accord Hybrid, that he thought might allow him to continue the regime of HEV ownership but also better connect him to the ideas of himself as a automobile enthusiast and a successful businessperson. In fact, later interviews with buyers of the Honda Accord Hybrid revealed that some were seeking this same combination of meanings when they purchased their vehicles.

Lifestyle Sectors

While it was not always clear why particular narrative elements were important to the Halls, one particular element of Richard’s self-narrative was relevant in a specific lifestyle sector (Giddens 1991). Richard was excited by the high-technology denotation

of the Prius, and connected the HEV to the idea of himself as a smart, innovative leader. Accessing these meanings in an automobile was new for Richard and, at least at the time of his HEV purchase, the high-performance aspect of his BMW seemed less appealing in comparison to the high-technology meanings of the Prius. Moreover, Richard had a specific intended audience in mind when accessing these meanings: his colleagues at work. Richard felt this group would be especially adept at interpreting the high-technology significance of his HEV, and that this group was most suited to appreciate the significance of the vehicle's "early-adopter cache."

English-Lueck (2002, p. 66) explains that "working with technology, thinking about technology, and producing technology change the way Silicon Valley people construct reality." Richard talked openly about this reality, a unique view of the world held by people who are immersed in technology development. "The Prius slots in neatly...it's congruent with that line of thinking, high-tech..." he explained. While his HEV also communicated with people outside of this lifestyle sector, it was Richard's colleagues who he felt really understood the meaning of his HEV. "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, but a futuristic "technological marvel" that was far better than a conventional BMW or Lexus. Within a specific lifestyle sector where innovativeness was strongly valued, Richard's HEV ownership established him as a technology pioneer and a leader who was ahead of his peers.

The Halls' Project of Culture

While self-identity played a major role in the Halls' HEV purchase, it would be inaccurate to suggest that the couple were concerned only with their own interests. In fact, their HEV purchase was rooted in their awareness of life politics and their desire to realize social and cosmic goals that were larger than themselves. Both Richard and Diane were aware of what Giddens (1991, p. 241) describes as the "political issues which flow from processes of self-actualization." They understood that the way they chose to live their lives would impact others, and that they had some responsibility to manage these impacts. Diane explained that her interest in preserving the natural environment related partly to her own future well-being, but also the future welfare of her children and others in their generation. As an individual, Diane believed that motor vehicle emissions were her most serious contribution to environmental degradation, and therefore purchasing a vehicle that reduced these emissions was an essential step in ensuring that she did not selfishly spoil the planet for future inhabitants.

While not discussed explicitly, the contrast between individual and community emerged repeatedly throughout the interview. For identity purposes, the Halls wanted to be seen as people who were community-oriented, but they also believed in the idea of subordinating some personal wants for the collective good of society. Richard described his HEV as a "compromise vehicle" since it forced him to give up some of the qualities he typically sought in a car. One was performance, and another was "image." Richard and Diane used the word "image" to describe a set of self-indulgent meanings, such as wealth or coolness, that they thought many people sought in their vehicles. In the past, Richard had liked cars with "image," but now he felt buying a vehicle to gain access to these

meanings was vain and selfish. He was proud of the fact that he had given up the BMW. To him, this represented an exchange of a vehicle that made a largely self-centered statement to one that portrayed a more selfless orientation.

Both Richard and Diane contrasted their HEV (as well as themselves) with SUV owners, who they characterized as preoccupied with “image” and, by extension, with themselves. With obvious disdain, Diane described SUV owners as “image-seekers” and explained how their aggressive driving habits revealed the fact that they cared little for anyone else on the road. Richard viewed SUV owners as selfish, pointing out that people purchased these large vehicles to ensure their own safety in an accident, but in the process endangered the safety of other drivers, particularly those in smaller vehicles like the Prius. For Richard, the SUV signaled its owner’s subscription to “the new American mentality,” a narcissistic ethic in which people focused only on themselves. This ethic was particularly evident in their new neighborhood, where residents proudly drove their “gross” Hummers and large pickup trucks. For the Halls, these vehicles were objectionable not just for their fuel use and environmental impact, but because they symbolized an individualistic viewpoint that was the opposite of Richard and Diane’s collectivist outlook. While the Halls had been gradually increasing their awareness of life politics and attempting to mitigate the effects their lifestyle had on others, their new neighbors were oblivious to these issues, and their ignorance seemed like it could only be deliberate.

The Halls' attempts to reduce their family's environmental impacts, participation in local political campaigns, and involvement in school and community groups are examples of what Csikszentmihalyi and Rochberg-Halton (1981) would characterize as social and cosmic goals. For example, Diane's desire to reduce her emissions and resource use is aimed at improving conditions for her children (a social goal) as well as for members of future generations around the world (a cosmic goal). The couple's participation in local politics also touches both sets of goals. On one hand, Richard and Diane were interested in encouraging more "open-minded thinking" in their local area, particularly among its leaders. On the other, they were concerned that after the 2000 Presidential election, the entire country's democratic system was in jeopardy. Thus, their involvement with the state Democratic party in 2004 was driven both by the desire to evoke change in their community (a social goal) and by the desire to influence conditions at a national level (a cosmic goal). While the Halls' political activism may seem disconnected from their HEV ownership, in fact the couple saw strong links between the two. Richard and Diane believed that many members of the Democratic party shared their concerns about the environment and supported a collectivist approach to managing societal issues.

When examining the Halls' behaviors, often it is difficult to determine the couple's precise objectives. Was Richard's plan to install solar panels on their new home driven by individual goals, social goals, or cosmic goals? It is likely that his decision was motivated by objectives in all three areas, and this is an important point. Through actions like buying an HEV, the Halls were influencing their self-narratives, but they were also affecting other people, groups, and the culture around them. At times, they were aware of

this impact: for example, Richard explained that he and other Californians who had relocated to the area were slowly changing the region's culture. He also knew he had influenced others and their views of HEVs, including a neighbor who had planned to buy a BMW until Richard talked to her about his Prius. And, like many HEV owners, he bought his HEV in part to cause change within the automobile industry. Richard was particularly irritated by the domestic automakers, who he believed were resistant to environmentally-friendly policies and slow to accept new ideas. Buying an HEV was Richard's way of encouraging these companies "to come along" with consumers like himself who supported more ecologically-sound vehicles. So while households like the Halls use the HEV as a tool in the construction of self-identity, the HEV is also a way for them to evoke larger changes in society and in the world.

The Baileys

Interviewed in the summer of 2006, Pat and Jim Bailey are a couple in their mid-50s. Pat (a real estate agent) and Jim (a manager at an engineering firm) had purchased a Honda Accord Hybrid a year earlier in the fall of 2005. The couple began looking at vehicles after Jim's car, a Cadillac, had mechanical trouble. Since 2002, Pat had been leasing a Lexus SUV. The Lexus was a good size for transporting her clients and real estate signs, but she was frustrated with the fact that it required refueling several times per week. At times, Pat also wondered whether she needed such an expensive vehicle. She liked how comfortable the Lexus was and that fact that it offered amenities like leather seats and a moon roof, but the monthly lease payments were so high that they sometimes felt excessive. As Pat and Jim discussed their options, they decided that Jim would drive Pat's Lexus until the lease expired in 2006. Since Pat needed a new vehicle, the couple

began researching models and visiting dealerships. Pat wanted something less expensive than the Lexus, but still wanted a comfortable car with all the amenities. She loved cars like the Mini Cooper and Volkswagen Beetle, but they weren't practical for transporting clients. A sedan seemed like a better choice, but there were so many models, Pat was unsure which was best. To limit their options, Pat and Jim agreed they would not buy a domestic model, and they would only look at new or slightly used models that cost less than \$30,000.

Pat and Jim spent the next weekend visiting a variety of auto dealerships. One of the cars Pat was curious about was the Toyota Prius. Pat had read reviews of the Prius and had seen it on the road, and was eager to test drive one. She was disappointed when the Toyota salesperson informed her that they did not have a Prius for her to look at, and that a six-month waiting list had formed for the vehicle. Pat liked the idea of an HEV, but she suspected that the Prius was too small for her, and she certainly couldn't imagine waiting six months for a new vehicle. She and Jim continued looking at other models, and soon found a used Infiniti G35. It was reasonably-priced, and Pat loved the car's styling, especially its leather seats and wood interior. But to be thorough, the couple kept looking, eventually arriving at a Honda dealership to look at the conventional Accord. Once on the lot, Pat noticed an Accord Hybrid. She hadn't been aware that Honda made a hybrid version of the Accord, but as she looked the vehicle, she got excited. It was a loaded model with the amenities she liked, and the price was just above the limit she and Jim had set. A test drive confirmed that the car was comfortable and drove well, and Pat decided to make an offer. She figured if the salesman was willing to negotiate and she could have

the Accord Hybrid for roughly the same price as the used Infiniti she had liked, she would buy the Accord. As it turned out, the dealership had 15 Accord Hybrids in stock and her salesman was willing to make a deal. Pat was thrilled, and she and Jim purchased their HEV.

The semiotic map for the Baileys is shown in Figure 5-2. Pat's HEV, a Honda Accord Hybrid, appears at the top of the diagram. Pat saw her Accord Hybrid as part of a category of hybrid vehicles that included the Toyota Prius. However, Pat noted key differences between her HEV and the Prius. The Accord Hybrid was a large, luxurious vehicle, while the Prius was similar in size and appearance to a small, stripped-down economy car. According to Pat, a "small car" signaled an owner who was "down on [his] luck" and who had little choice in the type of vehicle he drove. Pat also talked about other HEVs, including hybrid models from Lexus. Pat owned a Lexus RX prior to buying her HEV, but she did not consider the RX Hybrid. In part, this was because Pat was perplexed by Lexus' hybrid offerings: while they were called hybrids, she believed some had mileage as low as 20 MPG. Since Pat felt that HEVs were supposed to attain high mileage (at least 35 MPG), she did not include the Lexus hybrid models in the "hybrid" category of vehicles.

Pat associated an HEV with the idea of "high mileage"⁹ which connected to three denotations. The first was saving money. Pat was frustrated with how often she had to fill her Lexus SUV and how much money she seemed to be spending on fuel. Like most

⁹ Like many households in this study, Pat Bailey uses the term "mileage" to refer to gas mileage (fuel economy.) Thus, when they appear in this chapter, the terms "low mileage" and "high mileage" refer to low and high fuel economy rather than to the number of miles that a vehicle has been driven.

HEV owners, Pat did not systematically track her fuel expenses, but she felt that driving the Lexus “was costing [her] a bundle.” When she purchased her HEV, she and Jim didn’t perform any calculations to determine how much money they would save in fuel relative to a conventional Accord or relative to the Infiniti G35. But she assumed the

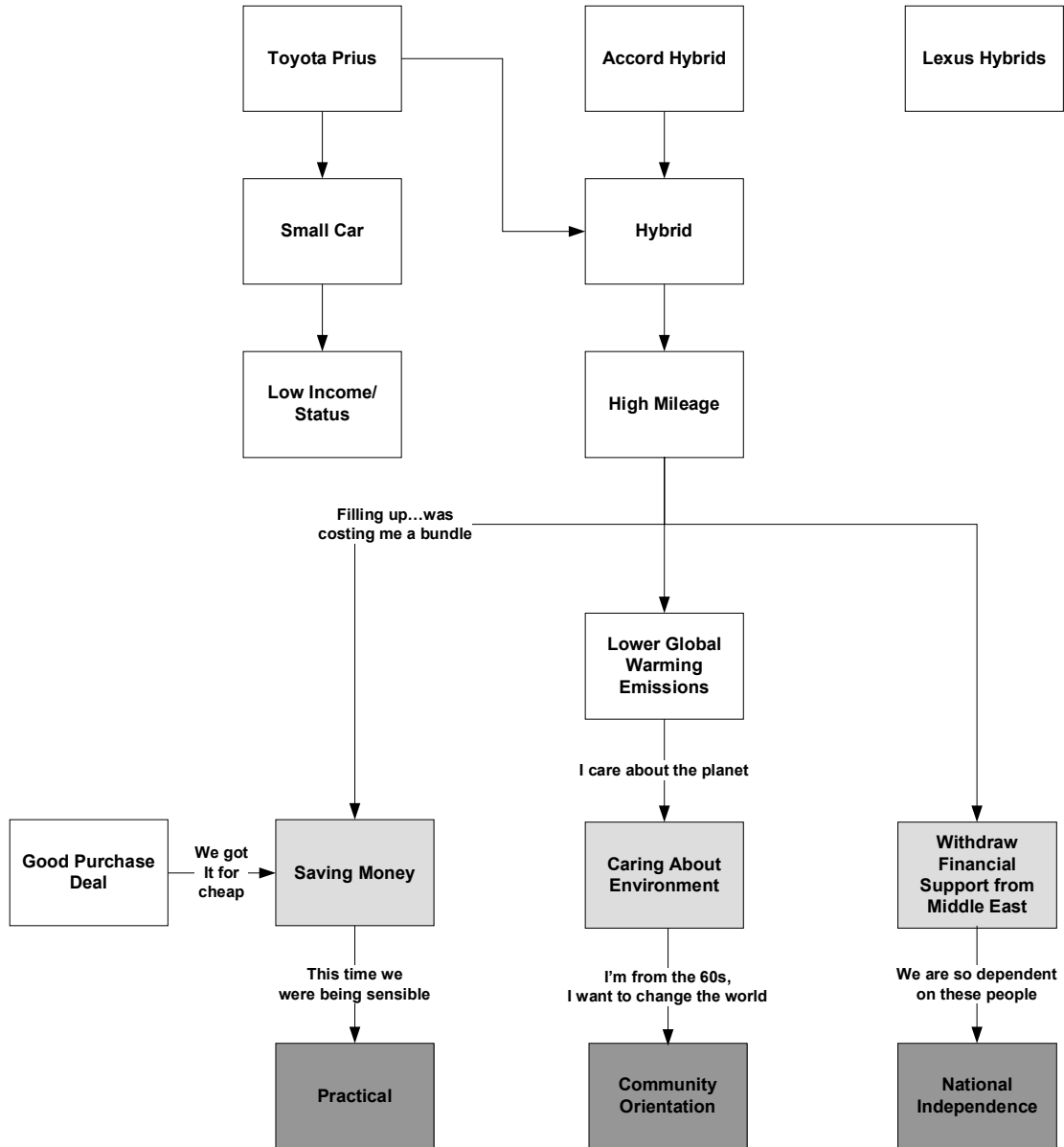


Figure 5-2: Semiotic Map for Pat and Jim Bailey

Accord Hybrid would go further on a tank of gas than other cars, and she was pleased that she could have a car that was both comfortable and delivered higher fuel economy. Pat was also pleased with the deal she and Jim got on the Accord Hybrid. “We got it for cheap” Pat explained, noting that while Prius owners paid MSRP for their vehicles, she and Jim paid \$6,000 under MSRP for their HEV. For Pat, the Accord Hybrid was a practical choice because it was reasonably-priced and because she expected it to generate ongoing fuel cost savings. She still liked luxury cars, and dreamed about owning a Mercedes sedan at some point in the future. But at the same time, she questioned the wisdom of owning a luxury vehicle, and wondered whether leasing the Lexus had been a “stupid” financial decision. Pat could have easily bought another expensive vehicle, but instead she and Jim exercised restraint: “this time we were being sensible” she explained.

Pat also linked her HEV to the idea of emitting fewer greenhouse gases and caring about the environment. Pat was concerned about global warming, and was frustrated by the Bush Administration’s seeming indifference to the problem. “The planet earth...we’re destroying it” Pat noted, pointing to a recent heat wave as evidence of the changing climate. Pat’s environmental concern connected with the connotation of community orientation. She explained how years earlier, as a young person in the 1960s, she and her peers had believed they could “change the world” simply by working together and educating others. Now she was trying to get her friends to buy HEVs, and was waiting for the day when a stranger approached her to ask questions about her Honda Accord Hybrid. For Pat, owning an HEV was like being involved in a movement. So far, she didn’t think there was enough “buzz” around HEVs, but she hoped to see awareness and ownership

increase. If enough people believed in protecting the environment, she was confident that problems like climate change could be resolved. “There’s got to be a movement” she explained, “enough people going in the right direction.”

Finally, Pat connected her HEV with the denotation of giving less support to oil-producing countries. Pat was frustrated that states like California had developed car-dependent cultures which made them highly reliant on petroleum. Referring to foreign oil producers, she explained “they are holding us hostage...because we need them.” Pat was particularly concerned about oil producers in the Middle East, countries that to her seemed full of violent hatred toward America. The Middle East’s anger toward the West didn’t seem fair, and Pat felt the relationship between the United States and oil producers in that region had become irreparable. “You can’t reason with these people...[they] want us dead,” she noted gravely. For Pat, the best approach was to use less oil, which would decrease the financial resources of anti-American groups and diffuse some of the violence in the Middle East. Using less oil would also strengthen the United States, making it less dependent on a volatile region. Pat’s HEV linked to these ideas, which were summarized in the connotation of national dependence. Pat also added that, like environmental preservation, she viewed national independence as a movement. “If everyone did a little bit, the earth could be a little safer and we wouldn’t have such as dependency on this,” referring to a photo of violence in the Middle East.

Pat Bailey’s Project of the Self

Pat’s HEV connected her to the idea of herself as a sensible consumer who made smart choices, a community-oriented activist contributing to a new movement, and an

independent person who fought U.S. dependence on foreign oil. Like Richard Hall, Pat Bailey is balancing diverse elements in her self-narrative and attempting to express them through the regime of HEV ownership and use. In Pat's case, two contrasting elements are evident. The first is Pat's view of herself as a community-oriented person who does what is right for society, even if it involves consuming less of the things she enjoys. The second is Pat's idea of herself as a successful businessperson who has earned the right to drive a nice car, live in a large house, and consume whatever goods she wishes. Pat's attempts to unify these two elements of her self-narrative are evident throughout her interview. Her case is important because it illustrates the conflicting desires that are present, to some extent, in many of the households in this study. HEV owners often want to participate in something larger than themselves, such as improving the environment or making the United States a stronger, more independent country. But many struggle to balance this participation with more self-oriented concerns, including the desire for a vehicle that is comfortable, performs well, and projects other ideas including financial wealth and professional success.

Pat's self-narrative development involved the integration of her past, present, and future into a unified, coherent "trajectory of the self" (Giddens 1991, p. 75). To provide evidence of her credentials in community-orientation, Pat pointed to her past, highlighting her involvement in social causes as a young person in the 1960s. "I'm from the 60s" she explained, "I want to change the world." For her, community-orientation was a generational quality, and although she was not currently active in community groups or political organizing, Pat still saw herself as someone who worked for change.

Thus, owning an HEV in the present and being part of a potential “movement” fit well with her self-narrative. In the future, Pat wanted to see the HEV movement grow, and she was excited to play a role in others’ HEV adoption. Pat lacked the zeal of many early HEV owners who actively engaged friends, family, and strangers in a dialog about HEVs. But Pat had shown her Accord Hybrid in her social circle and talked about her reasons for buying the vehicle. The initial reception had been tepid, but Pat felt she had an important role in changing the perception of HEVs. She explained that friends like hers, particularly those who were financially well-off, dismissed all HEVs as small uncomfortable economy cars. By showing them her Accord Hybrid, Pat could help them to understand that an HEV could also be a comfortable (even luxurious) vehicle in addition to delivering higher mileage.

Pat knew that the Prius was the best-known HEV model. If she wanted to signal to others that she was a community-oriented person who supported a movement to improve environmental conditions, the Prius was an obvious choice. But Pat shared some of her friends’ concerns about small HEVs. For Pat, the Prius seemed like a “tiny car” that was likely to be uncomfortable. Pat talked a lot about the need for a car to be “comfortable,” an aspect that she linked to amenities such as leather seats, a moon roof, and satellite radio. Part of the reason comfort was important to Pat may have simply been that she enjoyed the indulgence of driving a vehicle that was attractive and offered upscale features. Another reason may have been that Pat liked what a vehicle with these features said about her. Pat talked about how previous vehicles she owned communicated (or miscommunicated) aspects of her identity. One vehicle Pat recalled was a Dodge Caravan

minivan she and Jim had owned in the 1980s. The couple initially thought the Caravan would be an affordable replacement for their Volkswagen Vanagon, but soon after the purchase, Pat found that the image of the Caravan was different from her previous van. Pat disliked the way the Caravan cast her as a suburban mother. “It wasn’t me” she explained, “I’m so not a minivan person.” After driving the Caravan for two years, Pat sold it and bought another Vanagon, a “good little camping machine” that felt like a better fit with her identity.

Like the Caravan, the Prius had the potential to miscommunicate Pat’s identity. Pat explained that she believed cars and social status were strongly connected. A small car like the Prius told the world that she was someone with limited financial means, and this was not a message she wanted to send. She and Jim had a certain amount of financial wealth, and the things they owned reflected it. The couple lived in a well-appointed home in a gated community along a golf course, and both drove luxury cars before buying the HEV. Pat may also have been interested in projecting affluence for professional reasons. Pat was employed in sales, previously for a large consumer goods company and, at the time of the interview, in residential real estate. Self-presentation seemed important to her: she dressed professionally for her interview and presented the interviewer with a business card at the beginning of the session. While Pat didn’t explicitly say that her car was important to her professional image, other HEV owners with similar backgrounds did make this connection. One owner (also a real estate agent) noted that projecting financial success was important for someone selling expensive items like homes. Like Pat, he focused on the importance of amenities in his vehicle. In his case, he felt that his Toyota

Camry Hybrid struck the right balance in its symbolic meaning for a particular lifestyle sector: it told his clients that he was successful, but not too affluent. Pat may have been attempting to make a similar statement in the same lifestyle sector by purchasing her HEV.

Like Richard Hall, Pat was attempting to integrate elements of her self-narrative that contradicted each other. On one hand, she was eager to be part of a movement that worked toward environmental change, but on the other she wanted to enjoy luxury goods and project a certain amount of financial and professional success. Her struggle to find the right balance was evident numerous times during her interview. At one point, Pat expressed concern about the cargo room in her Accord Hybrid. She explained that if she couldn't fit her real estate signs in the trunk, she would have to get a new vehicle. The most likely candidate was a Volkswagen Toureg. While it was not clear how serious Pat was about purchasing the Toureg or how familiar she was with its fuel economy, the fact that she would consider a large, non-hybrid SUV indicates that she was seeking more than just environmental meanings in her vehicle. Pat's reflection on other people's vehicle needs also showed her internal conflict about wanting to preserve the environment but also wanting to own a nice vehicle. Pat insisted that most people (including herself) needed cars that were larger than the typical HEV, yet then shared that she was upset by people who drove large vehicles without considering the effects on the environment. One example was her son who owned a Range Rover SUV. Pat understood his desire to live the "high life" and enjoy his affluence, but she was disappointed in his complete indifference toward environmental issues.

For Pat, the Honda Accord Hybrid provided access to both the ideas of affluence and environmental concern. To achieve this balance, Pat engaged in what Csikszentmihalyi and Rochberg-Halton (1981) call a perception process. Pat selectively applied meanings from the Toyota Prius and the conventional Honda Accord to her HEV. Although she recognized that her HEV had a much lower fuel efficiency rating than that of the Toyota Prius, Pat still considered the Accord Hybrid to be in the “hybrid” category and thus assigned it meanings of environmental preservation and community orientation. Pat saw buyers of HEVs as “old hippies” like herself who cared about the environment. But unlike the Prius, her Accord Hybrid wasn’t associated with someone who was “making \$10/hour.” It was a nice, comfortable car, similar in amenities and status to the Infiniti she had considered. And while she disliked that the conventional Honda Accord was such a popular vehicle, the hybrid version seemed less common, and therefore like a more exclusive luxury vehicle.

Pat also was balancing the idea of herself as someone who made sensible choices with the idea of herself as someone who didn’t have to be overly concerned about finances. Pat’s two previous vehicles had been expensive luxury vehicles, and she had enjoyed owning them. But Pat wondered if driving such an expensive vehicle meant she wasn’t “keep[ing] it real:” in other words, failing to focus on what was important. She explained that, in some ways, she was happy to be rid of the Lexus, its high monthly payments, and the constant fueling it required. And yet part of her still longed for a luxury car. In the future, Pat explained, she could see herself driving a (non-hybrid) Mercedes. Pat was also

conflicted about how carefully she should scrutinize her expenses. She didn't bother to monitor her fuel economy as she drove (unusual for an HEV owner) nor did she perform any analysis of fuel cost savings. To Pat, focusing on the numbers seemed excessive: "I'm not that anal," she explained. Yet then Pat talked at length about households she observed who spent far more than they should on homes, cars, and other luxuries. She believed the problem was particularly prevalent among younger people, who seemed interested only in monthly payments rather than the long-term costs of the items they purchased. For Pat, the HEV symbolized a sensible decision that set her apart from people who were irresponsible with their money. But Pat didn't see the need to conduct a detailed analysis of the savings generated by her HEV. The vehicle symbolized saving money, and Pat was confident that she was spending less and driving further on a tank of gas relative to her previous vehicle.

Pat Bailey's Project of Culture

Pat's comments also demonstrate her awareness of life politics (Giddens 1991). Pat recognized that her decisions about energy use had larger consequences for both the country and the planet, and driving an HEV was an attempt to mitigate these consequences. At one point, Pat chided herself: although she was driving an HEV, she still ran the home air conditioner regularly, an act that she believed resulted in higher energy use and increased global warming. Pat explained that global warming was a problem primarily because of the negative effects it would have on others, including those in future generations. "This is important" she explained, "not for me, for your kids." Pat felt the same way about energy security. She believed that U.S. oil consumption fueled violence in the Middle East and around the world, and that reducing

oil use would improve conditions worldwide. “If everyone did a little bit...the earth could be a little safer” she explained. Pat’s view of the national independence connotation is slightly different from other HEV owners in this study. While the other owners focus on improving conditions exclusively for Americans, Pat intended to make the world safer for everyone. However, both cases are examples of cosmic goals (Csikszentmihalyi and Rochberg-Halton 1981).

Pat’s comments revealed that she saw an inherent conflict between people’s individual goals and the larger cosmic goals of preserving the environment and reducing global violence. She thought many Americans were worried about the effects of petroleum use, but she was skeptical that they were prepared to change their current habits in order to contribute to positive change. Yet Pat thought collective participation was essential. Her vehicle alone, she explained, made no difference, but as more people decided to drive HEVs, real progress could be made toward security and environmental issues. This was why Pat had tried to interest her friends in buying HEVs. Pat didn’t consider herself a strong HEV advocate, but she did feel some responsibility to involve others in a movement toward using less oil, and HEVs represented an initial step toward that cosmic goal. “I think it’s a start” Pat explained, referring to HEV ownership. “I don’t think it’s the answer...[but] if there was momentum going, maybe we could start something.”

Like the Halls, Pat linked her cosmic goals to national politics. Pat was not politically active and did not declare herself a member of a particular party, but she had strong feelings about the current Presidential administration. She was frustrated that no

measures were underway to reduce U.S. oil consumption, and she accused the administration of ignoring the environment and exacerbating unrest in the Middle East. In discussion of these issues, Pat often mixed in other topics that seemed wholly unrelated to her HEV. For example, while discussing energy security, Pat segued into the topics of homosexual marriage and abortion. Like energy security, she felt that these issues were being mishandled by the President, and was concerned that a large number of Americans seemed more focused on outlawing gay marriage and abortion than they did on finding a solution to the country's oil dependence problem.

(Life) Politics and HEVs

The introduction of national politics and issues other than energy security and environment occurred in numerous interviews with HEV owners. Initially, this seemed strange to me since topics like homosexual marriage have no obvious connection to HEVs, and most owners made no attempt to link these issues directly to their vehicles. But like Pat, some HEV owners saw these issues as part of a larger national political agenda that contrasted with their own views. Giddens (1991, p. 215) explains that like environment or energy use, issues like homosexual marriage or abortion are life-political questions that relate to an "ethics concerning the issue 'how should we live?'" In fact, gay marriage and abortion are excellent examples of life-political issues in a post-traditional world. Both relate to "reflexive appropriation of bodily processes" (Giddens, p. 218) and represent an area where freedom of choice has replaced previous biological rules and religious mandates. That national politics emerges in the discussion of these issues should not be surprising, since many life-political issues have emerged in the national political debate. Giddens (1991) explains this has occurred because, while

national governments cannot effectively decide life-political questions, they remain involved due to the central position that national governments occupy in the lives of postmodern individuals.

While not fully explored in Pat's interview, the HEV seems to link to an entire set of positions on life-political issues for owners like Pat. This explains why vehicles like the Prius are sometimes referred to as Democrats' cars (for example, see Wharton 2007). It also explains why some owners in this study felt their HEVs would portray them as liberal or progressive. The connection between HEVs and political affiliation was embraced by some owners and rejected by others. Alice Murphy, the Sacramento schoolteacher who purchased a Toyota Camry Hybrid (see Chapter 4), liked the fact that her HEV communicated her "progressive" political views. Included in these views was opposition to the Bush Administration's No Child Left Behind Act, an educational policy that Alice strongly disliked and which she discussed in her interview. In contrast, Tony Garcia, the Escape Hybrid owner who was teased by his Harley buddies for being a "liberal," was probably concerned about being seen as more than just a "tree-hugger." Because his HEV made a broad statement about his position on numerous life-political issues, Tony may also have been concerned that his Escape Hybrid misrepresented his position on issues unrelated to the environment, such as gay marriage, abortion rights, or gun control.

CHAPTER 6: THE HEV AS SIGNIFIER

One of the advantages of the interpretivist approach is that it exposes researchers to the emic viewpoint, providing them with a (brief) view of the world through their subjects' eyes. The lessons the researcher learns are sometimes unexpected. Phase II yielded one of these lessons. In the Phase II interviews, I had expected to identify additional symbolic meanings attached to HEVs that had not appeared in Phase I. One reason for this assumption was that Phase II vehicles were different in size, fuel economy, and functionality from those in Phase I. As noted in Chapter 2, function and symbolic meaning are often intertwined, so an HEV with lower fuel economy (for example) could connect with different meanings than an HEV with high fuel economy. A second reason for this expectation was that both Williamson (1978) and McCracken (1988a) indicate that a product's symbolic meaning can change over time. Since over six years had elapsed between the earliest purchase in Phase I and the latest purchase in Phase II, I assumed that new meanings would have emerged during that time, and that later HEV buyers might emphasize different meanings from earlier buyers.

However, new symbolic meanings were not identified in Phase II: buyers of SUV and performance hybrids attached the same ideas to the HEV as high-fuel-economy HEV owners did. We did discover, however, that some of the symbolic meanings in Phase II were not directly related to the "hybridness" of the vehicles. For example, one Phase II owner (a young professional in his thirties) liked the environmental denotation in his HEV and linked it with the connotation of being an ethical person. But it was also important to him that his fully-optioned Honda Accord Hybrid presented him as a

successful businessperson. In fact, it was the combination of these two meanings that led to his HEV purchase: the environmental denotation alone would not have been enough. Yet the symbolic meaning of successful businessperson did not relate to the fact that the vehicle was a hybrid. Instead, he explained that it related to the vehicle class (near-luxury sedan) and to the Accord's luxury amenities in particular. For this owner, the meaning of professional success was available in either the conventional Accord or the Accord Hybrid (or in the non-hybrid Audi A4 he also considered).

Contrast this example with the case of Dave Nelson, the Honda Civic Hybrid owner discussed in Chapter 4. Dave also said his HEV portrayed him as a successful businessperson. But in Dave's case, professional success was a meaning that linked directly to the vehicle's hybrid powertrain. Since his Civic was a hybrid, Dave connected it to the denotation of saving money on gasoline and to the connotations of intelligence and sensibility, attributes he felt were important for an entrepreneur like himself. These meanings were not available in a conventional Civic, which explains why Dave shopped only for an HEV.

As I reexamined data from Phase I, I discovered that many of those households also were assigning meanings to their HEVs based on aspects of the vehicle other than the hybrid powertrain. In other words, these vehicles had meanings that were unrelated to their "hybridness." This led to the realization that an HEV is actually a collection of signifiers. (Figure 6-1 shows examples of vehicle signifiers). These signifiers can include the vehicle's powertrain, but also aspects such as vehicle class, brand, and model. Each

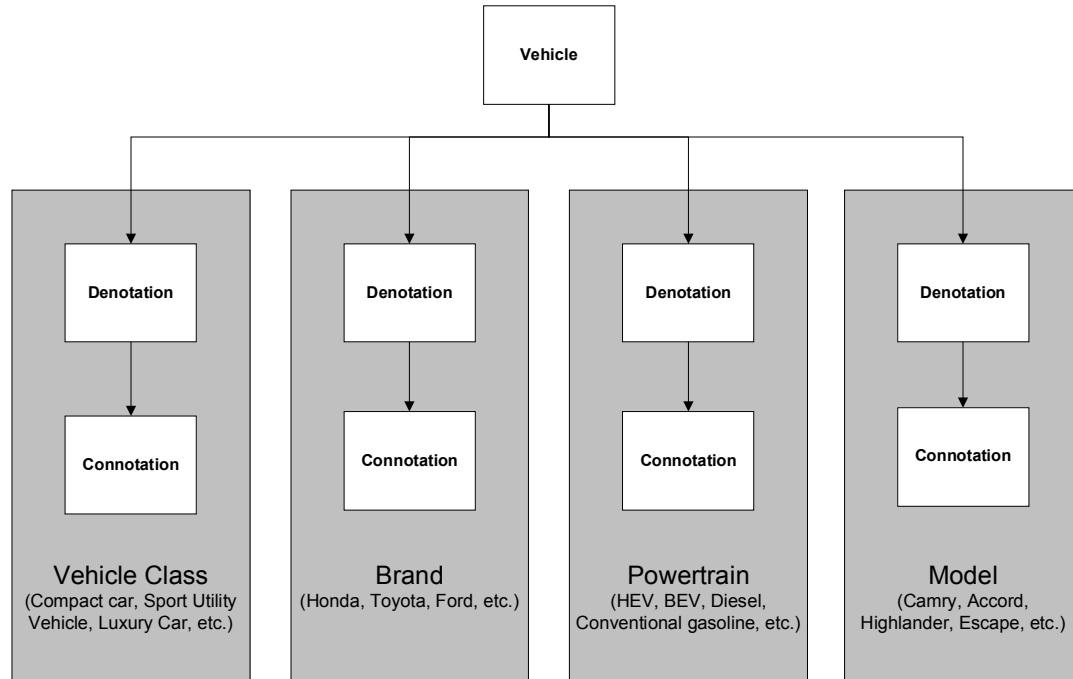


Figure 6-1: Examples of Vehicle Signifiers

signifier may be associated with a different set of denotations and connotations, or more than one signifier may link to the same denotation or connotation. In the Honda Accord Hybrid example above, vehicle class is associated with professional success while powertrain is associated with environmental concern. As shown in Figure 6-1, all of these denotations and connotations are ultimately associated with the vehicle. In general, the vehicle was the relevant signifier for households. During interviews, owners generally treated the HEV as a discrete unit of analysis when discussing meanings. But additional discussion often led to the introduction of vehicle attributes such as brand, vehicle class, and model. Owners did not explicitly state that their vehicle meant one thing because of its brand, another because of its vehicle class, and a third because of its model. In many interviews, it was clear that owners were thinking through the meanings of the various aspects of their HEV (and other vehicles) for the first time. As a result, much of our

understanding of the various signifiers within the HEV and the meanings connected to these signifiers is incomplete. (This is reflected by the unlabeled meaning boxes in the chapter's semiotic maps). This chapter attempts to outline the collection of HEV signifiers as thoroughly as possible and assign symbolic meanings to particular qualities of the vehicle.

The possibility that the HEV had multiple sets of meanings was not considered during Phase I. At the start of the study, my (erroneous) etic assumption was that the HEV was a single, unified signifier. For guidance in the interpretation of our Phase II interview findings, I reviewed additional semiotic theory. What I found was that the view of an HEV as a collection of signifiers fit well with theory from Saussure (1965), whose dyadic model of the sign underpins all of this study's symbolic analysis. The additional theoretical concepts from Saussure are outlined at the beginning of this chapter.

Following this theory is discussion of four households, two from Phase I and two from Phase II. The chapter's layout is identical to the layout used in Chapter 4: a story about the household's HEV is presented in the literary style on the right, while the left column includes technical analysis of the household's semiotic map. As in Chapter 4, I recommend that the reader begin with the story on the right and then proceed to the analysis on the left. Words or phrases that appear in quotations are direct quotes from respondents, and all names that appear here are aliases.

Revisiting Semiotic Theory: Syntagms and Paradigms

In his analysis of language, Saussure (1965) outlined two types of distinction between signifiers: syntagmatic and paradigmatic. Chandler (2002) explains that syntagms are

about combinations, while paradigms are about contrasts. In language, parts of speech (verbs, nouns, etc.) are paradigms that are combined to form units of meaning, called syntagms (sentences, paragraphs, etc.). An example is shown below in Figure 5-2:

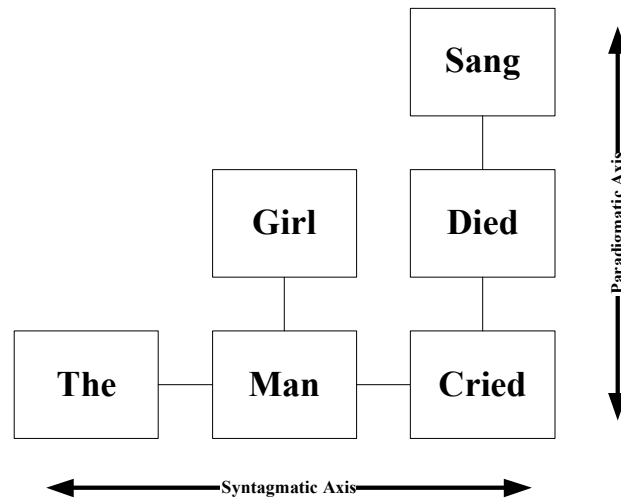


Figure 6-2: Example of Syntagmatic and Paradigmatic Relationships (Chandler 2002)

The simple sentence “The man cried” is a syntagm, which is defined as “an orderly combination of interacting signifiers which forms a meaningful whole” (Chandler 2002, p.81). In the case of a sentence, “orderly” means that the rules of grammar are followed. If this sentence contained only verbs, it would violate syntagmatic structure and lose its meaning entirely. In this example, the syntagm consists of three paradigms: an article, a noun, and a verb. Chandler (2002, p. 80) explains that a paradigm is “a set of associated signifiers or signifieds which are all members of some defining category, but in which each is significantly different.” For example, *sang*, *died*, and *cried* are all verbs, and any one of these words could be used in this sentence. However, members of the paradigm are mutually exclusive, so only one can be chosen. And since members of the set are

different from one another, replacing one of these verbs with another changes the meaning of the sentence.

This analysis in this chapter will apply the syntagmatic/paradigmatic framework to vehicles. In a sense, the objective is to “read” the HEV’s meanings like we decode meaning in written language. However, this analogy is an imperfect one. This is because the meanings of words in language are better-defined and agreed-upon than the meaning in vehicles. Written language also has explicit rules (grammar) that guide how meanings can be constructed and interpreted, while no explicit grammar exists for the meaning in motor vehicles. Nonetheless, the basic concepts of syntagm and paradigm can be applied to a vehicle to examine the signifiers contained within it. Figure 6-3 provides an example:

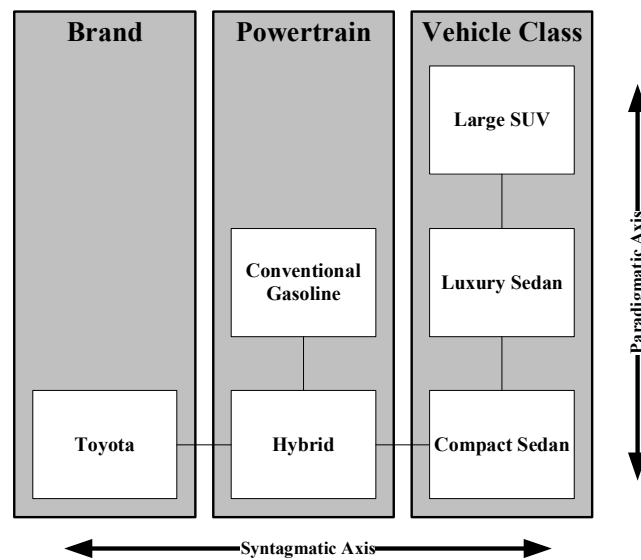


Figure 6-3: Example of Syntagmatic and Paradigmatic Relationships in Vehicles

In this example, the motor vehicle is a syntagm. The paradigms shown here are brand, powertrain, and vehicle class. *Large SUV*, *luxury sedan*, and *compact sedan* are all types of vehicle class, and like the verbs in the previous example, only one member of the set

can be used for a particular vehicle. Of course, this example is simplified: in reality, each paradigm has a larger set than is shown. There also may be other paradigms (such as vehicle model) that do not appear here. But this simple example illustrates how different combinations of paradigms can yield distinct vehicle meanings. A *Ford-conventional gasoline-large SUV* is likely to have a different set of symbolic meanings than a *Toyota-hybrid-compact sedan*.

This structure demonstrates how relationships between members of a paradigmatic set depend upon difference. *Compact sedan* only has meaning if it can be distinguished from another vehicle class, such as *large SUV*. Individuals may not associate meaning with every member of a paradigm, but they must associate meaning with at least two members so that difference can be established. This explains why many households in this study talked readily about large SUVs, a type of vehicle that they felt symbolized everything that their HEV was not. The same occurred for vehicle brand: many Honda and Toyota buyers established a contrast between their HEVs and products from domestic manufacturers such as General Motors. In many cases, respondents had little or no ownership history with large SUVs or GM vehicles. Nonetheless, they assigned symbolic meanings to these paradigm members that differentiated them from the HEV. For example, no household in this study had ever owned a Hummer vehicle, but to many households the Hummer brand symbolized ideas that were opposite from the HEV, including the denotations of inefficiency and environmental harm and the connotations of selfishness and immorality.

In this study, no household provided a complete meaning taxonomy for each paradigm; that is, no household articulated meanings for all vehicle brands, vehicle classes, etc. Although automotive marketers may attempt to solicit such a taxonomy from consumers, it is questionable whether a particular buyer really assigns separate meanings to every single car brand, model, or vehicle class. Results from this study indicate that a particular individual assigns meaning to only a few members within each paradigm. For example, many HEV owners attached meanings to hybrid and conventional gasoline powertrains, but very few articulated meanings for diesel powertrains. This study also shows that paradigmatic sets are not always agreed-upon across households or well-defined within a given household. One example is vehicle class: when assessing this paradigm, some HEV owners grouped all SUVs together in one category, while others considered large, midsized, and small SUVs to be separate paradigmatic members. As a result, households' assignments of symbolic meanings to a particular vehicle also differed. Households that associated all *SUVs* with the meanings of selfishness and arrogance viewed the midsized Toyota Highlander SUV negatively. However, other households assigned these negative meanings only to *large SUVs*, and attached different (often more positive) symbolic meanings to a smaller SUV like the Highlander.

This chapter examines HEV owners' interpretation of their vehicles as syntagms. This process involves both recognition and perception (Csikszentmihalyi and Rochberg-Halton 1981); that is, owners assign socially-shared meanings to their HEVs, but also develop unique interpretations of the HEV's significance by selectively applying symbolic meanings from the paradigms of brand, model, powertrain, and vehicle class.

This chapter is similar in format to Chapter 4: stories about individual households are presented, and are followed by general discussion of findings across all households. In this study, the applicability of the syntagm/paradigm framework only became apparent in the data analysis phase after all interviews had been conducted. As a result, we did not fully examine all paradigmatic areas. Instead, we focused primarily on one area (powertrain) and, more specifically, one member of the paradigmatic set (hybrid). Thus, our understanding of the meanings associated with other possible paradigms and all possible syntagms is limited. However, enough information was collected in areas such as brand, model, and vehicle class to begin to understand how households used meaning from these other paradigms¹⁰. This chapter outlines initial findings, but a deeper exploration of meaning in these areas represents a valuable area for future research.

An Introduction to Four (More) HEV Buyers

This section includes stories of four HEV purchases, two from Phase I and two from Phase II. To provide an authentic portrayal of their HEV purchases, the each household's story is presented on the left column of the page in the literary style. It is recommended that the reader review this story first. Then, the reader can review the semiotic map and the map explanation that appears in the column to the right of the story. Note that all participant names used here are aliases.

¹⁰ In Phase I, vehicle model was discussed infrequently. Part of the reason was that the majority of Phase I households owned a Toyota Prius, a hybrid-only model that had no conventional version. For these owners, model and the powertrain paradigms were merged: the Prius model implied the existence of a hybrid powertrain.

Sara Harris: Honda Accord Hybrid

The semiotic map for Sara Harris is shown in Figure 6-4. Sara's HEV, a Honda Accord Hybrid, appears at the top of the map. In her interview, Sara discussed her HEV's powertrain, vehicle class, and model. I identify these as three important paradigms in her vehicle syntagm. In the process of perceiving symbolic meaning in her Honda Accord Hybrid, Sara combined meanings from two of these paradigms, powertrain and model. Meanings in a third paradigm, vehicle class, were used to define meanings that were distinct from those in her HEV.

Sara defined her Honda Accord Hybrid as a hybrid vehicle, and connected the idea of a hybrid to using less gasoline and gaining access to "special considerations" such as the ability to drive alone in carpool lanes

Box 6-1: Sara Harris' HEV

In the summer of 2005, Sara Harris bought a Honda Accord Hybrid. At that time, Sara still was adjusting to life in California after moving from Florida a year earlier with her husband Dave and their five-year-old son, Tyler. The family had settled into a beachside home in a small community outside of San Francisco. Sara, a 37-year-old fashion model, had found part-time work with a company in the city's garment district, and Dave had signed on as a partner in an engineering firm. Both were regularly making the 60-mile trip to and from San Francisco, and Sara was struck by the length of her commute and by the amount of traffic in the area. She was also amazed at the cost of gasoline, which seemed much higher than it was in Florida. Sara was glad she had sold her Mercury Mountaineer SUV before the move. She had liked her SUV, and it seemed to make sense when gasoline was affordable, but California's high fuel prices made a "gas sucking" truck like the Mountaineer less appealing.

As she met people in her new community, Sara became conscious of an environmental awareness that hadn't existed in Florida. Many of her California neighbors were buying Toyota Priuses and talked regularly about environmental issues. In contrast, friends in Florida had focused on speedboats and large SUVs, and seemed more concerned about living comfortably than about limiting their impact on the ecosystem. Sara, who had heard little about hybrids before relocating to California, was intrigued by the new vehicles and by the idea that she too could make an environmental contribution. As she thought about buying a new car to replace the SUV, she decided it had to be a hybrid.

Dave loved the idea of owning a hybrid, and quickly suggested that they get a Prius. But Sara knew the Prius was the wrong choice. She had spent time riding in a friend's Generation I Prius

or park for free on city streets.¹¹ Both of these denotations linked with the idea of spending less money, and to the connotation of Sara as a smart person who had made a sensible vehicle choice. Using less gasoline also linked with the idea of being “better for the environment” and with the idea of Sara as a person who, like new her friends and neighbors in California, was aware of environmental issues. But Sara did not only stress the denotations of environmental awareness and financial sensibility. These connotations were available in other HEVs, such as the Toyota Prius, which Sara rejected. For Sara, the Honda Accord Hybrid also included important symbolic meanings associated with vehicle model. A decade earlier, Sara had owned a conventional Honda Accord that she had liked. She explained that it was a “nice,

and disliked both its size and appearance. To Sara, the Prius seemed like a “tiny little car.” Sara had driven her share of small cars in the past,

including a Chevrolet Chevette she owned after graduating from college. Small cars were uncomfortable, unsafe, and ugly; they also were slow and weren’t much fun to drive. Sara wanted a car that looked good and that she would enjoy driving. She also wanted a safe vehicle for transporting her son to school each day. At some point, she heard about a hybrid version of the Honda Accord, and it seemed like a far better choice. Unlike the Prius, the Accord was a great-looking car, offered a luxurious interior, and had plenty of power. Sara compared the Accord to sugar-free pudding: it gave her all the advantages of a hybrid, but required none of the sacrifices that she would have to make when buying a Prius. Without researching any other vehicles, she bought an Accord Hybrid.

In the months following her purchase, gasoline prices continued to rise, and Sara was confident her Accord Hybrid was saving her money. She wasn’t sure of her car’s mileage, but knew that she could go considerably further on a tank of gas in her car than in her husband’s vehicle, a Mercedes station wagon. Sara also was unsure how much she spent each month on gasoline, but at almost \$50 per fill-up, she was certain that fuel expenses were eating into her household budget. Sitting in traffic during her commute one morning, she remembers hearing the engine shut off in her Accord hybrid and thinking to herself: “Thank God I’m in a hybrid.” In her mind, she had little control over the amount of driving she did each day, but she did have control over the type of car she owned. By choosing a hybrid that used less gas, she had made a smart choice. She was saving money, just as her grandfather had encouraged her to do years earlier when he showed her how he carefully recorded his mileage and fuel expenditures at each fill-up. Best of all, her smart choice also let her drive the type of car she wanted, and connected her to the

¹¹ Figure 6-4 represents Sara’s semiotic map at the time of purchase. After purchase she realized that the “special considerations” did not apply to her Accord Hybrid. While not explored in the interview, it is likely that Sara now sees two different types of hybrids: those that qualify for HOV access, free parking, etc. and those that do not. If so, her powertrain paradigm contains two hybrid members.

middle-of-the-road car,” not a luxury model, but not a stripped-down “whatever-you-can-afford car” either. Sara recalled that her Accord had been attractive and fun to drive, and the current model had these qualities as well.

Sara explained that she was attracted to the Accord Hybrid partly because it was an Accord, and partly because it was a hybrid. The set of symbolic meanings associated with the Accord model was not fully identified in Sara’s interview. For Sara, it was important to have a vehicle that was attractive and fun to drive, although we did not explore why this was the case. But it is likely that the connotations of attractive and fun to drive linked with other connotations, some (or all) of which relate to Sara’s identity.

Sara felt strongly about having an attractive car that was fun to drive, and she was determined not to sacrifice these vehicle aspects in order to acquire the symbolic meanings associated with a hybrid powertrain. In the Honda Accord Hybrid, she found

environmental ideas that seemed pervasive in her new community.

Sara was happy with her Accord Hybrid, although on two occasions she questioned whether she had chosen the right car. The first occurred when she learned that the Accord hybrid was not eligible for the same privileges as models like the Prius. Before making her purchase, Sara had heard that California hybrid drivers were allowed to drive in carpool lanes, were exempt from paying tolls, and could park for free on San Francisco streets. She guessed those benefits would save her time and money during her commute, and they strengthened her perception of the Accord Hybrid as a smart, sensible car choice. But soon after she bought her hybrid, Sara learned that the Accord Hybrid was not eligible for any of these benefits since its gas mileage was lower than other hybrid models. Sara was confused and slightly annoyed: she had assumed that all hybrids were similar, and all received these benefits. Sara had also assumed that all hybrids were connected firmly to the idea of preserving the environment, but a second incident caused her to briefly question her Accord Hybrid’s environmental credentials. Soon after buying her Accord Hybrid, Sara encountered a Toyota Prius owner in a parking lot at a local store. Sara often looked for other hybrids as she drove, and she was excited about this spontaneous encounter with another owner. But to her dismay, the Prius owner dismissed her Accord Hybrid, telling her that it didn’t get good mileage and implying that it was inferior to his Toyota Prius. Sara was shocked: she knew the Prius had higher mileage, but it wasn’t nearly as much fun to drive, and she wondered why the Prius owner hadn’t acknowledged this advantage.

the combination of meanings she sought. These meanings were associated with the model and powertrain paradigms. Sara, a fashion model whose job required her to monitor what she ate, often used food metaphors to describe her HEV. She explained that her Honda Accord Hybrid was like “sugar-free pudding.” It connected her with the ideas of doing something good for the environment and spending less money, but did not require her to sacrifice having a “nice car.”

Sara noted that the Toyota Prius did not provide this same combination of meanings, and throughout her interview, she contrasted her Accord Hybrid with the Prius. For Sara, the Prius fit into a different vehicle class category than her Honda Accord. Sarah explained that the Prius was a small car, a category of vehicles that were unattractive, uncomfortable, and not much fun to drive. Like the model paradigm, the vehicle class paradigm was not fully explored in Sara’s interview, so the full set of meanings Sara associated with the small car category is not defined.

However, it is possible that the meanings of small car have identity implications for Sara. She explained how right after graduating from college, she had owned several small cars, including a Chevrolet Chevette. Sara remembered disliking these vehicles, and explained that she “never wanted to go back to a car that I felt I had to pry myself in and out of.” For Sara, vehicles in the small car category may have reminded her of a time in her life when she could not afford to drive a larger, more attractive, and more comfortable car. While she was still interested in saving money on fuel, she was not interested in a small

car that portrayed her as the person she was two decades earlier. Thus, vehicles like the Prius that she categorized as small cars were not considered during her purchase.

Sara also associated another vehicle class, the SUV, with a past version of her self-narrative. Sara had driven large SUVs for a decade before her HEV purchase. But she explained that the relocation to California changed her view of the SUV vehicle class. Higher gas prices in California made large “gas sucking” SUVs seem impractical. Sara couldn’t believe that people continued to drive such large vehicles, some of which she estimated to cost over \$100 to refuel. For Sara, “the [SUV’s] appeal had worn off.” While she wasn’t sure exactly how much it would cost her to continue driving an SUV, the SUV vehicle class represented one set of meanings that were opposite those of her HEV. The SUV symbolized spending more money, and thus connected to the idea of a stupid, foolish purchase.

Although she did not talk much about the environmental meanings of SUVs, Sara may have seen these vehicles as conflicting with her newly-developed environmental awareness. This conflict was evident when Sara talked about the Hummer, a vehicle that had strong negative meanings for her and many households in this study. Sara understood that some people needed large vehicles to transport their families, and she tried not to be judgmental when she saw large SUVs like the Chevrolet Suburban on the road. But she became annoyed as she talked about the Hummer: “nobody needs a vehicle like that” she explained. To Sara, the Hummer was more than just a foolish financial choice; it was a foolish environmental choice as well.

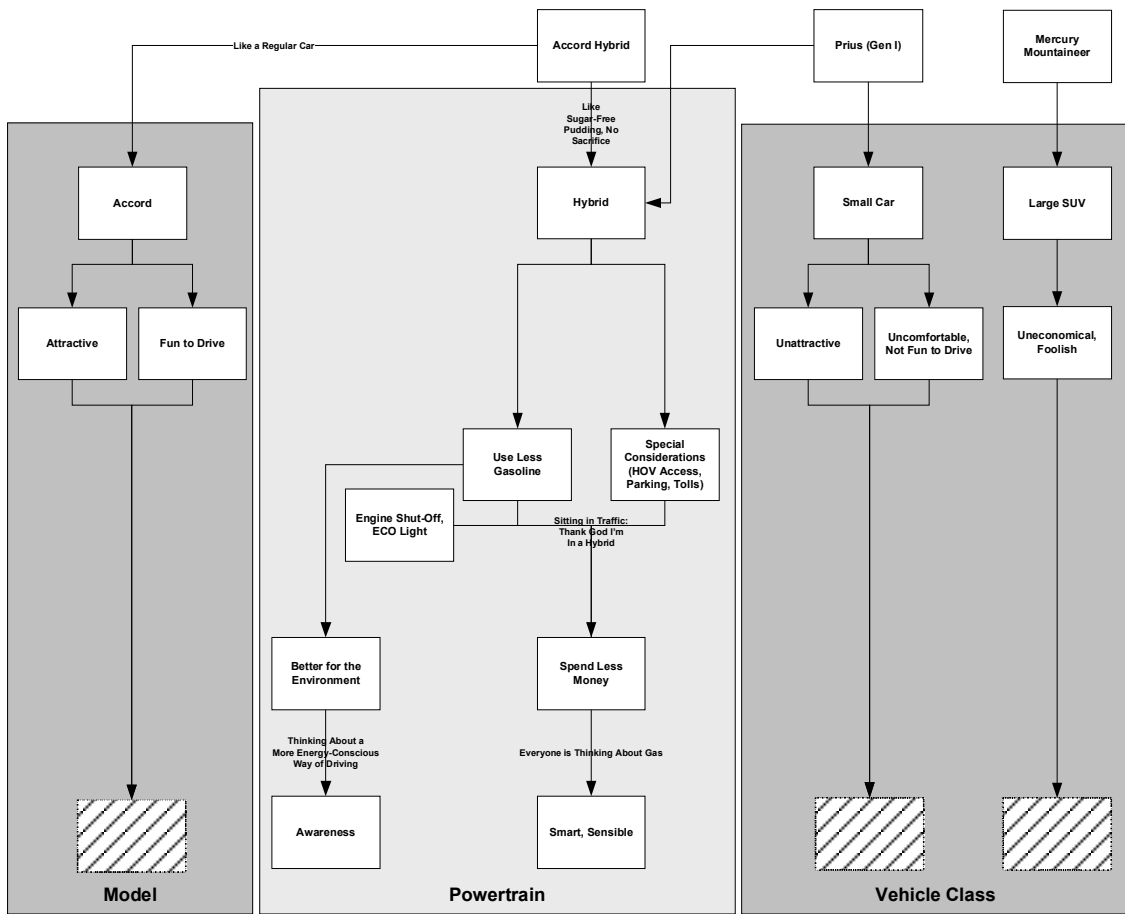


Figure 6-4: Semiotic Map for Sarah Harris

Tom Lay: Toyota Prius

Tom Lay's semiotic map appears in Figure 6-5. In his interview, Tom discussed the meanings associated with two paradigms: vehicle class and powertrain. Within the powertrain paradigm, Tom mentioned both HEVs and BEVs and associated symbolic meanings with each. To arrive at a set of symbolic meanings for his HEV, Tom selectively combined meanings from existing members of the powertrain and vehicle class paradigms: economy car and electric vehicle.

Tom identified a category of vehicles called "economy car" that included compact vehicles he had owned in the past. Tom associated a negative meaning with these vehicles: they were poorly-made and did not "hold up well" like other cars Tom had owned. But Tom also associated several positive meanings with

Box 6-2: Tom Lay's HEV

Tom Lay, a retired engineer in his 60s, purchased his (Generation II) Toyota Prius in the fall of 2004. At the time of his purchase, Tom was nearing retirement and had begun contemplating the impending changes to his daily routine. 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 management of 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 daily vehicle, a full-size pickup truck with a large diesel engine, he was concerned. The truck had been useful in the past when his family's business had required him to haul merchandise, but he no longer played a role in the business, and the truck's 20 MPG fuel economy seemed too low for everyday personal use. Tom felt he needed a more economical vehicle and, after hearing about the Honda Civic Hybrid and the Toyota Prius, he decided an HEV might be a good solution.

To Tom, the HEV had some of the advantages of an economy car. In the past, Tom had owned several economy cars, including two small Hyundai models. These cars were poorly-made, but they were fuel-efficient as well as easy to park and maneuver. Tom thought they were practical vehicles since they provided transportation without excessive power or amenities, features that he felt most people didn't really need anyway. The HEV also seemed like a practical vehicle: it was small, offered modest horsepower, and didn't use much gasoline. Tom wasn't really interested in owning another economy car, but the HEV seemed like a good choice, particularly if he could find one that was used but still in good condition. Typically, Tom tried to spend less money by buying his vehicles used. Just a few months earlier, he had purchased a car for his wife, and was pleased to have saved over \$10,000 by purchasing a low-mileage used car instead of a new model. But as Tom searched for a used Prius, he quickly realized that used HEVs were rare. He concluded that if he wanted an HEV, he would have to buy a new car.

small economy cars. To him, they were practical, sensible vehicles. They were maneuverable and fuel-efficient, without superfluous horsepower, interior room, or amenities. In perceiving the meaning of his HEV, Tom borrowed meanings from the economy car member of the vehicle class paradigm. This was unusual among the study's HEV owners, most of whom viewed economy cars and HEVs as distinct vehicles with very different symbolic meanings. But Tom assigned his positive *practicality* connotation from economy car to his HEV. Tom noted that his HEV had even higher mileage than non-hybrid compact cars, and that this high mileage linked to the ideas of using less gasoline and saving money. Part of what appealed to Tom about his HEV was that, like the economy cars he had owned in the past, he was not paying to fuel a large vehicle that he didn't really need.

Once Tom resigned himself to the idea of buying a new car rather than a used one, he visited a local Toyota dealership to look at the Prius. To Tom, the HEV resembled a BEV he'd driven years earlier while working at an electric utility. Tom's employer had provided him with a General Motors electric EV1 to drive for one week, and Tom had been really impressed with the car. The EV1 seemed so advanced compared to conventional cars, and its unique appearance and silent operation often attracted the attention of bystanders. Tom was excited when 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. For Tom, the BEV had fit well with his idea of himself as someone who tried new things before everyone else did. "I'm always looking for something new to be a part of" Tom explained.

The Prius also struck Tom as a great car for someone who liked new technology. During his test drive, he was impressed by the Prius' silent electric drive and computerized fuel economy display. Tom decided immediately that he had to own one, and that it had to be a loaded model: "let's go all out" he told himself, placing an order for a model that included every available option. Later, Tom would wonder whether adding so much optional equipment was really necessary since expensive features like the navigation system and Bluetooth wireless networking didn't get much use in his vehicle. But for Tom, the combination of these features with the hybrid powertrain made the vehicle seem novel and advanced. Like the EV1, Tom's Prius was a "conversation maker," and he talked with whoever he could about the vehicle. When showing his HEV to others, Tom often focused on the optional features he had added, such as the keyless entry system, in addition to explaining the hybrid powertrain.

But for Tom, the HEV wasn't only about new technology. He also was pleased that by using less gasoline, the HEV saved him money, although he wasn't exactly sure of the exact amount of savings. Before buying his HEV, Tom

Like most households in this study who articulated 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

didn't conduct any payback analysis, nor did he compare his HEV to functionally similar non-hybrid vehicles like the economy cars he had owned in the past. In fact, Tom knew he could have spent less for a non-hybrid vehicle, especially if he had bought it used. But his HEV seemed likely to generate substantial savings in the long run since its fuel economy was more than twice that of his diesel pickup. As Tom drove his HEV, he got excited when fuel economy monitor occasionally read 99.9 miles per gallon (MPG): a momentary, but powerful, confirmation of his Prius' frugality. For Tom, saving money was about more than just running the numbers. His parents had grown up during the Great Depression and had taught Tom to save whenever he could. Though his own finances were healthy, Tom felt an "emotional" desire to save, and buying a car that used less gasoline fit well with that desire.

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. This belief is corroborated by a symbolic feature, the HEV's fuel economy instrumentation. Each time Tom sees his Prius' fuel economy monitor read 100 miles per gallon (MPG), it reinforces Tom's perception of his HEV as a vehicle that saves money, and of himself as a person who cares about frugality¹².

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

¹² The multi-function display in Tom's Generation II Prius was only capable of displaying fuel economy up to 99.9 MPG, but in his interview he (mistakenly) recalled seeing his Prius display "100 MPG."

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 his car and about who he is. Tom believes his 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.

Note that Tom did not transfer the negative meaning of poor quality from economy cars to his HEV. This may be because Tom associated other meanings with the Toyota brand that countered the idea of his Prius as a poorly-made vehicle. Tom also may have seen the Prius’ amenities or advanced powertrain as signs that the vehicle was different from the cheap Hyundai models he had owned in the past. Since this negative meaning was not thoroughly explored in Tom’s interview, it remains unclear why it was not transferred to his HEV. But Tom’s case illustrates how meanings can be selectively transferred from one category to another.

Tom also selectively borrowed meanings from BEVs and attached them to his HEV. For Tom, the experience of driving an EV1 years earlier was an exciting one. As an engineer, he was interested in the BEV’s technology, but he also enjoyed the social interaction that

the EV1 generated. Tom liked educating others about the EV1, just as he now enjoyed teaching others about his Prius. Tom's HEV purchase was about more than just an interest in new gadgets. His HEV defined 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 HEV owners create new combinations of symbolic meanings that were previously unavailable in other vehicles 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.

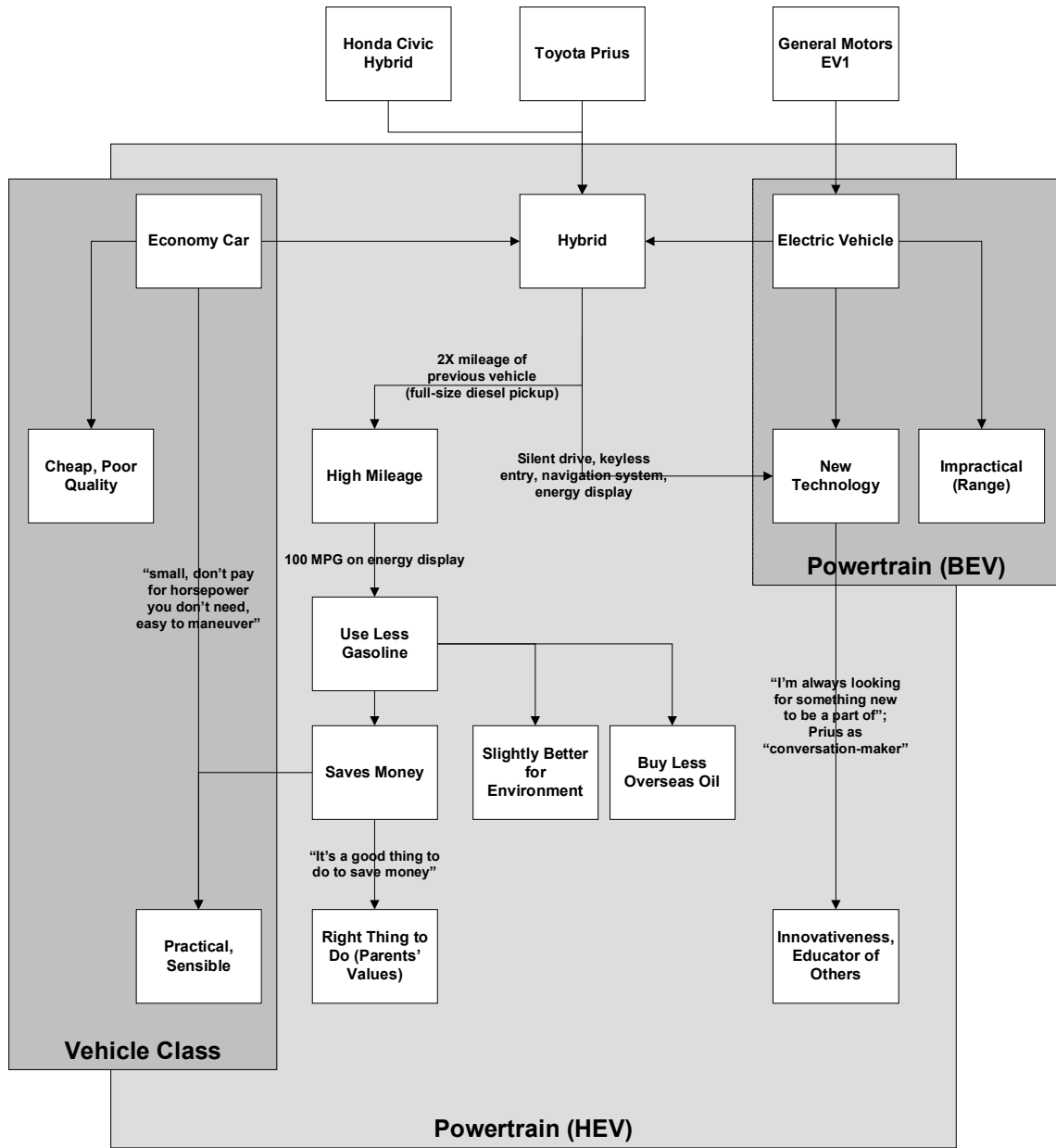


Figure 6-5: Semiotic Map for Tom Lay

Mark and Elizabeth Walker: Honda Accord Hybrid

The semiotic map for Mark and Liz Walker is shown in Figure 6-6. The couple's HEV purchase was influenced primarily by meanings they associated with the model and powertrain paradigms. In addition, they discussed negative meanings they associated with a particular model, the Toyota Prius. The couple's HEV, a Honda Accord Hybrid, appears at the top of the map. Unlike many HEV owners in this study who went shopping specifically for an HEV, Mark and Liz started by shopping for vehicles with no hybrid option. In the course of shopping for a conventional Accord, they discovered and opted for the hybrid model. In their case, the hybrid powertrain reinforced key symbolic meanings they perceived in the Honda brand.

Mark and Liz became interested in the

Box 6-3: The Walkers' HEV

Mark and Elizabeth Walker didn't initially expect to buy a hybrid car. Mark, a 35-year-old insurance underwriter, and Liz, a 29-year-old tax accountant, began car shopping after the couple's Chevrolet Malibu left Liz stranded on the side of the road one Friday evening as she returned home from a business trip. The next day, Mark visited car dealerships (while Liz stayed home with their three children) hoping to quickly find a replacement for the Malibu. Mark began his search with two models he really liked: the newly-released Chrysler 300 and Dodge Charger sedans. Mark thought both cars looked great, and he liked the fact that because they were new there were relatively few of them on the road. But because the two models were in high demand, dealers were asking buyers to pay a premium. In addition, Mark didn't want just a basic car. Typically he bought vehicles that were well-appointed, and the Chrysler 300 he liked best was the top-of-the-line model. After talking with the salesman, he called Liz to tell her the price: \$45,000.

Liz could tell that Mark was excited about the car, but \$45,000 seemed like a lot to spend. They agreed to think it over while Mark looked at other vehicles. Like Mark, Liz had a model that she was interested in as well: the Chevrolet Tahoe. The Walkers already owned a pickup truck, but Liz was attracted to the Tahoe's styling, and its three rows of seats seemed ideal for carpooling. Plus, Chevrolet was extending employee pricing to the general public for the first time ever. At Liz's request, Mark headed to the Chevrolet dealer, and returned home later that evening. The Tahoe turned out to cost nearly as much as the Chrysler 300, and while Mark had looked at other models, he hadn't seen much else that he liked. As the couple discussed their options over dinner, Mark's parents weighed in with their advice: the couple should buy a Honda. As Honda owners themselves, Mark's parents could testify that Hondas were affordable, reliable and lasted forever.

Initially, Mark was skeptical. He thought Hondas

Honda brand after talking with Mark's parents, enthusiastic Honda owners who attached the meanings of durability and dependability to Honda products. After owning a Chevrolet Malibu that they felt was poorly-made, Mark and Liz were attracted to the idea of vehicles that were durable and dependable. But Mark also associated negative meanings with Honda products: he thought their styling was conservative, and that a conservatively-styled car signaled an owner who was a boring, unremarkable person. Mark didn't like being ordinary. Liz explained that Mark "doesn't like average cars," preferring instead to drive a vehicle that was "a little different that everyone else's." For Mark, it was important to be unique, and Hondas did not deliver the symbolic meaning of uniqueness.

But Hondas symbolized dependability and durability, meanings that Mark and Liz linked to the connotations of intelligence

were boring, and he knew the Accord had far more conservative styling than the Chrysler 300 he wanted. But as he thought about it, a more sensible vehicle had some appeal. Typically, he and Liz bought whatever cars excited them, a strategy that often led to bad vehicle choices. Five years earlier, they had bought a two-door sports car that looked great in the showroom and offered amazingly low financing. But Mark remembers regretting the purchase as soon as he drove the car home from the dealership. A year later, the couple was so desperate to get rid of the sports car that they bought the Chevrolet Malibu, a car that neither of them had particularly liked. The Malibu wound up giving them regular mechanical trouble, and now required repairs that would cost almost as much as the car was worth. Both he and Liz were finance professionals: they knew how to make economical choices. But for whatever reason, they never seemed to do so when it came to their vehicles. Perhaps, Mark thought, this purchase could be different.

The next day, Mark visited the Honda dealer. The first car he drove was a base model Accord with a 4-cylinder engine and a stick shift. If Mark was looking for a practical car, this should have been it: it was affordable, no-frills transportation that had high fuel economy. But Mark was drawn to models with more amenities, and soon became aware of a hybrid version of the Accord. In the past, Mark had heard that hybrids such as the Toyota Prius were small and underpowered. But the Accord Hybrid seemed different. He liked the fact that it was the top-of-the-line model: in addition to amenities like leather seats, the Accord Hybrid offered even more horsepower than the conventional version. It was also considerably less expensive than the Chrysler 300 or Chevrolet Tahoe. Still, Mark was uncertain, and after calling Liz to tell her about the Accord Hybrid, he left the dealership to continue shopping. Later in the day, Mark's phone rang: it was Liz. She had just filled the pickup with gas and was struck by how much prices had risen since her last visit to the gas station. "Financially," she told Mark, "we should probably buy the Honda." Despite her financial background, Liz hadn't calculated how much less they would spend on gas if they bought the Accord, but she figured the Honda's mileage was higher than either the Chrysler or the Tahoe. Plus,

and sensibility. After making a series of bad vehicle purchases, Mark and Liz felt ready for a more practical vehicle choice. Each of them had a strong emotional attraction to a particular model (Mark to the Chrysler 300 and Liz to the Chevrolet Tahoe) and, in the past, they would simply have bought one of these models. But for this purchase, Mark and Liz felt it was important to think more carefully about their choice and to purchase a vehicle based on more than just styling. “We came to our senses this time” the couple explained, “we decided this time we should go with the smart choice.”

While Mark and Liz attempted to make less of an emotional vehicle choice, they continued to rely on symbolic meaning. The couple conducted no research on Honda products to confirm Mark’s parents’ claims, nor did they investigate other brands to determine whether they offered similar (or higher) levels of reliability and durability. To make a more sensible

Hondas were so durable that if they bought the hybrid version, she figured it would continue to deliver fuel savings for many years.

Later that afternoon, Mark and Liz talked at home. While Mark still wanted the Chrysler and Liz still was drawn to the Tahoe, they agreed that buying a Honda Accord (hybrid or not) was the sensible choice. And if they were going to buy a sensible car, it seemed best to buy the hybrid version that would save them the most money on fuel. “If we’re going to make the smart choice” Liz thought, “we might as well really make the smart choice.” Liz also saw buying the Accord Hybrid as a sign of maturity. It was bad enough when young people made irresponsible decisions, but she and Mark were adults with kids, jobs, and a mortgage. In the past they had been “immediate gratification people,” but lately they had been trying to take actions, such as selling their family’s powerboat, that placed their family’s future welfare above their own individual desires. “We came to our senses this time” Liz explained, reflecting on the purchase, “we decided we could be really grown up and get the hybrid.” Mark also noted the mature image of the Accord Hybrid, but noted that it probably fit with someone in his stage of life: “a conservative, boring guy...like it or not, that’s me.”

For Mark, it was no small sacrifice to give up the Chrysler 300, a good-looking car that had more “sex appeal” than the sensible but bland Accord. Mark also wasn’t thrilled that the Accord was so popular that he seemed to see it everywhere as he drove. But because the Accord Hybrid had a new, high-technology hybrid powertrain, Mark felt that it was set apart from other Accords. Mark was no hybrid expert, but he felt that the hybrid powertrain in his Accord made his vehicle unique, particularly since he saw so few Accord Hybrids on the road. Mark didn’t like “average cars”; whatever vehicle he drove needed to be “a little different than everyone else’s.” Like the Chrysler 300, the Honda Accord Hybrid was distinctive, but unlike the Chrysler, the Accord’s distinctiveness was rooted in its high-technology drivetrain rather than in its appearance.

vehicle choice, they simply selected a vehicle (the Honda Accord) that symbolized sensibility to them.

A conventional Honda Accord still would have provided access to the connotations of intelligence and sensibility. Mark and Liz bought the hybrid version because the hybrid powertrain enhanced these meanings. The couple explained that a hybrid used less gasoline, and therefore saved money on fuel. For Mark and Liz, spending less money on fuel also linked to the connotations of intelligence and sensibility. The couple explained that a Honda Accord was already a smart and sensible vehicle, but buying the hybrid version made it even more so. Liz remembers thinking, “if we’re going to make the smart choice, let’s make the really smart choice [and buy the hybrid].” Thus, the same symbolic meaning was present in both the brand and the powertrain paradigms. For Mark and Liz, the combination of Honda and hybrid generated an even stronger symbolic association with the connotations of sensibility and intelligence.

Mark and Liz also chose the hybrid version of the Honda Accord because it allowed Mark to cope with the negative meanings he associated with the Honda brand. Mark emphasized styling in his vehicle choices, and liked a car that made him stand out. In fact, part of the reason he was attracted to the Chrysler 300 was that the vehicle was new, uncommon, and distinctive. Mark thought the Honda Accord was boring, and he didn’t like the fact that there were so many of them on the road: “[I] pull up to any stoplight and I have three of them next to me” Mark complained. Yet the hybrid version of the Accord was a little different. There weren’t many Accord Hybrids on the road, and Mark felt that

most people noticed that his car was a hybrid model. Mark also liked the fact that the Accord Hybrid was loaded with options, including leather seats and satellite radio. For him, the hybrid powertrain made his well-equipped Accord even more “high end” and made it stand out from the thousands of other Honda Accords in his area. Because it was an HEV, his vehicle linked to the idea of uniqueness, and reinforced Mark’s idea of himself as a distinctive individual.

Mark and Liz also contrasted their HEV with another hybrid model: the Toyota Prius. While similar in size to the Chevrolet Malibu Mark drove previously, the Prius was not included on the couple’s shopping list. This was because Mark and Liz associated negative meanings with the Prius. To Mark, the Prius was an economy car, a vehicle that was small, underpowered, and poorly-equipped. Like many households in this study, Mark disliked economy cars and would not consider owning one. Liz felt less strongly, noting that she sometimes thought about “going really cheap” in her next car purchase and buying an economy model from a manufacturer like Kia.

For Liz, the Prius had another problem: it signaled an owner who was environmentally-conscious and politically progressive. While Liz’s political views were not fully explored in the interview, she clearly did not wish to portray herself as a progressive. She also did not see herself as someone who knew much about environmental issues or who made purchases for environmental reasons. In fact, neither Liz nor Mark thought much about the environment when buying their HEV, and they did not perceive environmental meanings in their vehicle. For Liz, a major issue with the Prius was that it made a statement that was a poor fit with her self-narrative.

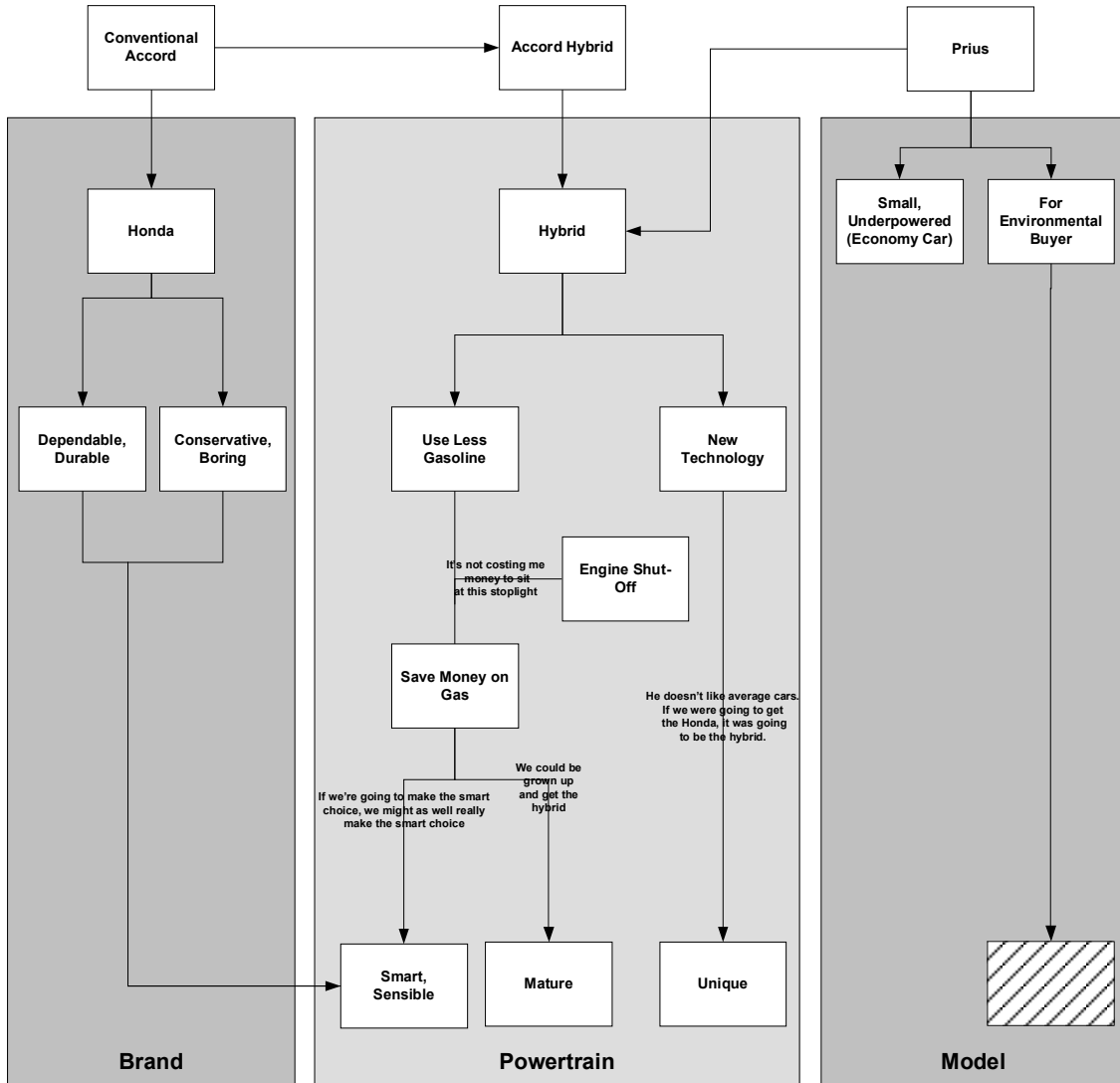


Figure 5-6: Semiotic Map for Mark and Elizabeth Walker

Ron and Jill Graham: Toyota Prius

The semiotic map for Ron and Jill Graham appears in Figure 5-7. The Grahams discussed meanings from three paradigms: vehicle class, brand and powertrain. In their perception of the meanings in their HEV, the Grahams transferred meanings from another member of the powertrain paradigm, the BEV. They also set up the meanings of their HEV in opposition to the meanings of a particular vehicle class: the large SUV. Finally, they used positive symbolic meanings associated with the Toyota brand to cope with concerns they had about adopting a new, unproven technology.

For the Grahams, an HEV symbolized “high efficiency,” a meaning that was reinforced by the vehicle’s engine shut-off feature. High efficiency was connected to the idea of lower resource consumption,

Box 6-4: The Grahams’ HEV

In the fall of 2003, Toyota released a redesigned version of its Prius HEV, and Ron and Jill Graham were one of the first households to purchase the new vehicle. As owners of a 2001 Generation I Prius, the Grahams already had one HEV in their garage, and they had been invited to place an early order for the new Generation II Prius ahead of the general public. As Jill waited at the dealership to pick up her new HEV, she was excited. Although she loved their 2001 Prius, she liked the idea of a newer Prius model with a hatchback and more interior room. But she wondered if the new Prius would really be as nice as it had seemed in pictures on the Internet. Months earlier, she and Ron had purchased their Generation II Prius sight-unseen, placing their order online long before the car was available in Toyota showrooms. “We were happy with the first one” Jill explained, “we knew what we were getting.”

Jill, a banking executive, picked up the new Prius by herself that October since Ron, a stay-at-home dad, was traveling at the time. A few weeks earlier, Ron had left on a trip around the country to perform volunteer work with a nonprofit environmental group. Ron was proud of his environmental service, noting that his work helped to identify polluters and punish them. “That’s what I do” he explained, “[I] cost others hundreds of millions of dollars working on water contamination.” For both Ron and Jill, environmental preservation was important, and they were pleased that the Prius “made a statement” about their environmental views. In fact, making a statement was so important to Ron and Jill that they dismissed HEVs like the Honda Civic Hybrid because they felt these conventionally-styled HEVs did a poor job of communicating to others.

But for Ron and Jill, the HEV’s statement was about more than just the environment. Driving an HEV identified them as people who were smart enough to understand the political and environmental effects of their vehicle purchase. An HEV also showed that they were people who

and lower oil consumption in particular. Consuming less oil was linked to two other concepts. One was minimizing 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. The Grahams linked the denotations of opposing war and preserving the environment 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.” The Grahams also characterized their HEVs as symbols of intelligence and awareness. Jill explained that HEV buyers look beyond advertising, and consider the political and

were concerned about more than just their own welfare. “When you pick a Prius” Jill explained, “you are thinking of the broader society.” The couple also noted that the Prius communicated their opposition to the Iraq conflict, a war that they characterized as unethical “killing for oil.” For Ron, all of these ideas fit well with his progressive political values, and he proudly displayed a bumper sticker supporting Howard Dean on his HEV. Like the original Volkswagen Beetle he had driven years earlier, the Prius was a visible “symbol” that told the world who he was and what he believed in. Ron was confident that people understood the message, and thought of himself as “advertising” every time he drove his HEV. With some satisfaction, he recalled an encounter in a rural area with two “good old boys” who slowed to take a long look at his Prius. The HEV’s distinctive styling presumably attracted these men, who Ron assumed to hold opposite values from his own. However, the two also became an audience for the HEV’s powerful message about Ron’s environmental views, political stance, and social values.

Ron liked the fact that his HEV opened up a dialog with people with whom he might not normally communicate. Both Ron and Jill often talked about their HEVs with other people, including work colleagues, teachers at their daughter’s school, and complete strangers. They felt a responsibility to educate others, and were disappointed that HEVs were not marketed more aggressively. “Our impression is no one else is selling them” Ron explained, “people will not take the time to figure it out for themselves, so you need people [like us] who are willing to talk about it.” Jill, who confessed that she “loves talking about her car,” had done more than talk about her HEV. She had given tours, rides, and testimonials, once even allowing a stranger to follow her home so he could test drive her Prius.

Ron and Jill wanted to teach others about HEVs, but also hoped to encourage others to think about a “new way of doing things” that included greater environmental awareness and an end to wars fought over resources. The group that frustrated the couple the most were drivers of large SUVs and pickup trucks who seemed to be oblivious to the problems their vehicles caused. Although Ron and Jill owned a pickup truck themselves, it was

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.

an older model that they only used occasionally for hauling the family’s kayaks and other large items. For most driving, they used their Priuses, and Jill felt that most families could easily satisfy their transportation needs with smaller, more fuel-efficient vehicles. Using a large pickup or SUV for daily transportation was simply “overkill.” Ron believed these trucks were more than just a bad transportation choice. To him, pickups and SUVs were symbols that made a statement just like his HEV did. But SUVs and pickups sent messages that were opposite from those sent by Ron’s Prius. Light trucks signaled owners who were stupid, selfish, and unethical. With some irritation, he discussed a recent episode at a local youth softball game. Owners of several large SUVs had ignored parking guidelines, blocked other vehicles, and then responded angrily to the suggestion that they move their vehicles. “Beyond selfish” he said, deeming SUVs the “antithesis” of HEVs and the ideas they stood for.

In interpreting the meanings associated with the HEV, the couple borrowed meanings from the BEV. According to Ron, HEVs were “like EVs, but could be used on [long] trips:” essentially electric vehicles with unlimited range. In the past, Ron had been exposed to BEVs by a friend who worked in state government, and Ron was enthusiastic about the vehicles although he had some reservations. The full set of symbolic meanings Ron associated with BEVs was not explored in the interview, but some negative meanings did emerge. Ron noted that the BEV’s limited range and recharging requirements made it an “impractical” vehicle. He also saw the BEV as symbolizing change that was too drastic for most carbuyers. “Radical revolutions fizzle out” Ron explained, “EVs were too extreme.” Viewing BEVs as too radical allowed Ron to position HEVs (another powertrain choice) as “more realistic” and more likely to be widely adopted.

While the Grahams viewed the HEV as more realistic than the BEV, they still had concerns about adopting a new technology. In particular, Ron and Jill worried about the durability of their Prius' battery pack. When purchasing their HEVs, they discussed the possibility that they would have to pay for an expensive battery replacement at 100,000 miles when the vehicles' warranties expired. Ron thought they might even have to retire their HEVs if replacing the battery proved to be too expensive. Yet part of what made the couple proceed with the purchase was their confidence in the Toyota brand. Ron explained that they associated Toyota products with reliability, and that they would have been far more reluctant to try the new technology if it was in a vehicle from an American manufacturer. While the meanings the couple associated with the Toyota brand were not fully defined in the interview, some of these meanings appeared to counteract negative connotations associated with the "future technology" denotation.

Many of the HEV owners in this study attached negative meanings to light trucks. The Grahams exhibited a strong dislike of SUVs and pickup trucks (at one point, Ron stated bluntly: "I hate SUVs") and their interview yielded one of the more comprehensive understandings of the negative symbolic meaning associated with these vehicles. For the Grahams, large (full-sized) SUVs and pickup trucks represented a vehicle type that stood in symbolic opposition to their HEVs. They perceived these vehicles as unnecessarily large: "people don't need them" Jill explained. Because light trucks were large, they were more likely to injure occupants of other vehicles in a crash. Bigger vehicles also consumed more petroleum, making them harmful to the environment and associating them with wars to secure oil supplies.

Ultimately, Ron and Jill associated large pickups and SUVs with three connotations: selfishness/arrogance, stupidity, and lack of ethics. For Ron in particular, the drivers of these vehicles represented people with values and political views that were opposed to his own. Ron likened the differences between HEV drivers and SUV drivers to the contrasting political views of Republicans and Democrats (“red state vs. blue state”) and to differing social views expressed through men’s hairstyles (“long-hair vs. short hair.”) The Grahams also illustrate how certain paradigmatic combinations can result in a clash of symbolic meanings. When asked his opinion of hybrid SUVs, Ron suggested that the two elements (SUV vehicle class and HEV powertrain) could not be paired together. Ron’s concerns were not about the technical feasibility of putting a hybrid powertrain into an SUV, but rather about the combination of meanings that would result. For Ron, the SUV represented the “antithesis of [the] Prius.” Combining two sets of opposite meanings into a single vehicle was simply inconceivable for Ron.

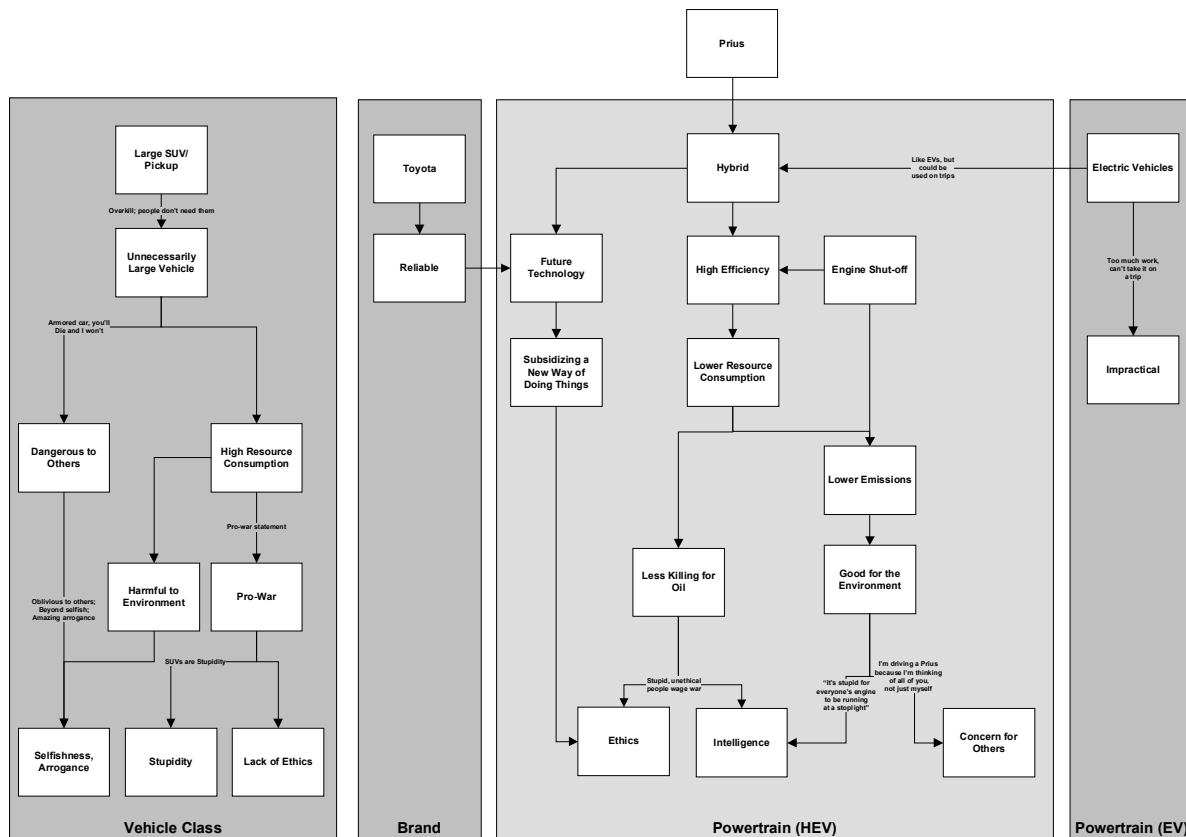


Figure 5-7: Meaning Map for Ron and Jill Graham

The Paradigms

All households in this study associated symbolic meanings with their HEVs because the vehicles were hybrids. But households combined meanings associated with the hybrid powertrains with meanings linked to other paradigms, including vehicle class, brand, and model. In addition, many households discussed other types of powertrains and compared the meanings of these vehicles with those of the HEV.

Powertrain

This focus of this study was to examine the symbolic meaning of hybrid vehicles. This approach assumes that certain meanings can be attached to a vehicle because it has a

particular powertrain. Indeed, the denotations and connotations identified in Chapter 4 are associated with the hybrid powertrain. But the meanings associated with other powertrains, including battery-electric, diesel, fuel-cell, and plug-in hybrid-electric, also emerged in discussions with households.

Battery-Electrics

Particularly in Phase I, HEV owners compared and contrasted their HEVs with BEVs.

Within our sample, BEV awareness was relatively high, most likely because households resided in California, a state where BEVs had been demonstrated and promoted in the past. Several households had previous experience driving electric vehicles, and a handful even investigated purchasing a BEV. For this study's households, BEVs shared at least two of the denotations of HEVs: advanced technology and environmentally-friendliness. But like Ron and Jill Graham, many HEV owners also attached the negative connotation of impracticality to BEVs because of the vehicles' limited range. For many households, the HEV was viewed as a more practical, usable version of the BEV. For example, one Prius owner explained that he viewed the HEV as a type of electric vehicle, and that his HEV purchase represented the "culmination of interest [he] had in electric cars." For him, the HEV was the "best of all worlds" since it offered many of the advantages of a BEV (including the "green aspect") without the hassle of having to repeatedly plug in.

The idea of an HEV as an improved electric vehicle was suggested by some early HEV advertisements. One example is the 2002 print advertisement for the Toyota Prius shown in Figure 5-8. The advertisement explains that the Prius uses "an electric motor that never needs to be plugged in." While the advertisement does not overtly mention BEVs, its authors are attempting to define a new member of the powertrain paradigm (hybrid) by

linking it with an existing member (battery-electric). Of course, the advertiser is assuming that the reader is familiar with BEVs; that is, that the BEV already exists in the powertrain paradigm. The advertiser is also assuming that the reader associates positive meanings with the BEV. One of the challenges in marketing new products is that

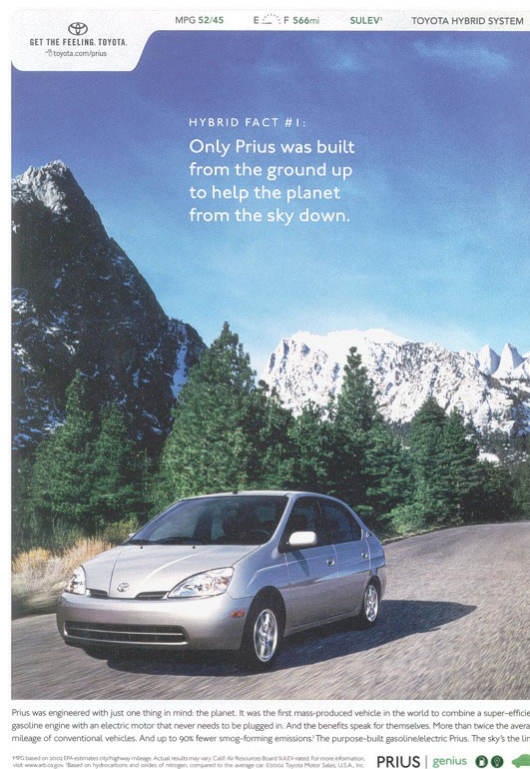


Figure 5-8 (Toyota Motor Sales 2002)

consumers must decide what symbolic meanings to attach to the product and how to interpret new members of a paradigm set and/or novel combinations of paradigm members. In the case of early HEVs like the Prius, some consumers' interpretations of the product included borrowed meanings from BEVs. From this perspective, BEVs may have played an important role in training consumers to interpret (and more readily accept) HEVs. This also suggests that for many consumers, HEVs did not represent an entirely new set of symbolic meanings. Instead, HEVs offered many of the same

meanings associated with BEVs, but with some additional new positive meanings (such as saving money) and without certain negative connotations (such as impracticality).

Diesel Engines

Among powertrains that are currently available to consumers, the diesel engine is the most similar in fuel economy to the gasoline hybrid-electric powertrain. However, only one of the 45 households in this study considered a diesel while shopping for an HEV, even though several households were familiar with diesel vehicles or had owned diesels in the past. This sample's low consideration of diesels is likely due to the fact that diesel vehicles are uncommon in the United States, and only a handful of light-duty diesel vehicles are available. But the low diesel consideration is also a result of the different meanings consumers associate with diesel vehicles and HEVs. For example, one Toyota Prius owner who had owned a diesel in the 1970s noted that the vehicle "got great mileage" but also used old technology that was "heavily polluting." As someone who viewed his HEV purchase as a "wonderful thing for the air," a diesel vehicle could not deliver the same environmental meanings as his HEV. Nor could the diesel, which he saw as antiquated technology, connect to the meaning of high technology as the HEV did. He did note, however, that diesel vehicles used less fuel than gasoline vehicles, and therefore did link to the idea of saving money. But since saving money hadn't been an important denotation in his purchase, the diesel vehicle was not an attractive choice for him.

Automotive analysts have suggested that diesel suffers from an image problem in the United States (for example, see Winter 2004 or Chon and Power 2006). American consumers attach negative environmental and technology meanings to diesels, what

Winter (2004) calls “the low-tech stereotype of clattering idle and sooty exhaust.” Households in this study confirm that diesel powertrains fail to connect with connotations such as environmental friendliness and advanced technology that are important to many HEV buyers. These findings suggest that as more diesel vehicles become available in the U.S. market, they are unlikely to draw buyers away from HEVs. However, the meanings associated with the diesel powertrain may also be influenced by the fuel that was used in it. For example, one HEV owner in this study was intrigued by the combination of hybrid powertrains with biofuels. For her, a biodiesel-hybrid had an even stronger connection to the environmental denotation than her gasoline hybrid. She explained that biodiesel also had a stronger link to the connotation of community orientation since she envisioned biodiesel users participating in local groups to collaboratively produce and distribute fuel. While more analysis is needed to fully understand the symbolic meanings of biodiesel, this study’s limited findings suggest that associating biodiesel fuel with the diesel engine could counteract some of the negative meanings that consumers currently associate with the diesel powertrain.

Other Advanced Powertrains

Many households in this study also were evaluating two new members of the powertrain paradigm set: fuel cell vehicles (FCVs) and plug-in hybrid electric vehicles (PHEVs). Awareness of these technologies depended partly upon when interviews were conducted. FCVs were mentioned more frequently in Phase I, while PHEVs were discussed more often in Phase II. Households attached both positive and negative meanings to both FCVs and PHEVs, although it was clear that most households were still learning about the technologies and determining what they signified. For some, FCVs accessed the same

positive denotations as HEVs, including the ideas of environmental preservation and national independence. However, for others the FCV was a “dumb idea” that symbolized automakers’ dishonest attempts to avoid making real environmental improvements in their vehicle fleets.

A mix of meanings also emerged when discussing PHEVs. Some owners viewed PHEVs as improved versions of the HEV that had stronger connections to symbolic meanings such as advanced technology and environmental preservation. However, a few HEV owners attached negative meanings to PHEVs. For example, two households (both hybrid SUV owners interviewed in Phase II) linked the PHEV to the idea of obsolete technology. For these households, the PHEV’s connection to the electricity grid represented a return to the small, range-limited BEVs of the past. Functionally, these households understood that PHEVs would still function when their batteries are depleted. But the symbolic connection between PHEVs and the negative meanings associated with BEVs was hard for them to sever. This example illustrates that PHEVs, like HEVs, may borrow meanings from the BEV, and that these meanings may not always be positive.

Vehicle Class

Households also associated symbolic meanings with particular vehicle classes. In general, vehicle class implies a certain combination of vehicle size, body style, and trim level, although classes are defined differently by different analysts. For example, the United States Environmental Protection Agency identifies 16 vehicle classes based on interior room, body style and vehicle weight (U.S. Department of Energy 2007). In contrast, CNW Market Research (2007) divides the automotive market into 30 classes, which

include categories such as economy cars and premium sport-utility vehicles. As there is no single class scheme for automobiles, that members of the vehicle class paradigm are not precisely defined. Nonetheless, vehicle class is used as a paradigm here because households in this study thought about and discussed vehicles in this way. Three basic vehicle classes emerged across the study's interviews. In general, households were in agreement about the meanings assigned to a particular vehicle class, but had different opinions on the vehicles that fit into that class. For example, nearly all households that talked about SUVs associated them with the denotation of harming the environment, but households disagreed on whether this denotation applied to all SUVs or just large SUV models.

Sport Utility Vehicles

A frequently-discussed vehicle class was the SUV. Many households attached negative meanings to SUVs; like the Grahams, they felt that SUVs symbolized ideas that were exactly opposite those symbolized by the HEV. Thus, they saw SUVs as vehicles that fouled the environment, wasted money, increased dependence on oil producers, employed outdated technology, and increased the chance of war. Roughly a third of all households in this study were previous or current SUV owners, and a handful owned hybrid SUVs such as the Ford Escape Hybrid or Toyota Highlander Hybrid. But even some SUV owners attached negative meanings to the SUV. One household that owned both a Honda Civic Hybrid owner and a conventional Toyota Land Cruiser explained that they felt guilty about their SUV. Each time they filled their SUV with gasoline, they were reminded that their "gas hog" was contributing to international conflict and environmental degradation, problems that their HEV was designed to resolve. Another

household discussed similar meanings in their SUV and their guilt over SUV ownership. After trading in her Ford Explorer SUV for a Toyota Highlander Hybrid, the owner explained that she bought the hybrid version so she could “feel a little less guilty” about driving an SUV. For her, all SUVs were bad for the environment, but a hybrid powertrain counteracted some of the negative meanings of the SUV vehicle class.

Many households that owned both an HEV and an SUV (sometimes in the same vehicle) separated SUVs into several vehicle classes and associated negative meanings only with a particular type of SUV: the large SUV. For these households, small or mid-sized SUVs such as the Ford Escape and Toyota Highlander avoided negative meanings, but large SUVs (especially those from the Hummer brand) were perceived negatively and in opposition to HEVs. “Hummer represents everything that isn’t me,” explained one hybrid SUV owner, indicating that the symbolic meanings of the Hummer were incompatible with her self-narrative. “Hummers and I don’t get along very well morally,” explained another, implying that the Hummer was an unethical vehicle. In general, these HEV owners felt that such large vehicles were unnecessary for most households and that using them for everyday transportation was wasteful, selfish, and harmful to both the environment and society. Some HEV owners who had previously driven large SUVs felt a sense of pride that they had downsized their vehicles. Like reformed smokers, these owners were particularly critical of vehicles they themselves had driven, often just months earlier. One HEV owner who traded her 5000-pound, 13 MPG Ford Expedition for a Ford Escape Hybrid explained that she regularly admonished drivers of large SUVs: “I’m very self-righteous...If I can drive this car, there is no reason others can’t.”

If other carbuyers attach the same negative meanings to large SUVs as this study's households, large SUVs with hybrid powertrains will not be popular. Both General Motors and Chrysler plan to introduce these vehicles in U.S. market in 2007; in Chrysler's case, the full-sized, HEMI V8-powered Aspen SUV hybrid will be the company's first hybrid offering. However, it is possible that a new type of buyer who does not associate negative meanings with large SUVs will be attracted to these vehicles. Even among households in this study, there were a few households that saw symbolic compatibility between large SUVs and hybrid powertrains. For example, Elizabeth Walker (whose story is discussed earlier in this chapter) was aware of the Chevrolet Tahoe Hybrid and planned to consider the vehicle when it was available in the market. However, in the Walker's case, the HEV's environmental denotations were not important in the purchase decision. For consumers who purchase HEVs in order to access environmental meanings, hybrid versions of the large SUV vehicle class are likely to be problematic since this vehicle class is associated with environmental harm and insensitivity to environmental issues. But like other HEVs, large hybrid SUVs may link to meanings such as saving money or embracing high technology. Buyers who are interested in these meanings and who prefer the large SUV vehicle class may create a market for the new large SUV hybrids from GM and Chrysler.

Luxury and Near-Luxury Vehicles

Households in this study attached both positive and negative meanings to luxury and near-luxury vehicles. Among some owners in Phase I, luxury vehicles had negative meanings such as selfishness. One Generation I Prius owner confessed that she was attracted to expensive luxury sedans, including a new Jaguar she had seen recently on the

highway. The Jaguar looked luxurious, and its high performance reminded her of fast muscle cars she had driven when she was younger. But she explained that driving a luxury vehicle would be self-indulgent and wasteful. In contrast, driving an HEV was altruistic and demonstrated her commitment to “doing the right thing for the future.” For her, a luxury sedan (or perhaps any luxury vehicle) opposed her HEV’s connotations of concern for others and community orientation.

However, among many buyers in Phase II, the meanings of a luxury (or near luxury) vehicle were important in the purchase decision. In particular, numerous buyers of the Honda Accord Hybrid and Toyota Camry Hybrid attached meanings of social status and professional achievement to their HEVs. These meanings were not related to the vehicles’ powertrains, but rather to the fact that they were large sedans that offered luxury amenities. As one Honda Accord Hybrid owner explained, “for me, at the level I feel I am now in my career, maybe it would be worthwhile for it to reflect in the vehicle I drive.” For this owner, a larger, well-appointed vehicle with amenities such as leather seats and a navigation system communicated to clients and colleagues that he was professionally and financially successful. In his mind, a smaller car would have been more ecologically sensitive, but would not have provided the same “presentation of myself” that the Honda Accord Hybrid offered.

Compact Cars

The majority of households in this study associated negative meanings with compact cars. While compact cars can offer high fuel economy like HEVs, the symbolic meaning of these vehicles differed from HEVs substantially. Many households attached strong

negative meanings to compact cars, viewing them as unattractive, uncomfortable, poorly-made, and unsafe. For example, one HEV owner was shopping for a vehicle that matched the high fuel economy of his previous vehicle, a 1992 Honda Civic. In his research, he discovered that two conventional vehicles (the Geo Metro and the Toyota Echo) attained high fuel economy, but he quickly dismissed these compacts as “rolling tin can[s]” that were cheap, unsafe, and lacking in amenities. Other households were even more emphatic in their negative perceptions of compact cars: “You’d have to torture me to get me to buy an Echo” insisted one Prius owner. Even when households perceived positive meanings in compact cars, the meanings were often slightly different than those they perceived in their HEV. For example, both HEVs and economy cars link to the denotation of saving money. However, at least one owner perceived the connotations of this meaning for the two vehicles as distinct. This owner, a Prius driver, explained that while her Prius signaled someone who chose to use less gasoline, a conventional compact car signaled someone who had no choice because of financial constraints. In her case, she recalled owning a compact Toyota Corolla in the past during a particularly difficult financial period in her life. She felt that, like her HEV, the Corolla made a strong statement about who she was. But the Corolla did not identify her as a smart consumer like her Prius did. Instead, the Corolla told the world that she was doing her best to manage with modest means. For this HEV owner, the Corolla (and its message) was part of her past, while the HEV made a statement that fit her current self.

The difference in symbolic meanings attached to compact cars and HEVs may explain why just one household in this study (a student who was on a limited budget) considered

conventional compact cars while shopping for an HEV. Compact cars' high fuel economy should permit association of these vehicles with the denotations of preserving the environment and reducing support for oil producers. Yet no household interviewed in this study made an overt connection between these compact vehicles and the environment, nor did any associate compact cars with independence from oil producers. The few households that attached positive meanings to compact cars associated the vehicles with practicality and frugality rather than with environmental soundness. This suggests that while a vehicle's size can influence its connections with environmental meanings, a smaller vehicle is not automatically viewed as environmentally-friendly.

Brand

Two main sets of brand meanings emerged during this study's interviews. The first were positive meanings associated with two members of the brand paradigm, Toyota and Honda. The second were mixed meanings associated with the Ford brand.

Toyota/Honda

In general, Toyota and Honda vehicles were linked to the denotations of quality, durability, and reliability. For some owners, these meanings connected to the connotation of practicality, and to the idea of themselves as practical, sensible people. For example, one HEV owner who traded in his BMW for a Honda Accord Hybrid explained that his HEV was a "practical, reliable choice" because it was Honda. He also attached the meaning of practicality to his HEV because he assumed the hybrid powertrain saved him money on fuel. In his case, the practicality of the brand (Honda) complemented the practicality of the powertrain (hybrid), an example of how similar meanings can be attached to different paradigms of the same syntagm (the Honda Accord Hybrid). During

the interview, this owner also commented that he found it strange when we referred to his vehicle as his “hybrid.” He knew his Honda Accord Hybrid had a hybrid powertrain, but he normally referred to the car as “the Honda” when talking with others. This is a small detail, but it hints that brand was dominant in this owner’s thinking about his HEV. For him, his Honda Accord Hybrid was a Honda first, and a hybrid second.

For other HEV buyers in this study, the meanings of reliability and durability attached to the Toyota and Honda brands were important in counteracting potential negative meanings of a new type of vehicle. Particularly for households in Phase I who purchased their HEVs when the technology was relatively new, concerns about battery replacement and general reliability of the hybrid powertrain were common. Failures in the powertrain would not only be expensive; they could also counteract meanings, such as intelligence and frugality, that many owners associated with their vehicles. But the fact that a new and potentially risky powertrain was offered by brands known for reliability and durability put many households at ease. One owner’s comment, “I figured it was a Honda, so the batteries should last,” illustrates how, for some owners, the symbolic meanings of the Honda brand neutralized some of the negative meanings associated with hybrid technology.

Ford

The second set of brand meanings were mixed meanings associated with the Ford brand. While not explored in detail, the association of negative meanings with Ford products was common. In some cases, the negative symbolism of the Ford brand was enough to prevent the inclusion of its HEV on households’ shopping lists. One owner who

examined hybrid SUVs during his purchase process quickly rejected the Escape Hybrid, recalling a bad experience he'd had years earlier with a Ford car. "I'm not buying a Ford," he told himself. Even some households that purchased Ford HEVs did so with some reluctance due to the negative meanings they associated with the brand. One owner who purchased a Ford Escape Hybrid after driving a Honda vehicle for several years explained he "was scared going from a Honda to a Ford," even after verifying that Ford had thoroughly tested their HEV. Another Escape Hybrid owner acknowledged that if the hybrid version of the Escape had not been available, he would never have considered a Ford product. Toyota and Honda, he explained, both offered small SUVs that were likely to be "better...more reliable" than a conventional Escape. In his case, the positive meanings of the hybrid powertrain counteracted the negative meanings of the Ford brand.

However, not all of the symbolic meanings associated with the Ford brand were negative. One Ford Escape Hybrid owner liked the fact that he had purchased a "domestic" brand, and associated this purchase with providing support to U.S. industry and to American workers. These meanings fit well with his view of his HEV purchase as a way of "voting with [his] dollars," an act that showed support to Ford not only because the company employed Americans, but also because it had chosen to invest in hybrid technology.

Model

Households also attached meanings to their HEVs because they were a certain model.

This was less apparent in Phase I since the majority of buyers owned the Toyota Prius, a relatively new, hybrid-only model. However, a reexamination of data from Phase I revealed that some buyers of the Honda Civic Hybrid noted that the Civic model (hybrid

or not) had specific connotations. In Phase II, the symbolic meanings of vehicle models were more apparent since all Phase II HEVs were hybrid versions of established vehicle models. In particular, buyers of the Toyota Camry Hybrid and Honda Accord Hybrid assessed not only what their HEVs meant, but also what was signified by the Camry or Accord models in general.

Honda Civic

The Civic Hybrid owners in this study viewed their HEVs as distinct from conventional Civics despite the fact that the hybrid and non-hybrid versions were almost identical in appearance. However, at least one Civic Hybrid owner associated negative meanings with the Civic model and was concerned these meanings could be attached to his Civic Hybrid as well. He believed that conventional Civics were the preferred vehicles for young men, many of whom tuned the vehicles for performance and drove aggressively. In buying a Civic, he worried that he could portray himself as a wild teenaged street-racer. This image was a poor fit with his self-narrative, which included the ideas of himself as a successful medical doctor and responsible father to his young children. As he evaluated the Civic Hybrid, he recalled being “distracted” by the negative meanings associated with the Civic model. Eventually, he decided that the subtle styling cues of the Civic Hybrid made it different enough that it would not be mistaken for the conventional version, and that others would not attach the Civic model’s negative meanings to his HEV.

Toyota Camry

Toyota Camry Hybrid owners in this study viewed their HEVs as distinct from conventional Camry models, but often still transferred some symbolic meaning from the

conventional model to their vehicles. One owner who traded a conventional Camry for a Camry Hybrid explained that she was more comfortable buying a hybrid powertrain since it was in a model that she knew to be reliable. She also noted that the hybrid version of the Camry eliminated a negative meaning attached to the Camry model. Because the Camry was so popular, the vehicle seemed ordinary and unexciting. However, the hybrid version (even though it looked almost identical to the conventional version) was relatively rare and therefore made her unique, “set[ting] her apart from the thousands of other Camry drivers.” Thus, for this owner a positive meaning from the Camry Hybrid’s powertrain paradigm balanced (even negated) a negative meaning from its model paradigm.

Another Camry Hybrid owner who traded a conventional Camry for his HEV also discussed the meanings associated with the Camry model. For him, the Camry had both positive and negative connotations. One on hand, the model had a “stigma” as a blandly-styled, underpowered car for older people: a “grandma’s car.” But on the other hand, driving such a vehicle made him look like a “picture of stability,” an important image for a young person who was trying to establish himself as a mature, competent businessperson. He explained that the meanings of stability and maturity associated with his HEV’s model combined with similar meanings from the vehicle’s powertrain. For him, the Camry Hybrid symbolized maturity because it was a “family car,” and also because it signaled a practical owner who cared about saving money.

Honda Accord

Honda Accord Hybrid owners in this study also transferred meanings from the conventional Accord model to their HEVs. Like the Camry, the Accord connoted the meaning of “family car” and the idea of the owner as a mature adult. For one household, a young couple who had just had their first child, this meaning was essential. As the wife explained, the Accord appealed to her because it was “more of a family, grown-up car” that fit well with a new element of her self-narrative: the idea of herself as a mother. In fact, for her it was the symbolic meaning of the Accord model that was most important. If it had not been for her husband, who was attracted to the environmental and financial meanings of the hybrid powertrain, she would have simply purchased the conventional version of the Accord.

Other Honda Accord Hybrid owners described negative meanings attached to the Accord model. Like some Camry Hybrid buyers, they were concerned that the Accord was such a popular model that it signaled an owner who was unexceptional and conformist. Mark Walker (whose HEV purchase is examined earlier in the chapter) struggled with this negative meaning. Not only did Mark see the Honda brand as boring; he also was concerned that the Accord was such a common model on the road: “[I] pull up to any stoplight and I have three of them next to me,” Mark explained. However, Mark attached the meaning of uniqueness to the hybrid powertrain in his Accord Hybrid, and connected this meaning to the idea of himself as a distinctive individual. Like the Camry Hybrid example cited earlier, Mark balanced a negative meaning from one paradigm with a positive meaning from another.

Chapter Conclusions

In the first phase of this study, we focused on symbolic meanings, and identified numerous meanings associated with the HEV. In Phase II, we discovered that multiple signifiers also existed within the HEV. These signifiers, called paradigms, include aspects of the vehicle such as powertrain, brand, vehicle class, and model. A particular symbolic meaning can be associated with one or more paradigms. The connotation of practicality, for example, is attached to both the hybrid powertrain and to the Honda brand. But the central point in this chapter is that an HEV can have meanings that are unrelated to its “hybridness.” This is especially true for HEVs that incorporate a hybrid powertrain into an existing model. For vehicles such as the Toyota Camry Hybrid or the Honda Accord Hybrid, owners blend the meanings associated with a well-known model with meanings of a new powertrain. Some analysts have attributed the success of the Toyota Prius to the fact that the vehicle has distinctive styling that is easily identified as an HEV (for example, see Maynard 2007b), but this may not be the only important factor. The Prius’ success may also be due to the fact that because it was launched as a hybrid-only model, there were no existing meanings in the model paradigm. This may have clarified the symbolic meanings of the Prius and simplified the recognition process for consumers as they evaluated what the HEV meant.

To define the HEV syntagm, HEV owners combine meanings from each paradigm to generate a blend of symbolic meanings. For many households, this blend of meanings was unavailable in the marketplace before HEVs were sold. This is one reason that identifying a vehicle that is comparable to the HEV is so difficult. Functional comparisons are relatively straightforward: a Ford Focus PZEV emits roughly the same

low level of criteria pollutants as the Toyota Prius, a conventional Honda Accord with a 4-cylinder engine attains fuel economy that is nearly equal to the Accord Hybrid, and a conventional Honda Civic provides the same styling and interior room as a Civic Hybrid. Yet few households in this study considered the Ford Focus, conventional Accord, or non-hybrid Civic when shopping for their vehicles. Part of the reason is that the non-hybrid vehicles do not provide the same blend of meanings as HEVs. Some paradigms (such as brand or model) may be identical between a hybrid and non-hybrid, allowing access to the same sets of meanings. But the syntagms of conventional vehicles lack the hybrid powertrain member in the powertrain paradigm, and therefore do not have access to symbolic meanings such as environmental preservation that owners in this study linked only to a vehicle's "hybridness."

CHAPTER 7: THE EMERGING MEANING OF PHEVS

This chapter examines early users' experiences with plug-in hybrid vehicles (PHEVs). At the time of this study, PHEVs were not yet commercialized. However, American consumers were becoming aware of the vehicles, and 25-30 PHEV conversions were on the road. Phase III of this study focused on the drivers of these vehicles. In interviews with 23 early PHEV users, we explored how PHEV drivers use and recharge their vehicles. We also discussed users' recommendations for future PHEV designs, and investigated how today's PHEV drivers think about PHEVs, including the benefits and drawbacks they perceive in the new vehicles. While today's PHEV users may not represent the mainstream American carbuyer, their behavior and viewpoints offer clues about how PHEVs will be received and used by other consumers.

Since the PHEV is such a new technology and so few PHEVs are in use, many fundamental questions exist regarding how drivers will use and recharge their vehicles. The goal of Phase III, therefore, was to conduct a general exploration of important issues from the perspective of the user. At the time of our interviews, drivers were still evaluating both the functionality and symbolic meaning of the vehicles. Therefore, we did not conduct the same type of comprehensive symbolic analysis that was performed in Phases I and II, and semiotic maps were not generated for individual PHEV users. Instead, we looked for early indications of what meanings are associated with PHEVs and what features are perceived as symbolic. As development of PHEV technology continues and the vehicles are commercialized, the denotations attached to these vehicles will become better-defined and more widely-held.

Since not all readers may be familiar with PHEVs, this chapter begins with a short summary of PHEV technology. It then outlines the sample assessed in Phase III, and discusses four main findings that emerged from interviews with PHEV users. To provide additional insight into users' reactions to the vehicles, three PHEV users' stories are also included in boxed text within the chapter. These stories are presented in literary style, and all names are aliases. Unlike previous chapters, the stories are not accompanied by semiotic maps since maps were not developed for respondents in Phase III. However, the stories provide insight into some of the meanings PHEV users attached to their vehicles.

Background

Plug-in hybrid electric vehicles (PHEVs) are a way to reduce urban air pollution, decrease emissions of greenhouse gases, and reduce petroleum consumption. While initial PHEV prototypes were developed at least four decades ago (Norbye and Dunne 1969), the PHEV concept has experienced a resurgence in the United States during the past three years. Winkel et al. (2006) note PHEV research conducted from 1996-2004 by Argonne National Laboratory, the Electric Power Research Institute (EPRI), and various U.S. universities laid the foundation for the more recent development of pro-PHEV organizations, for-profit conversion efforts, and automaker PHEV research programs. During the past two years, a small number of state and local government organizations began testing PHEVs, Congress saw its first bill (H.R. 5538) specifically aimed to promote PHEVs, and enthusiastic reviews of PHEVs appeared on the op-ed pages of major newspapers (for example, see Woolsey 2006).

Like hybrid electric vehicles (HEVs), PHEVs use a powertrain that combines an electric motor with an internal combustion engine. However, conventional HEVs are charge-sustaining: during use, they maintain roughly that same state of charge (SOC) in their batteries, and recharging occurs only from on-board generation. In contrast, PHEVs can operate in either charge-sustaining or charge-depleting mode. As the name suggests, charge-depleting mode occurs when the vehicle depletes the SOC in its batteries, and recharging occurs using off-board electricity from the power grid. While PHEV designs can vary considerably, one common design operates first in charge-depletion mode, then reverts to charge sustaining mode once the battery SOC reaches a certain point.

Typically, PHEVs provide greater amounts of on-board energy storage than HEVs by incorporating larger, higher capacity batteries. Many designs also provide all-electric operation for some limited distance, known as the all-electric range (AER). In the past, PHEV designs have been defined by their AER. A PHEV20, for example, is a PHEV with 20 miles of AER.¹³ However, all-electric operation is not essential for PHEVs.

PHEV Benefits

Charging from the electricity grid allows PHEVs to replace some portion of the gasoline they use with electricity. While the reduction in petroleum consumption for a particular PHEV depends on how the vehicle is designed and used, Wang (2001) estimates that a PHEV consumes nearly 60% less gasoline than a conventional vehicle, and almost 30%

¹³ Past studies by EPRI (2001) label a plug-in hybrid electric vehicle with a 20-mile AER as an HEV20 rather than a PHEV20. Other studies use the terminology “grid-connected hybrid electric vehicle” (GC HEV). This study uses the PHEV designation, and includes all-electric range in miles where applicable (e.g., PHEV20).

less gasoline than a non-pluggable HEV¹⁴. Since PHEVs use less gasoline, they also emit lower greenhouse gases (and potentially fewer criteria pollutants) from the tailpipe. In fact, a PHEV with robust all-electric cruising capability would have no tailpipe emissions at all until its usable onboard electrical energy was exhausted.

However, tailpipe emissions are not the only consideration. To fully assess the environmental impact of PHEVs, lifecycle emissions (including the emissions that result from upstream electricity generation) must be evaluated. Not surprisingly, the lifecycle emissions benefits of PHEVs are highly dependent on the electricity used to fuel them. Fueling PHEVs with renewable electricity results dramatically reduces greenhouse gas and criteria pollutant emissions, while using electricity from coal-powered plants yields less impressive results. Wang (2001) estimates that a gasoline-powered PHEV using “average” electricity from the U.S. grid would emit 37% fewer greenhouse gases than a conventional vehicle, but results in emissions of nitrogen oxides (NO_x), particulate matter (PM₁₀), and sulfur oxides (SO_x) that are 6%, 3.5%, and 62% higher, respectively. Kliesch and Langer (2006) estimate significant regional differences in PHEV emissions benefits. A PHEV that charges from the California grid (in which renewables and nuclear account for 45% of generation) emits about 30% less carbon dioxide (CO₂) and SO_x, and 40% less NO_x than a non-pluggable HEV¹⁵. However, if the same PHEV is charged from the coal-intensive power grid in the East Central area of the United States, the PHEV

¹⁴ Wang’s (1999) model does not assume a specific AER for PHEVs. Instead, it assumes that a PHEV (grid-connected HEV with spark-ignition gasoline engine) operates exclusively on grid electricity for 30% of its total miles.

¹⁵ Kliesch and Langer assume a PHEV40 that attains 50% higher fuel economy than a comparable HEV.

emits roughly the same amounts of CO₂ and NO_x as a non-pluggable HEV, and over three times the SO_x.

Current PHEV “Market”

Although at least four major automakers (General Motors, Ford, DaimlerChrysler, and Volkswagen) have developed PHEV prototypes, currently no mass-produced PHEV is available to consumers. Nonetheless, at the time this study was conducted there were already 25-30 light-duty PHEVs on the road in North America. All were modified HEVs (using the Toyota Prius platform) and were built either by a handful of conversion companies or by owners themselves. Current conversions add larger battery packs, either supplementing the existing HEV battery or replacing it entirely. The extra energy from these additional battery packs allows the PHEV conversions to drive longer in all-electric mode. In mixed-mode driving when the gasoline engine is used, Prius-based PHEVs also attain higher fuel economy¹⁶ (roughly double that of a conventional Prius) since extra electricity can be blended in more frequently than in a standard Prius. Overall, Prius-based PHEVs average between 65 and 95MPG, with brief periods of driving at well over 100MPG.

¹⁶ Since PHEVs use two fuels (electricity and gasoline), calculating fuel economy is different from the process used to calculate fuel economy for a conventional gasoline vehicle. Gonder and Simpson (2006) note there are different methods for performing this calculation. For PHEVs, Gonder and Simpson propose using the term “fuel economy” to refer only to gasoline consumption. They also recommend presenting the PHEV fuel economy figure in conjunction with an electricity consumption figure (for example: 50 MPG, 8.4 Wh/mi). In this chapter, the term “fuel economy” is used to refer only to gasoline consumption since many drivers talked about and measured their fuel economy in this way. Since only one respondent also provided electricity consumption data, I cannot present total energy consumption using the method that Gonder and Simpson propose. However, the reader should recognize that some level of electricity use is implicit in the fuel economy numbers that are presented in this chapter.

Early PHEV conversions are expensive: in addition to the purchase price of the original HEV, owners spend another \$4,000 to \$25,000 for conversion. PHEV conversions also lack some of the assurances that are provided with a typical vehicle. While some conversions include warranties and support, today's PHEVs almost certainly have voided parts of their original manufacturers' warranty coverage, and none have been crash-tested in their modified forms. In addition, questions remain about the durability of the additional battery packs since PHEVs typically discharge batteries more deeply than existing HEVs. Due to the high costs and uncertainties involved in PHEV ownership, few of today's PHEVs are owned by private citizens. Most are in the hands of electric utilities, research institutions or governments, many of which have previous experience owning and operating other types of advanced-technology vehicles.

To date, only limited analysis has been conducted on the consumer response to PHEVs. Consumer polls show as many as 49% of U.S. consumers are interested in PHEVs once they are made aware of the technology (Synovate 2006). When consumers are faced with paying more for PHEVs, interest falls but is still substantial: 26% of carbuyers in one study said they would pay a \$4,000 premium for a PHEV20 (OPC 2006). An EPRI (2001) market analysis confirms that consumer interest is highly sensitive to vehicle price. Among midsized car buyers, 53% preferred a PHEV20 to a conventional vehicle if the price difference was modest (roughly \$3,000). However, as the price difference between a PHEV and a conventional model widened, consumer interest declined dramatically: just 16% of buyers were interested in an HEV20 that cost \$9,000 more than its conventional counterpart.

However, measures of current consumer interest in PHEVs must be interpreted cautiously. Among HEV buyers in Phases I and II, few compared their HEV to a conventional vehicle during the shopping process, and almost none calculated the price difference between the HEV and an “equivalent” conventional model. If PHEV buyers behave in the same way, data on consumers’ willingness-to-pay for PHEV technology may not be useful in predicting demand. Hoeffler (2003) notes that asking consumers to predict their interest in a radically new product that does not yet exist in the marketplace can be a challenging process, and the demand forecasts that result are notoriously inaccurate. Since consumers have no experience with PHEVs, it is unlikely that many cannot predict whether they will buy one until they become more familiar with the new technology and how they might utilize it.

Sample Vehicles

A summary of the 15 PHEVs examined in this study appears below in Table 1. All were conversions of the Generation II Toyota Prius (model years 2004 – 2005) in one of the following configurations:

1. *EnergyCS*: Professional conversion by California-based EnergyCS/Edrive systems; includes 8.5 kilowatt-hour (kWh) lithium-ion battery pack that replaces stock battery
2. *Hymotion*: Professional conversion by Ontario-based Hymotion; includes 5 kWh lithium-polymer battery pack that is added in addition to stock battery
3. *Independent*: A variety of owner-performed conversions; configurations include 6 kWh nickel-metal-hydride (NiMH) pack added in addition to stock battery, and 2.5 – 3.5 kWh lead-acid (PbA) pack added to stock battery using CalCars PRIUS+ or Manzanita Micro PiPrius design

Vehicle Number	Conversion Date	Converter	Primary Vehicle Use	Location
1	September 2004	Independent	Personal Vehicle	CA
2	March 2005	EnergyCS	Performance Testing	CA
3	March 2005	EnergyCS	Personal Vehicle	CA
4	March 2006	Independent	Performance Testing	CT
5	March 2006	EnergyCS	Fleet Vehicle	CA
6	March 2006	EnergyCS	Personal Vehicle	CA
7	April 2006	EnergyCS	Performance Testing	CA
8	April 2006	Independent	Personal Vehicle	WA
9	May 2006	EnergyCS	Personal Vehicle	CA
10	August 2006	Hymotion	Fleet Vehicle	MN
11	August 2006	EnergyCS	Performance Testing	CA
12	August 2006	EnergyCS	Fleet Vehicle	CA
13	October 2006	Independent	Personal Vehicle	WA
14	November 2006	Independent	Personal Vehicle	IL
15	November 2006	Hymotion	Fleet Vehicle	VA

Figure 7-1: PHEVs in Phase III Sample

At the time of this study, 80% of the sample vehicles had been operated as PHEVs for less than 12 months. Vehicles were mainly located on the West Coast: 60% were based in California. Additionally, two vehicles were located in the Midwest, and two others were in the Eastern U.S. Figure 7-2 classifies the PHEVs in the sample by owner type. One interesting aspect of this sample is that three vehicles were owned by private individuals who performed and funded conversions themselves. The remaining 12 PHEVs were owned by institutions including city, county, and regional governments, electric utilities, PHEV converters and battery developers, and non-profit groups focused on energy efficiency and PHEV promotion. With one exception, institutionally-owned PHEVs were professionally converted by either EnergyCS or Hymotion.

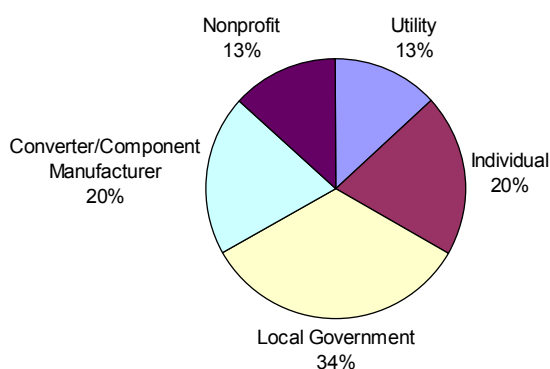


Figure 7-2: Ownership of Phase III PHEVs

PHEV use varied depending upon the owner. Figure 7-1 lists the primary use of each vehicle. Personal vehicles could be owned either by an individual or an institution, but were used mainly by one person for his/her daily driving needs, including personal travel to and from home. With one exception, drivers of personal vehicles had strong knowledge of PHEVs and tended to be PHEV advocates. Fleet vehicles, in contrast, were owned by institutions and were used by a larger number of drivers. A particular driver may have used a fleet vehicle on a daily, weekly, or monthly basis. These PHEVs were assigned to employees for temporary use like any other vehicle in the organization fleet. Drivers of fleet vehicle PHEVs had various levels of awareness about the technology: some were very knowledgeable about PHEVs, while others were new to the technology. In some cases, drivers of fleet vehicle PHEVs were not told that they were using a PHEV. Finally, a set of vehicles in this sample were used primarily to collect data on PHEV performance. Their PHEVs were driven primarily on specific test loops according to established procedures, and the resulting data was collected and analyzed. Drivers of

these PHEVs were trained before using the vehicles and tended to have high levels of technical expertise.

While Figure 7-1 lists a primary purpose for each vehicle, most vehicles served additional functions. For example, PHEVs that were used primarily for performance testing also served as fleet vehicles; in some cases, employees even took these vehicles home to test them during their commutes. Most personal vehicles and fleet vehicles were also subjected to some performance testing. Since PHEV technology is so new, virtually all PHEV owners were interested in collecting basic metrics such as average fuel economy. However, the differing primary purposes of the vehicles illustrates the wide variety of drivers that are using today's PHEVs. Some of these individuals have deep technical knowledge and such strong belief in PHEV technology that they paid for conversions with their own money. Others have little knowledge of PHEVs, and their first exposure to these vehicles came when climbing into the driver's seat.

This study is not a technical examination of existing PHEVs. Instead, it focuses on the drivers of these vehicles and their reaction to the technology. Where technical issues are relevant to drivers' experiences with the vehicle, these issues are discussed, but the intention of this report is not to critique the technical aspects of the three PHEV configurations. However, it may be helpful for the reader to be aware of some basic differences in vehicle functionality. All PHEVs in this study are built using the Toyota Prius platform, but the EnergyCS, Hymotion, and Ni-MH independent conversions store larger amounts of energy on-board than the PHEVs that use PbA packs. As a result,

PHEVs in the first group provide larger amounts of all-electric range (AER), though they are still subject to the speed and acceleration constraints of the base Prius design. These PHEVs also provide longer periods of higher fuel economy in mixed-mode driving, called “enhanced boost mode” or “boosted range” by users in this sample. For example, if driven conservatively at speeds below 34 MPH, EnergyCS vehicles can provide between 20 and 25 miles of AER. In contrast, conversions using less energy-dense PbA batteries generally attain between 8 and 12 miles of AER. Another difference between configurations is in instrumentation. Hymotion vehicles provided the driver no additional data on the status of the supplemental battery pack. Independent conversions tended to use CAN-view hardware to provide the driver with more detail on energy use and fuel consumption. Finally, the EnergyCS PHEVs included a separate display that provided the driver with detailed feedback on his/her energy demands and its effects on the vehicle’s powertrain.

Findings

This section outlines four main findings from interviews with PHEV users. It discusses users’ feedback on PHEV design and AER, experience with on-board instrumentation, recharging behavior, and general expectations regarding PHEV technology. For each finding, implications and recommendations for future PHEVs also are included.

Blended or All-Electric?

A key question regarding PHEVs is how much all-electric range they should provide.

However, a more basic question should be asked before any AER is considered: is AER even necessary in PHEVs? Some analysts view AER as a critical advantage of PHEVs.

Yet Winkel et al. (2006) note that a PHEV without AER would still deliver fuel economy benefits, and could actually offer better performance (acceleration and top speed) and marketability than PHEVs with all-electric modes. This is because delivering quick acceleration and operation over a wide range of speeds in all-electric mode requires a larger electric motor as well as a battery with high power output. A PHEV that only operates in “blended” mode, in contrast, is constantly providing some propulsion power from its internal combustion engine, allowing the use of a smaller electric motor and decreasing the peak power requirements for the battery. As a result, a PHEV0 is likely to be a more affordable vehicle and, for those consumers who place less value on AER, a more desirable option.

Today’s PHEVs provide AER, but subject to the control strategy of the Prius platform. Speeds above 34 MPH, rapid acceleration, or use of the vehicle’s climate controls can activate the ICE; vehicle startup also requires the ICE in order to bring emissions control equipment to the proper operating temperature. In other words, today’s PHEVs are limited not just in all-electric range (AER) but also in all-electric performance (AEP). Winkel et al (2006) observe that limiting AEP could be one strategy to achieve higher AER without adding more expensive components to PHEVs. However, consumers must be willing to accept slower acceleration times and reduced speeds in order to drive in all-electric mode.

Early Users’ Preference for AER

In fact, that is precisely what many of today’s PHEV users are doing. Most users kept their PHEVs running on electricity as long as possible when driving conditions permitted.

One driver who used his PHEV primarily on city streets proudly acknowledged driving all-electrically for the majority of his trips, attaining an average of over 800MPG as a result. Many users were aware of the basic criteria needed to keep their PHEVs in all-electric mode, and at least 2/3 of users had access to an electronic “EV button” that would manually place the vehicle in all-electric mode (assuming certain conditions were met.) One driver even went as far as pulling over and shutting his vehicle off when the ICE came on since this “reset” the vehicle and placed it back into electric mode.

Many drivers expressed their desire to have all-electric operation under a wider set of conditions. The most common request was for higher top speeds in all-electric mode. One set of users envisioned their PHEV as a surface-street-EV that attained all-electric speeds of 45 to 50 MPH and allowed electric operation on all roads except freeways. Another group of users wanted a PHEV capable of higher electric speeds (60 to 65 MPH), a freeway-EV that permitted all-electric highway cruising. Top all-electric speed is clearly an important characteristic for today’s PHEV users, and few commented on other metrics such as acceleration times or passing power. However, it is likely that participants expect all-electric operation not just to maintain top speeds, but also while accelerating to reach them.

Many users also shared what they believed their ideal AER might be. Responses ranged from 20-40 miles. Since users in Phase III were not faced with actual purchase decisions, their AER demands were theoretical. However, the method they used to determine optimal AER offers some insight into how future buyers may determine their AER needs.

Participants generally used a simple, easily-accessible figure - their one-way commute distance - to estimate AER, and most (if not all) assumed they would recharge both at home and at work. However, even among drivers with short commutes, 20 miles of AER seemed to be the minimal acceptable amount. One user, who drove six miles to work and had recharging available at his office, nonetheless dismissed a PHEV with less than 20 miles of range as a “joke.” A few users did acknowledge interest in PHEVs with lower AER, but they explained AER below 20 miles was acceptable only in initial vehicles as manufacturers improved PHEV technology. For example, one driver characterized 10 miles of AER as an acceptable starting point for PHEVs, but not necessarily an ideal configuration as the technology matured, nor the right amount of AER for his driving needs. Ultimately, it remains to be seen how much AER users need in PHEVs. It is likely that as consumers incorporate more specific cost information into their evaluations, their opinions about AER will change.

Part of the value to AER to these drivers may lie in its meanings. Going back to HEV owners in Phases I and II, even brief all-electric operation was an important symbolic feature for those HEV owners whose vehicles offered this feature. In addition to its aesthetic benefits, all-electric mode signaled to HEV owners that their vehicles used advanced technology, consumed less expensive fuel, and generated less pollution. While owners rarely calculated the fuel cost savings or emissions reductions of their HEVs, each time their vehicles operated all-electrically, they were reminded of these ideas. Similar symbolic meanings may be assigned to PHEVs because of their AER. The further they can drive a PHEV in all-electric mode, the more some drivers may associate their

vehicles with high technology, environmental preservation, economic sensibility, and freedom from petroleum fuels – the same meanings that HEV owners attached to their vehicles. For example, among PHEV drivers, one user explained how disappointed he was each time the ICE came on in his PHEV in urban driving. For him, it was a signal that he had returned to using old “brute force” technology instead of clean, advanced electric drive.

Given participants’ past experience with electric vehicles, it is not surprising that they found AER to be an attractive feature. Three-quarters of the 24 participants had driving experience in an electric vehicle, and four still used an electric-drive vehicle on a regular basis¹⁷. Past BEV experience also explains why this group tended to characterize future PHEV designs as EVs (either as a freeway EV or as a surface street EV). For many of today’s PHEV drivers, the PHEV represents progress away from conventional, internal-combustion powered cars toward a robust BEV. As one participant explained, HEVs were “the missing link” between conventional vehicles and BEVs. While the HEV was really just “a regular old gas car with a few electric tricks,” a PHEV was a real electric vehicle. The same participant was skeptical of blended-mode designs. Limited AER and AEP were necessary in the short run, he explained, but the eventual goal was for PHEVs to evolve into capable, robust BEVs.

The Blended Option

In fact, no participant envisioned future PHEVs as blended-mode PHEV0s without AER. However, many did emphasize high MPG, a feature that can be delivered effectively by blended designs. Today’s Prius-based PHEVs deliver roughly twice the fuel economy of

¹⁷ Three participants regularly drove BEVs, and a fourth drove a fuel-cell electric vehicle (FCV)

a conventional Prius. In side-by-side road testing of an unmodified Prius and an EnergyCS PHEV conversion, MacCurdy (2006) reports average fuel economy of 48MPG and 98MPG, respectively. Like all vehicles, PHEV fuel economy depends on how the vehicles are driven. In addition, PHEV fuel economy is heavily influenced by how far the vehicle travels between charges. Higher (or “boosted”) fuel economy is attained only as long as there is usable energy remaining in the PHEV’s batteries. Depending on configuration, today’s PHEVs attain boosted ranges of between 20 and 60 miles. A driver who consistently makes trips within his/her boosted range and then recharges achieves much higher (gasoline only) fuel economy than a driver who regularly exhausts the boosted range but continues driving. This makes sense: when a PHEV can blend in electricity, it displaces more gasoline consumption and increases fuel economy. But it makes predicting average fuel economy of PHEVs somewhat challenging. Assumptions must be made not only about how a vehicle is used, but also about both the frequency and timing of recharging events.

Today’s PHEV drivers receive direct feedback on their vehicles’ gasoline consumption, either from the stock Prius fuel economy display or through an aftermarket display units. Nearly all drivers knew the fuel economy of their PHEVs: average MPG for the 15 vehicles ranged from 55 to 98 MPG. However, only one user offered an overall measure of energy use that included both gasoline and electricity. As noted earlier, the PHEV uses two fuels (gasoline and electricity) and a true fuel economy number must account for both. Yet nearly all drivers omitted the electricity number when discussing fuel economy. This was even the case among drivers of EnergyCS vehicles, which are capable of

displaying both electricity and gasoline usage. This indicates that early users of PHEVs may think about their vehicles' energy use in the same way that they think about the energy use of a conventional vehicle. While users know they are using electricity when they drive, they are accustomed to measuring vehicle fuel economy using a metric (MPG) that captures only part of the PHEV's total energy consumption.

Many drivers cited a particular fuel economy number - 100+ MPG – and in some cases advertised this figure on their vehicles. One driver explained that while 100MPG was higher than his PHEV's average fuel economy, it seemed to resonate with people in a way that lower figures (including 99.9 MPG) did not. Indeed, the 100+ MPG claim is true to some extent. Today's PHEVs regularly attain (gasoline only) fuel economy of over 100 MPG during short periods and under the right conditions. Drivers of the EnergyCS vehicles (which are equipped with displays that render MPG in four digits instead of three) reported often seeing triple-digit fuel economy readings. These drivers also described the excitement they felt in seeing such high fuel economy, particularly since they often attained over 100 MPG while cruising at freeway speeds. Drivers' descriptions of this experience as "astronomical," "amazing," "very cool" hint that there is more at work than simply using less gasoline. (For more detail on one PHEV driver's reaction to her vehicle's high fuel economy, see Box 7-1).

High fuel economy, particularly numbers over 100 MPG that have not been attained before in production automobiles, may be symbolic. Periods of attaining 100+ MPG, even if brief, may signal to drivers that the vehicle has important qualities: that it is

unique, environmentally-friendly, or financially-sensible. High MPG is also important since it provides a basis for comparison with conventional vehicles. The typical American carbuyer has never owned a BEV or HEV, and thus is unfamiliar with all-electric driving. MPG, in contrast, is a relatively familiar measure. For owners of conventional vehicles, high MPG may be the single most important way to understand PHEVs – a key symbol for those with no BEV background.

However, there is another symbolic meaning that blended-mode PHEVs cannot access as effectively as PHEVs with AER: the idea of attaining almost complete freedom from gasoline use. This meaning was discussed by numerous drivers in Phase III who envisioned driving a PHEV all-electrically for local travel, and using the gasoline engine only for longer, out-of-town trips. As one driver explained, “you can drive electrically most of the time, and put in gas when you’re going to take a trip.” Another expressed a similar PHEV vision, noting that with such a vehicle she would “not go to the gas station at all.” The association of PHEVs with the meaning of freedom from gasoline meaning has not only been made by these PHEV drivers. Articles in the press (for example, see *EV World* 2005) describe PHEVs as gasoline-optional hybrid vehicles (GO-HEVs) that allow drivers to skip gasoline refueling under most travel conditions. For numerous respondents in Phase III, independence from gasoline was a powerful meaning that fueled their excitement about PHEVs. To attain this meaning, PHEVs must be designed as freeway-EVs, adding both expense and complexity to their design. However, a PHEV with that requires no gasoline for local travel has much clearer and stronger association with

independence from petroleum than existing HEVs, and this meaning may be important for consumers in differentiating the two types of vehicles.

Offering Blended and All-Electric Options

Current PHEV drivers are clear: they want larger amounts of AER and greater AEP.

While these requests come from a group with extensive electric vehicle experience, they should not be ignored since other early buyers of PHEVs may share these views.

However, manufacturers and policymakers should be careful not to design PHEVs in a way that limits their appeal. Some owners of conventional vehicles may see greater value in a PHEV0 that has a lower purchase price and attains very high fuel economy but offers no AER.¹⁸ Others may strongly be attracted to the symbolic meaning of freedom from gasoline and prefer a PHEV with high AER. Additional research is needed in this area to understand how consumers will respond to various PHEV designs, including a blended-mode PHEV0. This research must also include a deeper examination of symbolic meanings associated with particular designs, and an assessment of how these meanings relate to consumers' identities. Ultimately, the optimal solution may be to offer PHEVs in a variety of configurations. Just as today's vehicles are available with a choice of engines, a future PHEV might offer 0, 5, 15, and 30 miles of AER at different price points, each appealing to a different segment of carbuyers.

¹⁸ Winkel et al. (2006) note that previous consumer studies such as those by EPRI (2001) did not include a blended-mode option primarily because California ZEV regulations did not favor this design.

**Box 7-1: Emily Williams, Electric Utility Employee
2005 Prius, converted 2006 (EnergyCS)**

Emily Williams had her first experience driving a PHEV in the spring of 2006. At that time, her employer had just taken delivery of a converted Prius PHEV that it planned to use in as part of a performance testing program to evaluate PHEV technology. But when the vehicle wasn't being tested, it was made available to employees like Emily for business use. Emily, who was scheduled to attend an out-of-town weekend conference shortly after the car arrived, was selected to use the PHEV for her trip. While Emily was no expert in advanced vehicles, she had driven BEVs in the past, and was curious about what it would be like to drive a PHEV.

As she began her 100-mile trip to the conference site, Emily initially was overwhelmed by the PHEV's instrumentation. She had never driven a Toyota Prius before, and she had difficulty even locating the speedometer at first. But as she drove, Emily became more comfortable and began watching the fuel economy displays. Her EnergyCS vehicle had an additional display unit mounted on the dashboard, but Emily focused mainly on the Prius multi-function display (MFD), watching her fuel economy and the amount of regenerated energy. Gradually, Emily tailored her driving using feedback from the MFD, and enjoyed pushing her average fuel economy higher as she drove. On downhill portions of the trip, Emily shifted the PHEV into regeneration mode and was excited to see the graph bars grow on the MFD's energy consumption screen. When driving uphill, she tried to accelerate carefully, and was disappointed when the internal combustion engine finally came back on. When she reached the conference site, she plugged in the PHEV outside of her hotel. Unlike the EVs she had driven in the past that required special charging infrastructure, Emily characterized the PHEV as a "little miracle" since it could recharge using any conventional outlet.

After several days and a few hundred miles of driving in the PHEV, Emily attained what seemed to her to be "astronomical" fuel economy: 98 MPG. She was sold. She figured she wouldn't have the opportunity to purchase too many more cars in her life, and confidently declared that "my last car is going to be a plug-in hybrid." For Emily, the PHEV represented "the complete solution:" it could cut emissions, reduce the country's dependence on foreign oil, and save its owner money, plus it could be driven just like a conventional vehicle (including on long trips). As Emily thought about owning a PHEV in the future, she imagined a vehicle that provided higher AER and AEP than the Prius conversion she had driven. Emily really wanted a PHEV that would operate all-electrically at faster speeds, perhaps as high as 60 MPH. Emily also thought that the PHEV should have 40 miles of all-electric range, which she guessed would allow most people to commute all-electrically. With that type of vehicle, she estimated that all of her own travel - except for long trips - could be handled in electric mode. Even a full day of shopping, during which she might drive to several area stores or malls, seemed likely to involve less than 40 miles of travel.

To Emily, the PHEV seemed so much better than other vehicles. FCVs were interesting, but Emily was concerned that large amounts of energy were needed to make hydrogen fuel. And BEVs just didn't seem practical: they were fine for local travel, but required that their owners keep a conventional vehicle (a "backup car") to be used on long trips. Even HEVs didn't appeal to Emily. After driving the PHEV, HEVs like the Toyota Prius and Honda Civic seemed to barely be an improvement over conventional vehicles: "They don't really do what they are supposed to do" Emily explained, noting that HEVs did not make much of a contribution toward cleaner air or reduced petroleum consumption. For Emily, exposure to the PHEV made other vehicle technologies obsolete, and she was determined to continue driving a conventional vehicle until PHEVs were available.

Instrumentation

Many of today's PHEVs provide more than just the ability to drive using energy from the electricity grid; they also present more detailed information to the driver about how that energy is being used. Unmodified HEVs typically display instant fuel economy information to the driver (in MPG for U.S. vehicles). Some, like the Toyota Prius, provide more detailed information about fuel economy and energy use. The Prius multi-function display (MFD) is shown in Figure 7-3. The stock MFD includes two screens that include fuel economy information: an Energy Monitor that shows current MPG and



Figure 7-3: Toyota MFD (Source: Toyota Motor Sales 2006)

diagrams the flow of mechanical and electrical energy in the hybrid powertrain, and a Consumption summary that shows current MPG, average MPG over a specific distance, and recent regenerated energy. Drivers who are not interested in this information can switch off the MFD or use it to display information related to other vehicle functions, such as climate control.

Nearly all the PHEVs in Phase III had additional instrumentation in addition to the stock MFD screen. (The exceptions were the two Hymotion vehicles, which retain the

unmodified MFD). Most independent conversions incorporated the CAN-view display from Hybrid Interfaces, a multi-screen unit that can be displayed by the existing MFD or shown on an additional LCD display. Figure 7-4 shows one screen of the CAN-view unit. In addition to providing information on numerous parameters related to battery and ICE performance, the CAN-view also includes fuel economy data, including historical and current MPG. Unlike the stock MFD which can display fuel economy between 0 and 99.9 MPG, the CAN-view is capable of displaying fuel economy numbers over 100 MPG. The CAN-view also tells users when their vehicles are operating in all-electric mode and, for some vehicles, provides an “EV button” that the driver can use to request all-electric operation.



Figure 7-4: CAN-view (Source: Hybrid Interfaces, 2007)

The most comprehensive energy and fuel economy data is provided in EnergyCS conversions. These PHEVs include a separate dashboard-mounted display unit that captures and displays a variety of performance parameters, including customized data about the PHEV battery pack. The EnergyCS display provides multiple screens: one is shown in Figure 7-5. Like the CAN-view unit, the EnergyCS display is capable of

showing MPG over 99.9 MPG, tells users when they are operating in all-electric mode, and allows users to request all-electric operation. In addition, the EnergyCS unit provides a graphical display of the driver's power requirements and their impact on the vehicle's drivetrain. Once in all-electric mode, drivers can use the display to determine how much power will activate the ICE and can moderate throttle inputs to prolong all-electric operation.

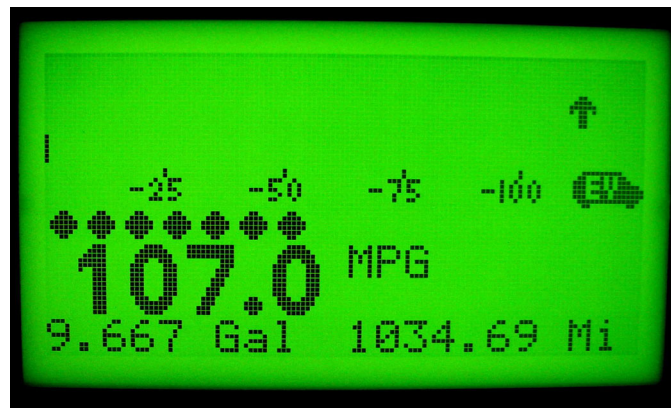


Figure 7-5 EnergyCS Display (Source: CalCars 2007)

Instrumentation and HEV Owners

Evidence from HEV owners in Phases I and II suggests that fuel economy instrumentation was important to many early buyers of HEVs. While some owners drove their HEV in the same way that they had driven their previous vehicle, many reported changing their driving behavior to maximize fuel economy. In particular, many Prius owners watched the MFD during driving since it provided instant feedback on ICE use and fuel consumption. To maximize fuel economy, many owners drove more slowly, accelerated and braked more gradually, and moderated their air conditioning usage. As one HEV owner explained, "I really like the fuel efficiency screen...I think that every vehicle in the world should be required to have one of these types of screens, [it] really

gets the driver's attention and shows them how much fuel they're using." For many HEV owners, instrumentation is an important tool that enables higher fuel economy.

But for many HEV owners, fuel economy instrumentation was more than just a tool. Numerous drivers explained the satisfaction they felt in seeing brief displays of fuel economy as high as 99.9 MPG while driving. For one driver, witnessing such high fuel economy was a reminder of the money he was saving by using less gasoline; for another, 99.9 MPG was proof that his HEV was far more technologically advanced than other vehicles. Some owners also were excited by their average fuel economy numbers, and proudly posted these numbers on the Internet for other HEV owners to see. One owner recomputed his lifetime average fuel economy each week, and experienced "nirvana" when the fuel economy for a particular tank was higher than average. When educating others about HEVs, many owners showed them the MFD since its MPG log provided proof of the HEV's high fuel economy. Because few non-hybrids have MFDs, the display also served as an indicator that the HEV was different from conventional vehicles. Instrumentation, therefore, can be more than a tool to help drivers to maximize fuel efficiency. It can signal that a vehicle is different or advanced, can make an intangible concept (using less fuel) seem more real, and connect drivers to ideas that relate to fuel economy, such as saving money or preserving the environment. MPG itself has become a symbol that stands for more than just economics.

Instrumentation and PHEV Drivers

Like the fuel economy instrumentation in HEVs, the instrumentation in today's PHEVs serves as both a symbol and a tool. One of its roles is to remind users that they are driving

a new type of vehicle. To a skilled observer, it may seem obvious that a PHEV is distinct from an HEV. However, for the typical driver, today's PHEV offers few clues to differentiate itself from an unmodified Prius. Most PHEVs in this study have some type of exterior signage identifying themselves as PHEVs, but otherwise the only unique exterior features are a small charging receptacle on the bumper and, in some vehicles, additional vents for battery cooling. Inside the vehicle's cabin, drivers have no indication that they are driving a PHEV except in those cars that included additional displays or modifications to the MFD. In one Hymotion PHEV that served as a fleet vehicle, the only reminder drivers had that they were using a PHEV was a note affixed to the dashboard reminding them to unplug the vehicle before leaving the parking lot. Even the driving experience was not different enough for many drivers to tell the difference between the PHEV and an unmodified PHEV. As one user of an EnergyCS conversion explained, "if no one told you, you would never know it was a plug-in hybrid." Installing instrumentation that includes fuel economy and energy use information is one way to differentiate PHEVs and alert drivers that they are in a new type of vehicle.

Just as it does in HEVs, instrumentation can also provide PHEV drivers with feedback that allows them to maximize their fuel economy. Most drivers in this study monitored their fuel economy as they drove, a skill they developed in past experience with conventional HEVs. One driver characterized his CAN-view as a "great training tool" that was constantly instructing him how to extract the most fuel economy from his PHEV. Another confessed to watching his PHEV's instrumentation closely and "playing the fuel economy game" as he drove. Like these drivers, consumers who buy PHEVs in

the future are likely to care about higher fuel economy, so it makes sense to provide tools that will help them attain it. However, today's PHEV drivers stress that instrumentation design is important. Several drivers were concerned that the current displays were too complex for the average user, and a few acknowledged making mistakes during their own use of the displays. Users in two vehicles inadvertently shut off their PHEVs' battery packs by pushing the wrong button on the display; another driver reported unintentionally adjusting the emissions mode of his PHEV. While both the EnergyCS and CAN-view displays are designed for a technically-competent user, future instrumentation will have to be accessible to drivers with less understanding of the PHEV powertrain.

In addition to serving as a tool for drivers who wanted to maximize their fuel economy, the instrumentation in this study's PHEVs also had larger significance for numerous drivers. Like HEV owners in previous studies, many PHEV drivers were excited when their vehicles attained 100 MPG, even if this fuel economy lasted only for a brief period. For many, 100 MPG signals performance they never thought was possible in an ICE-powered vehicle. "It's just amazing to drive at freeway speeds and get 100 MPG" explained one participant. For others, seeing 100 MPG on the PHEV's display serves as a tangible reminder of their vehicles' reduced greenhouse gas emissions or low consumption of imported petroleum. One driver proudly acknowledged that his fuel economy display had averaged 800 MPG recently, and that he had now set a new goal of attaining 1000 MPG. The excitement drivers feel when experiencing such high fuel economy cannot be explained simply by economics. Instrumentation affirms the connection between PHEVs and other significant ideas. Many of these ideas are the same

denotations we found to be associated with HEVs: preserving this environment, providing less support to oil companies and overseas oil producers, and accessing new technology.

While many drivers reported driving their PHEVs to maximize fuel economy, there were a few drivers who ignored their vehicles' fuel economy displays. One of these drivers explained that while he believed in the promise of PHEV technology, he was skeptical that the average carbuyer would change his driving habits to get better fuel economy. Rather than carefully watching the fuel economy display, he simply "drove the PHEV like a normal vehicle" at freeway speeds up to 75MPH. His resulting fuel economy was not much better than a conventional HEV, but he felt he had conducted an important test. "Plug-in hybrids have to function like normal cars, or they won't be widely accepted," he explained. This driver's behavior illustrates an important point: the efficiency of PHEVs varies significantly depending on how the vehicles are driven. Driver behavior, therefore, is an important component that must be better understood when assessing the environmental and energy use impacts of PHEVs. This driver also demonstrates that instrumentation is not a panacea. Regardless of how much information they are given about fuel economy or energy consumption, some drivers will maintain their current driving habits.

However, instrumentation can play an important role in making efficiency "real" for some drivers, and can cause them to drive more carefully than they otherwise would. One participant explained that he paid greater attention to efficiency when driving his PHEV

than when driving his BEV. Arguably, maximizing energy efficiency was more important in his BEV since the vehicle had limited range. However, he explained that he drove the PHEV more carefully because it gave him direct feedback about his energy use while the BEV did not. Instrumentation, therefore, is not just important for drivers who already have decided they want to conserve fuel. In some cases, instrumentation may be the reason behavioral change is even contemplated.

Recharging Behavior

A key issue in predicting the environmental benefits and fuel savings from PHEVs is the frequency and timing of recharging. A PHEV20, if consistently recharged before reaching 20 miles from a full charge and operated within the limits of its AEP, would use very little gasoline and would generate almost no tailpipe emissions. In contrast, a PHEV20 that was recharged only occasionally would have emissions and fuel use similar to that of a comparable HEV. How often a PHEV is recharged, and when that recharging occurs relative to miles driven, makes a significant difference in the vehicle's environmental impact and petroleum use.

With no data available on consumers' PHEV recharging behavior, previous analysis has relied on assumptions. For example, the Society of Automotive Engineers Recommended Practice (SAE J1711) covering HEV and PHEV fuel economy assumes that PHEV owners have a 50% chance of charging their vehicles on a given day. In their analysis of SAE J1711, Gonder and Simpson (2006) deem once-per-day charging as more likely. Gonder and Simpson's reasoning is based on economic incentives: while the purchase price of a PHEV will be higher than a comparable HEV, per-mile fuel costs for the

PHEV will be lower if operated on electricity. Owners, therefore, will have an incentive to recover some of the initial expense of the PHEV by operating on electricity and recharging often, even multiple times per day if possible.

Drivers' Willingness to Plug In

Among PHEVs in this study, frequent charging is common: 12 of the 15 vehicles were regularly plugged in multiple times per day. In fact, owners of nine vehicles reported plugging them in whenever possible; some organizations required their fleet vehicles to be plugged in anytime they were not being driven.¹⁹ Many participants explained that since they had PHEVs, they wanted take advantage of the technology. Since all of the PHEVs in this study could charge using a common, 110-volt (110V) household outlet, the number of potential charging locations was almost unlimited. The majority of vehicles (80%) were recharged in multiple locations that drivers visited regularly, such as their workplaces and homes. A smaller number of vehicles were also “opportunity charged” at other locations, including friends’ homes, hotels, and offices drivers visited during their workdays. Owners of independent conversions tended to conduct the most ambitious opportunity charging since their PHEVs’ lead-acid batteries provided the least boosted range. One participant had learned the importance of regular charging with his previous vehicle, a BEV conversion. He carried a 50-foot extension cord with him in his PHEV and plugged in at home, at work, at friends’ houses, and even on the street where outlets were available.

¹⁹ Of these vehicles, six were EnergyCS conversions. Owners of EnergyCS vehicles were advised to keep the vehicles plugged in as much as possible to maintain the condition of the battery pack. The charging behavior of these vehicles’ owners may have been different if they had not received this advice from their conversion provider.

Numerous drivers mentioned the ability of PHEVs to reduce gasoline costs. In general, drivers recognized that running their vehicles on electricity was less expensive than fueling them with gasoline, and associated PHEVs with the idea of saving money. One participant explained that recharging regularly maximizes the “extra efficiency that you paid for” in buying a PHEV. Another predicted that “anyone who would pay to own a PHEV is going to plug it in – it just makes economic sense.” Many also felt that cost savings would be the most appealing aspect for the average carbuyer. One driver explained that not everyone was interested in the PHEV’s environmental benefits, but the “pain the wallet” caused by rising gas prices seemed to be a universal concern that the PHEV was well-positioned to address. Another agreed, saying that he emphasized cost savings when talking to the public about PHEVs. Rather than discussing details about the PHEV’s battery, he explained the benefits of having “a second fuel tank that can run the car for [a few] cents per mile.”

However, it is not clear that today’s PHEV owners behave in exactly the way Gonder and Simpson (2006) suggest. Most drivers did not calculate the cost savings from operating their PHEVs electrically, nor did they compare lower operating costs with initial purchase price to determine a payback period. Those drivers who did analyze their operating expenses discovered that their PHEVs delivered only modest cost savings. For example, one owner of an independent conversion estimated that he had saved a paltry \$8.00 in 3,000 miles of driving. Some drivers did mention the potential for greater savings in the future. For example, one participant predicted that rising gas prices would continue to make electricity a more attractive fuel for the PHEV, eventually allowing her

to “save big bucks at the gas station.” She and other drivers who talked about future savings were thinking beyond today’s Prius-based PHEVs to new configurations with greater AER and AEP. These participants envisioned PHEVs that covered 80% or more of their miles in all-electric mode. As one driver described his ideal PHEV, “you can drive [it] all-electrically most of the time, and put gas in when you take a trip.” But even these drivers did not have specific cost savings in mind, and none had calculated an estimate of future savings generated by the PHEV.

In this way, PHEV drivers are similar to many of this study’s HEV owners who associated their vehicles with saving money even though they had not performed the financial analysis to confirm this belief. PHEV users know the vehicles can be operated for less money using electricity instead of gasoline, and this is what matters. Quantifying savings is less important, as is comparing ongoing fuel cost savings to other costs, such as purchase price, maintenance, and insurance. Like HEV owners, PHEV drivers also associate driving electrically with other symbolic meanings, including reducing air pollution, emitting fewer greenhouse gases, consuming less imported petroleum, and using a high-technology product. Since plugging in enables driving electrically, it also enables access to these important meanings. Drivers’ reasons for recharging, therefore, have as much to do with meanings as with financial savings.

The same applies to drivers’ purchase decisions. Only a handful of Phase III drivers actually owned their PHEV, but those who did pay for their own PHEV conversions were not interesting in saving money. (For the story of one independent PHEV owner’s

reasons for converting his vehicle, see Box 7-2). Past studies often assume that consumers will pay more for technologies that increase fuel economy only if the initial cost of these technologies is offset by fuel cost savings during a specified period of time, known as the “payback period” (for example, see National Research Council 2002). Kurani and Turrentine (2007) find that few consumers actually perform payback computations when purchasing any type of vehicle. There is no question that widening the gap between electricity prices and gasoline prices will make PHEVs more attractive. But policymakers and marketers should be careful not to overemphasize the importance of the payback period. U.S. sales of HEVs climbed to 250,000 units in 2006 despite continued insistence by some analysts and automakers that the vehicles do not make financial sense for consumers (for example, see Welch 2007). For drivers in this study, PHEVs were more than just a way to save money, and it is likely that other carbuyers will see additional value in PHEVs beyond their economic benefits.

Drivers’ Skepticism About Plugging Out

Another indication that PHEV drivers were not primarily interested in economics is that few raised the possibility of selling electricity back to the electricity grid. Vehicle-to-grid (V2G) connections, in which electric-drive vehicles provide power to the electricity grid, have been proposed as one method to offset the additional costs of PHEVs (for example, see Kempton and Tomić 2005). Participants were not prompted to discuss V2G, although several drivers did raise the topic; mainly these were employees of electric utilities who viewed V2G connections as impractical. One driver who did express interest in connecting his PHEV to the grid was not interested in selling power. Instead, he was excited by the possibility of providing electricity to his home during power outages, and

**Box 7-2: Alan Young, Private PHEV Owner
2005 Prius, converted 2006 (PiPrius)**

In the fall of 2005, Alan Young bought a Toyota Prius. Alan already owned a BEV, a conventional vehicle that he had converted to run on electric power with help from local BEV enthusiasts. Alan loved his BEV, but it wasn't always the most practical vehicle. Its limited range meant that he was often "stranded" away from home while his BEV recharged, and careful planning was required to successfully handle his 40-mile round-trip work commute. Alan's Prius offered more reliable transportation, and at the time of his purchase Alan was already envisioning a way to make it even better. Months earlier, he had read an article about PHEVs and was intrigued by the concept. To Alan, the PHEV seemed like the "best of both worlds." Much of his driving (perhaps 50-80%) could be done electrically, but he also would never be stranded as he often was in his BEV. A year after buying his Prius, Alan decided to convert it to a PHEV.

For a private individual, the cost of a PHEV conversion is considerable, and Alan found he had to sell his BEV in order to afford the PiPrius conversion kit. But for Alan, the expense was worth it. He was thrilled with his new PHEV, describing it as "infinitely better than an EV." Like his BEV, the Prius PHEV could operate all-electrically - under the right conditions - and Alan tried to keep his PHEV in electric mode as much as possible. He also drove to maximize fuel economy, using a CAN-View unit to provide him with fuel use information and feedback on his driving style. Even with the majority of his driving on the freeway, Alan was averaging 60 MPG, roughly a 20% improvement over his previous mileage in the Prius. Part of Alan's strategy to maximize mileage was to recharge his vehicle as often as possible, plugging in wherever and whenever he could. Typically, he charged at home in the evening and at work during the day. In addition, Alan charged opportunistically, carrying an extension cord in his trunk that could be used to connect his PHEV with outlets wherever he parked, including at friends' houses. Alan recalled one occasion when plugging in at a friends' condominium had caused a confrontation with the property manager, who accused Alan of "stealing energy." Alan was amused and calmly explained to his accuser that, at current rates, it cost just fifty cents to fully charge his PHEV's 5 kWh battery pack.

For Alan, the PHEV was mainly about the environment. He explained that he "feel[s] pride in leaving a better carbon footprint" and in doing his part to reduce fuel use. The denotation of advanced technology also played a role. Alan explained how his BEV had made him feel like a "maverick;" his PHEV also linked to the same idea of personal uniqueness. In addition, Alan indicated that his PHEV was a statement to automakers. To Alan, automakers seemed intent on selling inefficient trucks that most buyers didn't really want. Recently, he had watched the Superbowl on television and recalled that many of the advertisements were for large pickup trucks and SUVs. But Alan hoped that at some point in the future, automakers would embrace PHEVs, and television advertisements would showcase PHEVs rather than pickups. Yet Alan was realistic about the future of PHEVs. He recognized that many people would not buy a PHEV simply because it was better for the environment. While saving money was not a factor in his own purchase, he guessed that economics would figure more prominently into the purchase decision of the average carbuyer. Unless gas prices rose and PHEV prices dropped, Alan was unsure if many households would really be interested in buying PHEVs.

felt that the ability to provide backup power could be an important selling point for PHEVs.

Recharging Issues

While most drivers charged their PHEVs frequently, two drivers in this study had difficulty plugging in their PHEVs on a regular basis. Each of these drivers used a PHEV as a personal vehicle, and both often drove their PHEVs as HEVs. While most PHEVs in this study were plugged in at night, nighttime charging was not feasible for these two vehicles. One driver frequently had his PHEV on overnight trips away from home; the other was home each evening, but parked her PHEV on a public street without access to an electrical outlet. Daytime charging was also challenging for these drivers since both typically traveled in their vehicles to various destinations throughout the business day. One PHEV was parked at the driver's office for 1-2 hours each day and was plugged in during that time, but this was not enough to fully replenish the battery.

These two vehicles suggest that recharging is more complicated for drivers who lack a home base for their PHEVs. In this study, the PHEVs that were plugged in most often were those vehicles that made short trips (less than 40 miles) and regularly returned to a location where charging was available. The further a vehicle's use patterns deviate from this model, the more challenging it may become to use the vehicle as a PHEV. In theory, operating a PHEV as an HEV should not be an issue. However, two users in this study confirmed that some of today's PHEV battery packs can experience failures when they remain depleted for long periods of time. This is another technical issue that must be addressed before PHEVs can meet users expectations of them as fuel-flexible vehicles.

Infrastructure improvements may be one solution to the problems experienced by the two drivers described above. It is unclear whether these two drivers were unable to opportunity charge at other locations where parked their vehicles, including hotels and offices. It is also possible these drivers were wary of opportunity charging. As other PHEV drivers explained, the opportunity charging process was not always easy. Asking hotel clerks, parking attendants, or property managers for permission to plug-in often resulted in confusion and skepticism. Plugging in without permission was an easier solution, but sometimes drew the attention of property owners and made them angry. As members of the public become more familiar with PHEVs, they may be more willing to allow PHEV owners to charge their vehicles. Public charging infrastructure may also be installed, much like the charging stations that were installed for BEVs in California.

Part of what makes developing PHEV charging infrastructure easy is that today's vehicles recharge using 110V circuits that are already widely available. However, some of today's PHEVs also permit rapid recharging on higher-voltage circuits. Several owners reported occasionally "fast charging" their vehicles, usually on a 220V household circuit²⁰. The ability to recharge in less time would have solved the problem of one of the PHEV drivers who had recharging issues since her vehicle was parked at her office for 1-2 hours each day (assuming her employer was willing to install a higher voltage outlet for her vehicle.) Rapid charging was not a priority for most drivers in this study; most were satisfied with 110V recharging. However, this example illustrates that for some PHEV

²⁰ Although drivers in this study referred to it as "fast charging," 220V/50A charging may be referred to as normal charging in some literature.

drivers, rapid charging is important. In addition to providing 110V charging, future PHEVs may want to offer higher-voltage rapid charging as an optional feature.

Timing of Recharging

Studies assessing the impact of PHEVs on the U.S. electrical grid generally assume that these vehicles will charge only during periods of off-peak power demand (for example, see Kintner-Meyer et al. 2006). In this study's sample, nearly all vehicles were regularly charged during daytime business hours. Since owners of the eight EnergyCS vehicles were encouraged by the converter to keep their vehicles plugged in when they were not being driven, their daytime charging habits were likely influenced by guidance from their converter. However, among the remaining seven PHEVs, six plugged in as often as possible during the day. This result is not surprising given that many owners were not subject to time-of-use electricity rates, and therefore did not incur higher costs when plugging in during peak periods. Several drivers did acknowledge concern about exacerbating peaks on the electrical grid, and at least one driver intentionally delayed charging his vehicle until late in the evening. But in general, participants did not voice strong concerns about the ability of the electrical grid to handle the additional load of PHEVs.

Owners of the six non-EnergyCS PHEVs show a preference for frequent recharging of the vehicles, including during peak periods. Various methods have been proposed, including time-of-use rate schedules, timers, and smart chargers, that will discourage PHEV owners from charging during peak times. However, this sample shows that when

**Box 7-1: Steve Anderson, County Employee
2005 Prius, converted 2006 (PiPrius)**

Steve Anderson first heard about PHEVs at a solar energy conference he attended in late 2004. At the time, Steve didn't have any first-hand experience with hybrids or electric vehicles, but he was immediately interested in the PHEV concept. Steve, a public official who led his county's economic development efforts, began researching the vehicles and searching for ways to acquire a PHEV. Two years later, Steve was granted approval by his employer to purchase a used Toyota Prius. With help from engineers at a local college, Steve converted it to a PHEV using the PiPrius design. At the time, the vehicle was one of the first PHEVs owned by a government agency, and Steve was proud to be an early PHEV user.

Steve and his assistant used the PHEV mainly for work-related trips during the business day, although Steve also commuted to and from home in the vehicle occasionally. Whenever the PHEV was parked at Steve's office, it was plugged in to recharge its 3.5 kWh lead-acid battery pack. Generally, Steve charged the car only during the business day. At night, he disconnected the vehicle since he was concerned that charging problems could occur off-hours while the office was closed and the vehicle was unattended.

While driving the PHEV, Steve did his best to keep the vehicle in all-electric mode for as long as possible. Theoretically, his PHEV had 10-12 miles of AER, but Steve had found that he generally could drive 4-5 miles electrically before triggering the internal combustion engine. For Steve, driving all-electrically meant that his gas mileage numbers would increase. As he drove, he watched the fuel economy reading on his CAN-view unit. Steve confessed that when he first had his PHEV, his mileage numbers hadn't been so impressive. But the CAN-View had proved to be a "great training tool," and as Steve changed his driving habits, his in-town mileage rose to between 85 and 100 MPG. Like many PHEV drivers, Steve was captivated by the idea of attaining 100 MPG or more. "Our transportation fuel is in jeopardy" Steve explained, and vehicles with dramatically higher fuel economy seemed to be an important step toward a more sustainable and reliable transportation system. Steve felt the 100 MPG idea resonated with others too, and stickers on the outside of his PHEV told onlookers that the vehicle was capable of "100+ MPG."

For Steve, part of the PHEV's appeal was its high technology image. Steve's county was in a rural area that was trying to broaden its economic base beyond agriculture. High-technology firms were beginning to show interest in relocating to the area, and part of Steve's strategy to attract them was to demonstrate that the county's leaders had technology vision. The current companies Steve was courting were not automotive component manufacturers, but he figured that by purchasing a PHEV, the county defined itself as technology-savvy in general: "a place where new technology can be embraced." Steve also thought that the PHEV appealed to many of the county's residents who (he believed) saw the vehicle as it was being driven around the area. Steve imagined that, to them, the PHEV signified saving money and addressed the "pain in the wallet" that they felt each time gas prices rose. Steve also explained that many residents were political conservatives who were likely to be motivated by concerns about energy security. Steve guessed that for these residents, the PHEV represented an end to the situation in which we "hold ourselves hostage" through over-reliance on overseas petroleum.

It was these meanings that made the PHEV exciting for Steve. Most of his economic development work was so specialized that friends and family rarely asked about the details. But the PHEV was different. Members of the general public (especially young people) were interested in the car, and seemed to easily understand the bigger implications PHEV technology could have on transportation. "PHEVs are hot," Steve explained, and it felt good to be part of something that had so much appeal among residents in his community.

drivers have the capability to refuel from the electricity grid, they use it. Limiting the ability to recharge may make PHEVs less attractive to potential PHEV buyers.

Restricting PHEV charging to off-peak periods may also affect the PHEV configurations that appeal to buyers. Many of today's PHEV drivers set their AER requirements equal to the distance of their one-way commutes (usually between 20 and 40 miles.) This probably was because most drivers imagined charging at home and again at work, so their PHEVs could be fully replenished for the evening commute home. If the option of daytime charging is eliminated, drivers will lose the option to recharge at the office during business hours. As a result, they may prefer greater on-board energy storage to satisfy their round-trip commute distances (40 – 80 miles). PHEVs with these types of higher AER are feasible, but additional AER will result in higher vehicle prices. The EPRI (2001) consumer study suggests that many consumers lose interest in PHEVs (particularly PHEVs with high AER) as costs increase: just 7% of buyers said they would pay \$15,000 more than a conventional vehicle to buy a PHEV60. Thus, if PHEV recharging will be restricted in the future, consumer preferences for PHEVs in general, and specific PHEV configurations in particular, should be reevaluated.

Evaluating Electricity as a Fuel

As mentioned earlier, the environmental benefits of PHEVs vary depending on the source of electricity they use. Numerous participants were aware of this issue, and talked about how their electricity was generated. In particular, drivers of vehicles in the Northeast and Midwest noted that much of their power came from coal-fired plants. Drivers regularly explained to members of the public that PHEVs using electricity from coal were cleaner than conventional vehicles, since large plants could generate energy more efficiently and

offered a single point where pollution-abatement technology could be applied.

Nonetheless, some PHEV drivers were uncomfortable with connection between their clean vehicles and coal-generated electricity. For example, one Midwestern PHEV owner purchased renewable electricity from its local utility and proudly displayed an image of a wind turbine on the side of its PHEV. Even among PHEV drivers who recharged their vehicles with relatively clean electricity, the appeal of renewable electricity was strong. Two owners were planning to add solar panels to their roofs to fuel their PHEVs, and several others responded enthusiastically to this idea. The connection between PHEVs and home systems that generate renewable electricity should be explored further in future consumer research. In particular, the idea of bundling these two products should be discussed with consumers to understand whether it increases the appeal of the PHEV.

Managing Consumer Expectations

In the past few years, numerous organizations have begun to educate policymakers, auto manufacturers, and the public about PHEVs. Their efforts, combined with coverage of PHEVs in the popular press, have made many Americans aware of the new technology. One study found that over 75% of the U.S. public now has heard of PHEVs (Wall 2006), although this claim seems optimistic. Several of this study's drivers commented on the "buzz" that surrounds PHEVs, and a few participants acknowledged actively promoting the PHEV concept to others. In general, today's PHEV drivers are enthusiastic about the technology and believe it has significant potential. However, many are pragmatic when discussing the future market for PHEVs. The most common view was that the economics of the vehicles needed to improve considerably before widespread adoption would occur. Reductions in vehicle price are obviously needed: at the high end, aftermarket PHEV

conversions can cost as much as \$60,000, nearly double the base price of the original vehicle. But participants also felt that fuel prices would play a major role in affecting the public's interest in PHEVs. "\$6/gallon gas would change a lot of minds," explained one participant. Even among private owners of PHEVs, this view was common, although these owners acknowledged that their own decisions to acquire a PHEV were not motivated by cost savings.

Long-Term Reliability of PHEVs

PHEV drivers in this study discussed the reliability of their vehicles. While the majority of respondents expressed interest in driving a PHEV as their personal vehicle, at least one voiced caution about the state of the technology, saying that he would likely delay his purchase of a mass-market PHEV model until the second or third production year to avoid buying a vehicle with unresolved issues. In fact, numerous vehicles in this study experienced technical problems, and four vehicles had severe issues including failures of battery modules, on-board chargers, and electrical connectors. These issues often persisted for weeks and prevented the use of the vehicles as PHEVs. At the time Phase III interviews were conducted, two owners were operating their PHEVs as HEVs due to failures in the PHEV systems, and a third owner declined to participate because his PHEV was not functioning. Since all of today's PHEVs are custom-built conversions, technical issues are to be expected. However, the number of problems that have occurred in this small sample of vehicles indicates that significant testing may be needed before PHEVs can be made as reliable as conventional vehicles.

Another important consideration is that nearly all of the PHEVs in this study have been on the road for less than one year. In that time, they have generated valuable real-world data on battery and component performance. However, these vehicles don't yet tell us about what may happen in the long-term. In particular, key questions remain about the expected life of PHEV batteries that cannot be answered simply by looking at past experience with HEVs. Part of the uncertainty is due to the use of a battery chemistry that has not previously been employed in motor vehicles. Today's HEVs use nickel-metal hydride (Ni-MH) batteries, but the most appealing battery chemistry for future HEVs (including PHEVs) is currently lithium-ion (Li-ion). In this study's sample, two-thirds of the vehicles used Li-ion batteries. In the long term, Li-ion promises higher gravimetric and volumetric energy densities at lower cost than existing technologies. But technical issues (including thermal management) remain, and additional testing of Li-ion batteries in motor vehicles is needed to determine the actual performance potential of the technology.

A second source of uncertainty is rooted in the higher demands PHEVs place on their batteries. Today's HEVs maintain their batteries within a relatively narrow state-of-charge window to maintain battery life. This has allowed manufacturers like Toyota ease customer concerns about HEV technology by warranting batteries for 100,000 miles of use. However, Winkel et al (2007) note that because PHEVs require deep discharging of their batteries, shorter battery life is likely for these vehicles (given present commercial battery technologies). This means PHEV customers may face shorter manufacturer warranties and as well as battery replacement costs. Because this study's sample vehicles

are relatively new, they tell us little about the long-term performance of Li-ion batteries in PHEVs. One PHEV did require replacement of its battery pack, but it used lead-acid rather than Li-ion technology. Nor does this group tell us much about consumers' willingness to accept shorter warranties. By modifying their HEVs, owners in this study accepted potential loss of manufacturer warranty coverage for their vehicles, far more risk than the average consumer is likely to take when purchasing a new vehicle.

Educating the Public about PHEVs

Given the questions that remain about PHEV battery performance, some care should be taken to properly set consumer expectations. Educating the public about PHEVs makes sense as long as the technology is not oversold. Wind and Mahajan (1987) note that the "marketing hype" around a new technology product can substantially enhance consumer acceptance, but warn that timing is important. Getting consumers interested in PHEVs too long before the vehicles are available risks frustrating potential buyers. Much of this frustration will be directed at automakers, and some is already evident. In January 2007, General Motors unveiled a series-hybrid PHEV concept vehicle, the Chevrolet Volt, at the North American International Auto Show. As a result, General Motors received substantial positive press coverage and over 400,000 consumer requests for the company to build the vehicle; however, two months later the company acknowledged that consumers' and policymakers' expectations regarding the Volt were far too optimistic, and labored to explain that major technical hurdles remain before the PHEVs like the Volt can be mass-produced (Terlep 2007).

Among PHEV drivers in this sample, frustration with automakers was apparent. Several felt that automakers had a poor understanding of consumer needs, particularly regarding environmentally-friendly vehicles. Participants also accused automakers of ignoring PHEVs in favor of vehicles with older, less efficient technology (including ICE-powered trucks) that could be manufactured more cheaply and sold more profitably. Participants who were interviewed after GM's Volt announcement strongly favored the design, but many questioned whether the vehicle would actually be mass-produced. Certainly some of this skepticism is justified: until recently, most automakers showed little interest in PHEVs. Even Toyota, the leader in HEV sales, deemed PHEVs impractical as recently as two years ago (Hakim 2005b). However, automakers do have a point that additional research and development on PHEVs is needed, and this effort takes time.

In the end, PHEV advocates (including many drivers in this study) face a balancing act. Many want to spread the word about PHEVs in order to influence automakers to produce these vehicles. But the risk is that promises will be made that cannot be kept. The claim of one PHEV advocate that "plug-in hybrids are totally available and ready to be manufactured" (Motavelli 2006) is a good example: while the message may excite consumers, it does not fairly represent the state of battery technology or manufacturer readiness.

Chapter Conclusion

While Phase III did not include a detailed analysis of the symbolic meanings attached to PHEVs, there are indications from early users of the vehicles that the same denotations associated with HEVs are also associated with PHEVs. PHEV users associated the

vehicles with preserving the environment, saving money, reducing support for oil producers, and embracing new technology. Perhaps this should not be surprising, since all of today's PHEVs are converted HEVs, and to the uninformed user the two types of vehicles can be difficult to distinguish from one another.

As manufacturers, policymakers, and others consider ways to promote PHEVs, they should consider these symbolic meanings and their relevance to the consumer. Design choices, including the amount of AER and AEP, can not only affect the price and performance of a PHEV, but also the symbolic meanings that are attached to it. And behaviors such as recharging are likely to be affected as much by consumers' interpretation of symbolic meanings as they are by concerns about economics. As PHEV technology improves and nears commercialization, the denotations associated with these vehicles will become better-defined and more widely-held. But those who wish to promote PHEVs should also remember that over promising on the capabilities of PHEVs may lead to the association of negative meanings with these vehicles.

CHAPTER 8: CONCLUSIONS

“This is now what I’m more excited about than I was about the Dodge Viper or anything that we’ve ever done. This can bring about the revolution, and really make us independent of foreign oil and solve all the other problems.”

Robert Lutz, describing the Chevrolet Volt plug-in hybrid electric vehicle, during an appearance on National Public Radio, May 19, 2007

This dissertation began with the story of Robert Lutz, General Motors’ Vice Chairman for Product Development, who dismissed HEVs as an “interesting curiosity” during an interview at the 2004 North American Auto Show. Three years later, Lutz used the same venue to unveil GM’s own hybrid vehicle: the Chevrolet Volt, a series-hybrid PHEV40 with a very high AEP²¹. While the Volt was only a concept car, Lutz promised it would be put into production, insisting that the PHEV “could be one of the most important things we’ve ever developed” (Maynard 2007a). Interestingly, during at least one media appearance, Lutz’s pitched the new PHEV without any mention of fuel cost savings, payback periods, or other aspects of the financial analysis that had led him to deem earlier hybrid models as nonsensical. Instead, Lutz focused on symbolic meanings, highlighting the Volt’s connections to the denotations of national independence, revolutionary technology, and environmental preservation. Lutz seemed to understand that the meanings of the Volt would have more appeal to consumers than the promise of fuel cost savings.

²¹ General Motors claims the Volt will accelerate all-electrically from 0-60 MPH in under 8.5 seconds and will have a top speed of 120 MPH (Krebs 2007).

Recognizing the Importance of Symbols

A central point in this study is that HEVs are symbols, and their meanings are important to consumers. Buyers of HEVs purchase their vehicles for mobility, but they also purchase access to ideas such as environmental preservation, opposition to war, financial acumen, reduction of support to oil producers, or technology savoir-faire. These denotations, in turn, connect with owners' own ideas of themselves and are used in the construction of self-identity. An HEV is a statement about the environment, but it also is a proclamation about its owner's intelligence, personal ethics, and concern for other people. An HEV not only symbolizes the latest automotive technology: it also signals an owner who is smart, visionary, and able to help others to see the potential of an important new idea. An HEV links to the idea of saving money, but it also signals a smart, sensible consumer who has chosen a creative way to reduce unnecessary expenditures. In this way, the HEV is as much an identity solution as it is a transportation solution.

Giddens (1991) tells us that the development of self-identity is a critical activity in modern life. Nearly every choice we make, including our consumption choices, has identity implications, even if we don't intend it to. In the case of HEVs, many buyers are aware of their vehicles' meanings, and explain that their purchase decisions were motivated, at least in part, by the desire to access these meanings. This indicates that promoting new vehicles like HEVs involves getting the meanings right. Because a desirable set of symbolic meanings have been attached to HEVs, a vehicle like the Toyota Prius that was initially regarded as suitable only for a small market niche of environmentalists and technology geeks has risen to become one of the bestselling vehicles in the United States (R.L. Polk 2007b).

Among current vehicles, the Prius is the best example of how to get the meanings right in an HEV. The Prius' association with positive denotations such as the environment and high-technology occurred with very little manufacturer advertising. Instead, meanings were attached to the Prius because reporters, academic researchers, leaders of nonprofit groups, and Prius owners decided these vehicles symbolized environmental preservation and high technology and shared their views with others. In many ways, the success of the Prius has less to do with Toyota's marketing efforts and more to do with cultural process of meaning definition. The Prius demonstrates that manufacturers cannot completely control the meanings of their vehicles. Yet manufacturers like Toyota do have substantial influence over what their products symbolize, particularly in the design choices they make. Toyota's choice to launch the Prius as a new, hybrid-only model meant that, unlike the Honda Civic, the Prius entered the market without preexisting meanings attached to its model paradigm. In addition, the Generation II Prius' unique appearance meant it would not be easily confused with non-hybrid models, assisting in its communication of symbolic meanings and in owners' efforts to make statements about themselves. Also, inclusion of certain features such as all-electric launch and Bluetooth wireless networking strengthened the Generation II Prius' connection to the advanced technology denotation in particular. Finally, Toyota's choice to enlarge the Generation II model separated it from the compact car class and from the negative "economy car" meanings that offended many potential buyers.

Manufacturers cannot dictate what their vehicles mean, but they can design their offerings in a way so that the vehicles have a clear and authentic connection to desirable symbolic meanings. Toyota's recent decision to extend the Prius model line and launch additional hybrid-only models (*Automobile* 2007) exemplifies this strategy. The company's previous approach was to add hybrid powertrains to existing models, including the Highlander, Camry, and Lexus RX. Sales of these hybridized models have been modest compared to the Prius: in the first quarter of 2007, the Prius easily outsold all other Toyota hybrid models combined (R.L. Polk 2007b). Part of the problem may have been that hybridized models such as the Camry already had symbolic meanings associated with the model paradigm. Another issue may have been that hybridized models can be difficult to recognize as HEVs, and therefore have only a weak attachment to symbolic meanings associated with the hybrid powertrain. By developing additional hybrid-only models, Toyota has a better chance of establishing a strong connection between these models and the positive denotations and connotations that have spurred Prius sales. Associating these new vehicles with the Prius name (and morphing the Prius from model to brand) will further strengthen this association.

Policymakers have a role to play in meaning definition as well. As new types of technology such as PHEVs near commercialization, potential buyers become aware of the vehicles. Part of what consumers seek is an understanding of how the new technology functions. For PHEVs, buyers may want information such as the vehicle's purchase price, fuel economy, recharging procedures, and expected battery life. But in evaluating a new product, consumers conduct more than just a functional assessment. They are also

assessing what the product means. Initial evidence from early PHEV users suggest that facts and figures are less interesting than the idea of driving on the freeway and momentarily experiencing fuel economy of over 100 MPG (and feeling good about the environmental contribution this makes), never buying gasoline until an out-of-town trip requires it (and sticking it to overseas oil producers in the process), or gliding silently around town in all-electric mode (and showing off the latest in automotive technology). This means that policymakers should consider programs that educate consumers about both the functionality and the meanings of new products like PHEVs.

There may also be a role for policymakers in the protection of meanings once they have formed. If “hybrid” connects to the idea of high fuel economy and environmental preservation, vehicles that employ hybrid powertrains for other uses (such as increasing horsepower) have the potential to confuse that symbolic connection. To avoid this problem, policymakers should consider developing terminology that reinforces clear symbolic connections and also assists in the attainment of policy objectives. HEVs, for example, could be divided into several categories based on fuel economy and environmental friendliness, and a model’s category could appear on its window sticker. However, categories must be more user-friendly than some government-devised schemes (such as emissions ratings) that use highly technical language and tend to remain meaningless for the average carbuyer.

Avoiding Functional Myopia

A colleague who develops forecasting models once assured me that if I provided him with a driver’s income and family size that he could easily predict the type of vehicle that

person drove. Implicit in his claim is the assumption that functional needs and budget dictate people's car purchases. Certainly these two factors are important, but they are not the only considerations. Among this study's sample, there are numerous examples of households that switched from a larger vehicle into a smaller HEV, or from an expensive luxury vehicle to a relatively affordable non-luxury HEV. In some cases, this shift was accompanied by grumbling from spouses who missed the comfortable ride of the previous vehicle, from children who resented the HEV's cramped back seat, or from owners themselves who missed the high performance of their old cars. But what made the purchase worthwhile for these HEV owners was that they acquired a set of symbolic meanings in their HEVs that was unavailable in any other vehicle. This explains why many buyers shopped only for HEVs, and why few considered the non-hybrid version of their car when it was available. Only an HEV provided access to the denotations and connotations that these buyers sought.

What complicates our understanding of automobile purchases is that when consumers talk about functionality or finances, they are often really talking about symbolism. Examples include the Prius owner who insists he purchased his HEV for the Bluetooth feature but then admits he has never used it, or the Honda Accord Hybrid owner who claims she bought her HEV to save money but does not know how much she spends on gasoline. It may appear that these consumers are behaving illogically, but they are not. In both cases, the HEV symbolized denotations (high technology and saving money, respectively) that mattered to the respondents. The fact that owners talk most readily about particular feature-functionality in their vehicles should not surprise us. On the

surface, the HEV's engine auto-stop feature is more obvious and easier to describe than the vehicle's anti-war meanings. But we should not mistake the things that consumers can easily articulate for the things that really matter in their car purchases. To really understand purchase behavior, we have to look beyond simplistic explanations, even when these explanations come from consumers themselves. As researchers, we should stop pretending that if we ask the "right" question, our subjects automatically will deliver a "true" and comprehensive answer. Instead, we should explore ways to work with respondents to collaboratively develop a deeper understanding of how symbolism, functional needs, budgetary constraints, and a multitude of other factors converge during households' vehicle purchase decisions.

Debunking the Analyst's Fallacy

As scientists, if we want to understand an issue, we investigate it in a structured, comprehensive way. To understand the environmental benefits of HEVs, for example, we might review numerous models of well-to-wheel energy use and CO₂ output, or conduct dynamometer experiments to measure tailpipe emissions and fuel use. As experts, we know members of the general public can't go to the same lengths to understand these issues. But we expect that if people care about a problem (such as the effects of motor vehicles on the environment) that they will take the time to study it in some detail, perhaps reviewing material produced by experts. We also expect that this understanding then will become the basis for action (such as an HEV purchase). In other words, we like to think that people basically behave like us: they identify a problem, research it, and develop a solution.

But this is a fallacy: I'll call it the analyst's fallacy. In reality, comprehensive analysis is not the only tool people use to explore an issue: they can also use symbolic meanings.

This was evident among many households in this study. Few among those who associated their HEVs with the environment knew much about their vehicles' emissions rating or CO₂ output. Few among those who associated their HEVs with independence from Middle Eastern oil investigated the source of U.S. petroleum supplies. Instead, households used a combination of analysis and symbolism, researching issues as well as they could and combining (and sometimes overriding) their findings with symbolic meanings. One owner who was interested in the HEV's financial benefits constructed a detailed spreadsheet comparing his current BMW sedan with various options, including several hybrid and non-hybrid models. His analysis showed that buying a hybrid SUV like the Ford Escape Hybrid was by far the worst financial choice, even more costly than keeping his pricey BMW. Yet in the end he purchased the Escape Hybrid, motivated largely by his "emotional attraction" to the technology meanings in the HEV and by his perceived ability to "send a message to the American car industry" by purchasing an HEV.

Ortner (1979) notes that one function of symbols is to help us make sense of complex issues. Issues like energy security, international politics, and environmental preservation are not easy topics to understand. In environmental preservation, for example, what is really "good for the environment" is subject to debate, as are many other questions. Does recycling make sense? Will global warming have severe consequences? Individuals who attempt to gain a better understanding of these issues are often confronted with

conflicting evidence, and find that there can be disagreement among experts regarding the best course of action. Symbols can be important tools for managing complex, confusing issues like environmental preservation. Few households in this study were environmental experts, but many felt that buying an HEV meant they were having a positive impact on environmental problems. For them, it was the symbolic connection between the HEV and environmental preservation (rather than a calculated assessment of the HEV's ecological impact) that motivated their purchases.

For those who believe strongly in the analyst's fallacy, it is tempting to dismiss symbolism as a merely a shortcut individuals use when they lack the time, will or ability to conduct a more thorough analysis. In fact, the opposite may be true: people may generally use symbolic meanings to guide their behavior, but at times conduct more careful, deliberate analysis that allows them to reevaluate the legitimacy of symbolic associations they hold. The truth is, I don't yet know which (if either) of these views is correct. It was beyond the scope of this study to explore respondents' cognitive processes in such detail, but the findings here show that at the very least, symbolism appears regularly in the vehicle purchases of HEV owners. This means that, as researchers, we should not assume that comprehensive analysis is the only method (or even the most common method) consumers apply when buying an automobile.

In fact, our faith in the analyst's fallacy means that we often avoid examining important aspects of consumer behavior and substitute assumptions instead. For example, one survey that asks consumers why they purchase hybrids reveals that buyers are seeking

new technology, higher fuel economy, and/or lower emissions (CNW 2004b). There is nothing wrong with these results, unless we then assume that HEV buyers who seek higher fuel economy are people who monitor their fuel expenses carefully and HEV buyers who seek low emissions are environmentalists who are well-versed in air-quality issues. Once we begin making these types of assumptions, we replace our understanding of how people behave with a prescription of how we'd like them to behave, or how we think we would conduct ourselves under the same circumstances. The best approach is to dig deeper into these responses, and to ask why. Why is higher fuel economy important? Why are HEV buyers interested in new technology? Why do lower emissions matter? This study answers these questions and, in the process, outlines real-world vehicle choice behavior that clearly debunks the analyst's fallacy.

Adopting a New Research Paradigm

If we want to develop a better understanding of why people choose to buy the vehicles they do, the first step is to make fewer assumptions and allow consumers to show us what is really going on. This means acknowledging that respondents (rather than researchers) are the real experts, and recognizing that the adoption of the respondents' emic viewpoint is essential to understanding their behavior. It also means studying the context of consumer's decisions rather than attempting to strip this context away. Within the rich purchase narratives of HEV owners, numerous elements emerge that are not captured in any vehicle choice model. Within these elements lies the potential not just to improve existing modeling efforts, but also to provide more comprehensive explanation of why people behave the way that they do. Some readers may see these as the same thing: the more we quantify, the more we understand. But this is not the case. Just because we can

discuss a behavior in numbers and examine it using mathematical models or statistical tools doesn't mean we really understand that behavior, why it occurs, or how it might change in the future. There is a role for quantitative methods in behavioral research, but there is also an important role for qualitative techniques. Given that quantitative studies have dominated in the transportation field, perhaps it is time for researchers to place greater emphasis on qualitative techniques and balance the existing body of quantitative studies with qualitative findings.

Setting a Future Course

Any well-constructed study generates more questions than it answers, and this one was no exception. As we talked with households, numerous new issues arose that could not be thoroughly explored. In addition, during the study several new methods were identified that could not be incorporated without substantially altering the study's timeline and scope. A few of the most promising areas for future research are outlined below.

Additional Research Methods

One potential enhancement for this study's methods is to increase the level of collaboration between researcher and respondent during the data analysis phase. In the current study, data for a given household was collected during an ethnographic interview, and analysis of that data was then conducted independently by the researcher. Future studies may want to follow this same procedure, but include a second ethnographic interview. In this second interview, the researcher would return to the household, present his initial findings and semiotic map, and let the household respond. The subjects themselves would judge the accuracy of the findings and provide additional detail where

it was needed. For some households, the semiotic map could be a catalyst for additional discussion, and might trigger recollection of new symbolic meanings or other important aspects of the purchase that were not discussed during the first interview. The second interview also would provide a setting for the researcher to obtain clarification in key topic areas.

This approach is not entirely new: previous studies have included “member checks” (Belk et al. 1988) or “respondent validation” (Silverman 2001) in which researchers’ final results were verified by one or more trusted respondents. However, it is less common to share findings with every respondent in a structured way, or to do so early in the data analysis process. The goal of the second ethnographic interview is to encourage households to reflexively examine their own behavior with assistance from the interviewer. This approach is modeled on previous work by Kurani et al. (1994) in which household travel diaries were translated into timeline charts by researchers. These charts were then used as a basis for discussion about BEVs and their potential usefulness for the household. In many cases, the charts presented respondents with information about themselves in a format they had never seen before, increasing respondents’ awareness of their own behavior. As interviewers, we cannot simply assume that households understand their own behavior and are ready to tell us about it. Often, we must assist respondents in thinking about what they do and why they do it. One technique is to provide respondents with an external assessment of their behavior (in the case of the second interview, a draft semiotic map) that serves as a catalyst for additional reflection and discussion. Of course, this approach assumes that the research process is truly

collaborative, and that respondents can comfortably tell the researcher when they think he has mischaracterized a behavior or drawn a faulty conclusion. Ultimately, the goal of the second interview should not be to persuade the respondent that the researcher's view is correct, but rather to collaboratively refine and expand both parties' understanding of the respondent's behavior.

A second technique for future studies involves the placement of advanced technology vehicles with households. In this study, much of our analysis was in the present: we examined what existing HEVs meant to the people who owned them. Perhaps a more important area for automobile manufacturers and policymakers is anticipating what future vehicles (such as PHEVs or FCVs) will mean to consumers and how this might impact commercialization. One way to evaluate the symbolic meanings consumers attach to a new product is to expose them to the product and assess meanings as they develop. With vehicles, this would entail placing a PHEV or FCV with a household who has not previously used this type of vehicle and then conducting a series of interviews over time as the household gains more experience using the vehicle. Unlike current field trials of FCVs, the goal would not be to assess the technical performance of the vehicle, but rather to understand what the vehicle means to users, how these meanings evolve over time, and how they may impact the likelihood of future purchase.

Additional Research Topics

A common question that is asked in response to this work is, what about people that decided not to buy HEVs? We have been asked whether consumers who considered and then rejected HEVs represent a different type of carbuyer who cares less about symbolic

meaning. A more likely explanation is that hybrid rejecters recognize symbolic meaning in vehicles and use it in self-narrative development just as HEV owners do, but that there is a poor fit between the HEV's meaning and rejecters' self-identities. Just as households in this study rejected the Hummer H2 as a poor symbolic fit with their own selves, hybrid rejecters may see themselves as incompatible with denotations such as environmental preservation or technology adoption. In particular, this may occur if hybrid rejecters perceive more negative meanings in HEVs than buyers do. For rejecters, a denotation like environmental preservation may link more strongly with connotations such as radicalism and unreasonableness, while advanced technology may connect with the idea of a risky, untested product. Interviews with HEV rejecters would reveal how these consumers perceive HEVs, why they decided not to purchase them, and whether substantial differences in the perception of symbolic meaning exist between HEV buyers and non-buyers.

A second area for additional research is a more comprehensive examination of the symbolic meanings attached to the HEV's numerous signifiers. In Chapter 6, I discuss the meanings that households in this study attached to paradigms such as model, vehicle class, and brand. However, a full exploration of the meanings in these areas was beyond the scope of this study. As a result, the semiotic maps in Chapter 6 are incomplete, and I can only speculate about the connotations underlying many of the denotations that were identified. Since it is not just an HEV's powertrain that gives it meaning, a deeper exploration of other paradigms would broaden our understanding of what current HEVs

mean as well as allow us to better anticipate what future paradigmatic combinations may signify.

The techniques and theory outlined in this dissertation can also be applied more generally within the transportation field. An obvious place to begin is with other vehicles. For example, what are the meanings of pickup trucks? Full-size pickup models are some of the bestselling vehicles in the United States (*Automotive News* 2007), but the popularity of these large, fuel-inefficient vehicles has implications for our nation's greenhouse gas emissions and petroleum use. Understanding why consumers buy these vehicles and the role meaning plays in pickup truck purchases is the first step in developing solutions to mitigate the energy and environmental issues caused by these vehicles.

In addition, semiotics is applicable in areas other than the automobile purchase.

Consumer choice lies at the heart of many transportation issues, and symbolic meanings are likely to influence many of these choices. Why do people refuse to ride the bus? Why do many households choose to live in the suburbs? Why do some people drive dangerously fast? To answer these questions, we must first understand what riding the bus, living in the suburbs, and driving fast mean to people. Like HEV ownership, these activities may be regimes that connect (or in the case of riding the bus, fail to connect) with individuals' identities. If this is true, than prescriptions such as improving bus service, discouraging suburban development, or increasing fines for speeding are unlikely to change people's behavior. To develop successful transportation policy, we must first understand why people do the things they do. This means acknowledging the modern

individual is engaged in a constant process of self-definition, and that he is always seeking meanings that can be used to maintain or improve the story he tells about himself. If we can understand which meanings are important and why, we can begin to develop policy solutions that stimulate behavioral change.

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APPENDIX I: SAMPLE SUMMARIES (PHASES I - III)

<p style="text-align: center;">Phase I Compact HEV 11/04 – 4/05</p>	<ul style="list-style-type: none"> • 25 Households • 84% In-Home Interviews • 84% Multiple Decision-Makers Present • 96% Northern California • 50%/50% Male/Female • Participant Age: 18 - 87 • Vehicle Ownership: 1 month – 3.5 years 	 <table border="1" style="display: none;"> <caption>Phase I Vehicle Ownership</caption> <thead> <tr> <th>Vehicle Model</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Prius (Gen II)</td> <td>62%</td> </tr> <tr> <td>Civic</td> <td>28%</td> </tr> <tr> <td>Prius (Gen I)</td> <td>10%</td> </tr> <tr> <td>Insight</td> <td>4%</td> </tr> </tbody> </table>	Vehicle Model	Percentage	Prius (Gen II)	62%	Civic	28%	Prius (Gen I)	10%	Insight	4%
Vehicle Model	Percentage											
Prius (Gen II)	62%											
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Insight	4%											

<p style="text-align: center;">Phase II SUV, Full-Size HEV 5/06 – 9/06</p>	<ul style="list-style-type: none"> • 20 Households • 85% In-Home Interviews • 50% Multiple Decision-Makers Present • 100% Northern California • 68%/42% Male/Female • Participant Age: 24 - 69 • Vehicle Ownership: 1 month – 1.5 years 	 <table border="1" style="display: none;"> <caption>Phase II Vehicle Ownership</caption> <thead> <tr> <th>Vehicle Model</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Accord</td> <td>30%</td> </tr> <tr> <td>Escape</td> <td>30%</td> </tr> <tr> <td>Camry</td> <td>25%</td> </tr> <tr> <td>Highlander</td> <td>15%</td> </tr> </tbody> </table>	Vehicle Model	Percentage	Accord	30%	Escape	30%	Camry	25%	Highlander	15%
Vehicle Model	Percentage											
Accord	30%											
Escape	30%											
Camry	25%											
Highlander	15%											

<p style="text-align: center;">Phase III Plug-In HEV 12/06 – 3/07</p>	<ul style="list-style-type: none"> • 24 Participants • 74% In-Person Interviews • 71% California Residents • 83%/17% Male/Female • Vehicle Ownership: 2 months – 2 years • 20% Vehicles Owned by Private Individuals 	 <table border="1" style="display: none;"> <caption>Phase III Vehicle Ownership</caption> <thead> <tr> <th>Vehicle Model</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Energy CS (Li-Ion)</td> <td>54%</td> </tr> <tr> <td>Independent (PbA & NiMH)</td> <td>33%</td> </tr> <tr> <td>Hymotion (Li-Ion)</td> <td>13%</td> </tr> </tbody> </table>	Vehicle Model	Percentage	Energy CS (Li-Ion)	54%	Independent (PbA & NiMH)	33%	Hymotion (Li-Ion)	13%
Vehicle Model	Percentage									
Energy CS (Li-Ion)	54%									
Independent (PbA & NiMH)	33%									
Hymotion (Li-Ion)	13%									

APPENDIX II: PRE-INTERVIEW QUESTIONNAIRE (PHASES I AND II)



Dear Participant,

I'm pleased that you have volunteered to participate in the UC Davis Institute of Transportation Studies Hybrid Vehicle Study. There are two things we need you to do **before** the day of your interview:

1. Complete the **attached questionnaire** electronically or on paper and return it to us via fax (530-231-0160) or email (rrheffner@ucdavis.edu).
2. Select **two or more pictures** that express the thoughts and feelings that come to your mind when thinking about your hybrid vehicle. These pictures may come from any source such as a magazine, newspaper, the Internet, or even photographs you have taken yourself. We'll spend part of our interview discussing your pictures and why you selected them.

All the information you provide in the attached questionnaire and during the interview will remain strictly confidential. If you have any questions before the interview, please feel free to contact me by phone (530-400-2702) or via email (rrheffner@ucdavis.edu). Our research team is looking forward to meeting you.

Regards,

Rusty Heffner
Researcher
Institute of Transportation Studies
University of California, Davis
One Shields Avenue
Davis, CA 95616
(530) 400-2702

Hybrid Vehicle Study: Pre-Interview Questionnaire

Household Members

1. Please tell us about each person in your household. Begin with yourself on line #1.

Household Member	Name	Age	Gender (M/F)	Licensed Driver? (Y/N)	Occupation
1					
2					
3					
4					
5					
6					
EXAMPLE	John Smith	19	M	Yes	Student

Household Vehicles

2. Please tell us about the cars and/or trucks your household owns. Begin with your hybrid car on line #1.

Vehicle	Model Year	Make/Model	Date Purchased (Month/Year)	Purchased New or Used?
1 (HYBRID)				
2				
3				
4				
5				
6				
EXAMPLE	2004	Volkswagen Golf	June 2004	New

3. Are there any other vehicles your household uses? (These could be vehicles your household borrows, leases, or rents regularly). Describe them below:

4. Roughly how far do you drive your vehicles? (You can provide your estimate in whichever format is most convenient: miles per week, per month, or per year.)

	Make/Model	Miles Per Week/Month/Year
1 (HYBRID)		
2		
3		
4		
5		
6		
EXAMPLE	Volkswagen Golf	12,000 miles/year

Hybrid Vehicle

5a. Did you have to wait before purchasing your hybrid, or was it available immediately?

- Waited for hybrid
 Available immediately

5b. If you had to wait for your hybrid, how long did you wait?

6a. Does one household member usually drive the hybrid, or is it shared regularly?

- Usually driven by one person
 Usually shared

6b. Who drives the hybrid regularly?

7. What are the main uses of your hybrid? Where does it go during a typical day or week?

HYBRID USES	Activity or Destination	Frequency
EXAMPLE	Take kids to school	Every weekday

8. What do you like best about your hybrid?

9. What do you like least about your hybrid?

Previous Vehicles

10. Please tell us about some of the cars and/or trucks your household had in the past but no longer owns. Begin with the vehicle that you sold or disposed of most recently. Include as many vehicles as you can, up to 10 in total.

Vehicle	Model Year	Make/Model	Date Purchased (Month/Year)	Purchased New or Used?	Date Sold (Month/Year)
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					
EXAM PLE	1996	Ford Explorer	March 1998	Used	June 2002

Pictures

Don't forget to select two or more pictures that express the thoughts and feelings that come to your mind when thinking about your hybrid vehicle. These pictures may come from any source such as a magazine, newspaper, the Internet, or even photographs you have taken yourself. You don't need to send these pictures to us, but please have them ready for your interview.

APPENDIX III: INTERVIEW PROTOCOL (PHASES I AND II)

[Household Name] [Household Number]

- Interviewers:
- Date:
- Location:

1. Introduction

- Introductions (Interviewers, ITS-Davis, Study)
- Interview Plan
- Confidentiality
- Paperwork
- Participant Questions

2. Background Information

Confirm pre-questionnaire responses in the following areas:

1. Household members
2. Household vehicles
3. Other vehicles used by household
4. Vehicle use (mileage)
5. Waiting and duration of wait
6. Vehicle use (person)
7. Vehicle use (activities)
8. Best aspects
9. Worst aspects
10. Previous Vehicles

a. What kind of mileage (MPG) does your hybrid typically get? Do you have a rough idea of how much you spend on fuel each month or year?

b. What are you currently paying for gasoline (per gallon)? Where do you expect prices to go?

c. Roughly what do you spend to insure your hybrid?

3. Hybrid Purchase

3.1 Purchase History (Storytelling)

a. Description of Events

Cover, if needed:

- b. Initial event(s) that provoked interest:
- c. Point when subject decided to make purchase:
- d. How vehicle is optioned:
- e. Why hybrid not considered earlier:

Note:

- e. Purchase Drivers:
- e. Symbolic Meanings:
- f. Referents/Info Sources

3.2 "Wide" Choice Set

- a. What were the other vehicles considered during the purchase of your hybrid?

Vehicle (Yr/Mk/Mdl)	Actions Taken	Reason for Thinking About this Vehicle	Perceived Advantages	Perceived Disadvantages

3.3 Prompted Choice Set

- a. Did you consider any of the following vehicles during your hybrid purchase?
- b. Why or why not? (explore associations with other vehicle types)

Vehicle (Yr/Mk/Mdl)	Actions Taken	Reason for Thinking About this Vehicle	Perceived Advantages	Perceived Disadvantages
Other Hybrid				
Compact non-hybrid (Corolla/Civic)				
Midsized/fullsize non-hybrid (Camry/Accord)				
Other (non-hybrid)				
Any Pickup/SUV				

Symbolic value of other vehicles:

4. Symbolic Benefits (Photo)

- a. Review photo if subject has selected one.

Note: Symbolic Benefits, Functional Benefits, Experiential Benefits, Metaphors

Photo 1:

Photo 2:

Photo 3:

Photo 4:

Photos they wanted but couldn't find?

5. Symbolic Benefits (Verbal)

- a. Who buys a hybrid like yours? Do the same people buy a Prius (Civic Hybrid)?
- b. Does your car say anything about you? When people see you in this car, what do they think? Would a Prius (Civic Hybrid) say something different?
- c. Can you remember a time when you thought "I'm so glad I bought this car"?
- d. Do others (friends, family, etc.) know what kind of car you drive? Who? How?
- e. Have you talked to strangers about your car?
- f. What do you think about SUVs in general? Would you own a non-hybrid SUV?

6. Benefits

6.1 Main Purchase Drivers

- a. Distill main purchase drivers and confirm with subject. (Priorities are relative.)

Priority	Reason for Selecting Vehicle

- b. Explore importance of frequently-cited hybrid advantages:

- a) Reduced pollution

- b) Less global warming emissions
- c) Fuel cost savings (now or in future)
- d) Reduced resource use
- e) Demonstrate “values”
- Would a Prius (Civic Hybrid) have the same benefits?

6.2 *Evaluating Purchase Drivers*

a. Probe for means-end chain on each main purchase driver.
Purchase Driver 1

Why was this important to respondent?

What was respondent’s knowledge level?

What were respondent’s other supporting behaviors?

Why was chosen vehicle better than those in choice set?

Why were other alternatives excluded? Other fuels? Other vehicle body styles?

Purchase Driver 2

Why was this important to respondent?

What was respondent’s knowledge level?

What were respondent’s other supporting behaviors?

Why was chosen vehicle better than those in choice set?

Why were other alternatives excluded? Other fuels? Other vehicle body styles?

7. Disbenefits

a. When purchasing the vehicle, what problems did you see with the hybrid?

Priority	Before/After Purchase

b. Explore typically-cited hybrid issues:

- Vehicle size (passenger and cargo room)
- Vehicle styling
- Price (more expensive than comparable non-hybrid cars)
- Failure to attain advertised mileage
- Performance (poor acceleration, handling)
- Safety (collision with larger vehicle)
- Long-term durability (Battery replacement fears)
- Reliability (Technology has not been fully proven)
- Would a Prius (Civic Hybrid) have the same issues?

Disadvantage 1
Why important?

Coping strategy?

Disadvantage 2
Why important?

Coping strategy?

8. FCVs

Discussion of FCVs _____ prompted or _____ unprompted

- a. Have you heard about fuel-cell vehicles? What have you heard and from whom?
- b. Do you think you'll be driving an FCV in the future?

APPENDIX IV: INTERVIEW TOPIC LIST (PHASE III)

I. Participant Background

- Basic Demographics: Age, Brief Household Information, Occupation
- Why selected for PHEV use?
- Current personal vehicle(s)
- Past experience with AFVs

II. PHEV Use

- Personal, business, or both?
- Destinations (where, when, how often)
- MPG; changes to driving style?
- Driving experience (likes/dislikes)
- Passengers (who, why, when)
- Company rules regarding use (destinations, passengers, cargo, speeds, log requirements)
- Training, education received

III. PHEV Refueling/Recharging

- Typical recharging behavior (when, where, how long)
- Recharging process
- Recharging experience (likes/dislikes)
- Company rules regarding recharging

IV. Meanings

- Narratives: First use, typical use, recharging
- Explore common HEV meanings
 - Positive: Environment, Oil independence, Technology, Financial
 - Negative: Expensive, Unreliable, Unsafe, Harmful to Environment