Dishsoap for clean water: how the design of everyday objects can promote happiness

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School of Design
M.F.A. Thesis
Rochester Institute of Technology
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contents

Dishsoap for clean water: how the design of everyday objects can promote happiness

Xanthe Matychak

abstract

This project began with the question: What keeps us from achieving sustainable happiness, happiness for ourselves and future generations? I have chosen to focus on the citizen/consumer conflict which occurs when our consumer choices are incongruous with our moral obligations to society. This conflict is a consequence of the market systems that are in place and consumers' lack of a critical understanding of these systems. Thus, with this project, I am attempting to make these systems more transparent. Looking at economic approaches like price adjustment and awareness-raising strategies I have focused on the latter. Drawing from the history of semiotics and experiential pedagogy, I applied pedagogical principles to an everyday consumer product, in this case dish soap, in order to help consumers understand, through the use of the product, the product's ecological benefits and how their own consumer choices affect environmental health. The name of the emerging product is *Clean: dish soap for clean water.*

key words

product design, sustainable design, sustainable happiness, eco-labeling, awareness raising, consumer preferences, environmental values, pedagogy, experience, semiotics, aesthetic theory, green chemistry, industrial ecology

This project began with the question: What keeps us from achieving sustainable happiness, happiness for ourselves and future generations? I have chosen to focus on the citizen/consumer conflict which occurs when our consumer choices are incongruous with our moral obligations to society. This conflict is a consequence of the market systems that are in place and consumers' lack of a critical understanding of these systems. Thus, with this project, I am attempting to make these systems more transparent. Looking at economic approaches like price adjustment and awareness-raising strategies I have focused on the latter. Drawing from the history of semiotics and experiential pedagogy, I applied pedagogical principles to an everyday consumer product, in this case dish soap, in order to help consumers understand, through the use of the product, the product's ecological benefits and how their own consumer choices affect environmental health. The name of the emerging product is *Clean: dish soap for clean water.*

In this paper I will document my design process, which includes the following five areas of research:

1 Moral philosophy: an ideological investigation of my own environmental values.
2 Economics/marketing: a theoretical analysis and empirical study of the factors that shape consumer preferences.
3 Semiotics of design: a historical overview of the influence of the designed world on values.
4 Experiential pedagogy: a definition and application of pedagogical principles to my dish soap project.
5 Product life cycle: a brief survey of the industrial and biological ecology of dish soap.

This project owes much to a writing exercise given to me by Professor Richard Shearman in his Environmental Values class at RIT. The assignment was to develop a moral philosophy. The timing was such that I was developing this philosophy, and asking the big questions, as I was embarking on my thesis project. Once I found the answer to the meaning-of-life question, many smaller questions concerning my thesis were answered.

To develop my philosophy, I asked myself this question: Why am I an environmentalist? I concluded that happiness is a human right and in order to achieve sustainable happiness—happiness for ourselves and for future generations—we must all have environmental health.

I believe, with Aristotle, that happiness is the goal of the human race. And I hold that we can achieve happiness by understanding the natural world as a community (what I will call world community), of which each of us is an integral part. This belief is based on the assumption that all humans, or at least most of them, would never intentionally harm another person. Yet, those of us who do not intend harm do in fact cause harm through the industrial practices that we support through our consumerism: industrial practices that create pollution and therefore health hazards to all living things, including humans. If we can understand how our consumerism affects environmental health, then we can work toward establishing deep connections to the natural world and thus be able to experience meaningful relationships that will motivate us to care for the physical health of the world community. A shift toward these values can result in a more sensitive relationship to the world community as an ecosystem with particular needs. When we respect such needs, we will live in a way that is sustainable, and thus we will be able to sustain our happiness.

Our current behaviors illustrate that we are isolated from the natural world. We tend to favor the desires of individuals and small groups and ignore the needs of the world community (note: this is a major conflict throughout the project. I will include Mark Sagoff's discussion of this problem in the economics section of this document). For example, many of us value

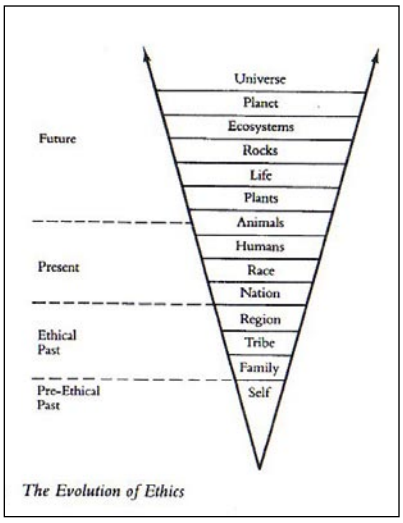


Figure 1. The evolution of ethics. (Nash 1989, 5).

mostly our homes (property) and families, then our city and its people (a little less), our state and its members (a little less), and lastly our country and its citizens if we are patriotic .

From this perspective, it is easy to be concerned with only what is immediate to us, and this myopic vision shapes our values and behavior in ways that have a negative impact on the natural world. Though we may think that we are able to achieve happiness in this way, we are in fact harming the environment, and thus whatever happiness we attain is not sustainable, not real, because it does not further our understanding of nature.

We make decisions that seem beneficial to us within our immediate location and time, but are inconsiderate of the happiness of those beyond our limited scope. For example, we bring products into our homes (immediate location) that seem to benefit us and give us an immediate happiness. But often a sizable percentage of these products becomes waste. We take a product we want and enjoy it, and then when we are tired of it we throw it away. But when we throw something away into our kitchen trash can we are saying, "Here ya go, natural world. Take this waste that is damaging to your physical health and do something with it. It's your problem now and has no effect on me and my family or anyone else in my community." This denial of the environmental impact of the waste we generate is an obstacle in our own path toward happiness. Waste management in this country is overextended, evident with the recent emergence and popularity of non-fiction books with titles like *Garbage Land: On the Secret Trail of Trash* and *Rubbish!: The Archaeology of Garbage*. But a lot of this stress could be minimized if we could understand the connection between our purchasing habits and the negative impact our habits have on the environment, habits that keep us from achieving sustainable happiness.

Another example of how our current perspective and wasteful behavior prevent sustainable happiness is in our relationship to our cars. Even though our cars allow us to travel away from our homes, they are mere

extensions of our homes. We are just as isolated from the natural world when we are driving as when we are in our homes. And we are encouraged on every level to drive alone (despite Mr. Bush's call to conserve), so when we are out on the road we see car after car with only one occupant, and instead of solving this problem by arranging carpools or by using public transportation (a community-minded approach) we expand our roads and parking lots to accommodate this behavior. This current motorist behavior leads to pollution in our immediate location and contributes to global warming—not the kinds of effects that enable sustainable happiness.

More evidence of our limited perspective is found in our commercial and residential land development. I saw a great movie in 2006 entitled *Friends With Money*, in which a couple decides to add a second floor to their suburban home that will give them a view of the ocean from their bedroom, and as soon as they start construction they notice that their neighbors no longer talk to them. Eventually the couple realizes that while their addition gives them a nice view, it blocks the view of everyone living behind them. This is a great illustration of how we approach land development. We develop land merely to attain some immediate and selfish gain. For the RIT college town project, for example, the gain would be the continuous flow of money from the RIT community into its stores and apartments, but what will happen to the merchants that are right down the street at The Marketplace Mall, an already converted wetland area? And of course, what is happening to the ecosystem of the land at RIT that is being developed? Here, I'm assuming, cost benefit analysis has answered these questions. But does the cost-benefit ensure sustainability? Not necessarily, and in this case, I doubt it. If sustainability is important, then what we need instead of a cost-benefit analysis is a cost-effectiveness analysis that will identify the least costly way of achieving the sustainable result, the result that most respects environmental health and thus supports sustainable happiness.

In the examples above I have demonstrated that when the individual is isolated from the world community, while possibly achieving short term gains (a short-lived satisfaction from products, freedom of solo driving, a

view from your new second story bedroom) he/she is unable to identify and understand the obstacles to sustainable happiness. Sustainable happiness is achieved only with values and behaviors that recognize the self as an integral part of the ecological health and happiness of the world. We must think of ourselves as integral when we are making decisions that impact the planet. For example, even though I enjoy eating shrimp, now that I understand that Thai shrimp farming, from which we get most of our shrimp, exploits the land and people of Thailand, I will rarely if ever buy it. I feel that my boycott is a very small sacrifice for me to promote the health of the Thai ecosystem and the people in it.

I believe that we typically behave in ways that prevent our sustainable happiness because we are simply in the habit of doing so. Habits are tough to break because we associate that behavior with perceived reality, "the way things are." It is true that breaking habits takes practice. I believe that a good start for this practice is to find a short period of time every day to reflect on one's behavior. When we make an effort to slow down and reflect, we are rewarded with a deeper understanding of the world and our part in it. We can understand that our good fortune is tied to something greater than our immediate surroundings. For me, the simple act of taking five minutes to count backwards from two hundred to one is very helpful. This practice is cleansing and allows me to think more clearly and make wiser, more thoughtful decisions. In addition to counting backwards, I often count my blessings. In Richard Layard's book *Happiness*, he cites a study that shows that those who regularly take account of what they have to be thankful for are happier than those who don't (Layard 2005, 198).

I was very sick with a rare bone cancer in 2004 and going through that pain left me with a gift: a greater appreciation of my fortunes and a greater sympathy for people's misfortunes than I had before. Does everyone need to go through a traumatic illness to gain a greater appreciation and mindfulness of their good fortunes? I hope not. Just start by engaging in reflective practice.

Reflecting and counting our blessings can help us understand that health is a universal human right. When I count my blessings, I am thankful for feeling physically good, feeling loved, and feeling privileged with the ability to make wise choices. I believe that the planet as a whole can benefit from being treated in ways that yield these results of the good life. If we can understand how our consumer behavior affects the planet, then we can alter our behavior to support sustainable happiness. I hope that the results of this project have fulfill some of the goals mentioned in this section such as designing a product that inspires reflection and keeping sure that this design is cost effective, and thus, can be easily realized in the market.

INTRODUCTION

While developing my moral philosophy explained in the previous section, I encountered a recurring factor that impedes our ability to achieve sustainable happiness: our habitual consumer selves are in conflict with our moral citizen selves. This problem is defined by Mark Sagoff in his article from the journal Ecological Economics, entitled "Aggregation and Deliberation in Valuing Environmental Public Goods":

> Consumer preferences reflect conceptions of the good life individuals seek for themselves, while citizen preferences reflect conceptions of the good society offered for the consideration and agreement of others (Sagoff 1998, 215).

After writing the moral philosophy section of this thesis, I had some philosophical understanding of this problem, but I was unable to understand through philosophical analysis alone how to promote a shift that would resolve the conflict. Instead, partly as a result of the influence of Professor Jeffrey Wagner at RIT, I began thinking about the problem in economic terms. Thus, in this section I will discuss an economic perspective on why consumers behave in ways that are incongruous with their own social values, and what economic system or principles we can adopt to help consumers understand the effects of their behavior and move toward making changes to resolve that conflict.

TWO APPROACHES TO SHAPING CONSUMER PREFERENCES

As I mentioned in the philosophy section of this paper, we develop habits as consumers that are incongruous with our moral obligations to society but consider these habits as unbreakable. But in order to address the problem with consumer preferences, we must first realize that they are not fixed. In Bryan Norton, Robert Costanza, and Richard Bishop's paper "The evolution of preferences: why 'sovereign' preferences may not lead to sustainable policies and what to do about it" they argue that, "Sustainability is an inherently long-term problem and in the long run it does not make sense to assume tastes and preferences are fixed and given" (Norton, Costanza, and Bishop 1998, 193).

To an economist, there are only a few ways to shape consumer preferences: One is to adjust pricing. For example, if politicians were to raise the price of water to reflect its scarcity, consumers would likely conserve water more than they do now. Another way to shape consumer preference is to raise consumers' awareness about a product or resource. If, for example, our government sponsors public education classes or workshops on the scarcity of water, then as a result of that greater awareness consumers might conserve water more. "Might," however, is the operative word here. The effectiveness of that effort to raise awareness depends on the medium and the design of the message. As a designer, I understand the relationship between communication and education: a designer designs a message, and it may or may not educate consumers in the way it's intended. If we look at marketing campaigns as methods of communication, we can observe some that fail to raise awareness and some that succeed. But the reasons why they do so are ambiguous. And precisely because of that difficulty in measuring the success of those education efforts, economists may prefer price adjustment, the success of which is much easier to measure.

A COMPARATIVE ANALYSIS OF THE TWO APPROACHES

Let's take a closer look at the differences between these two approaches for some insight into making a comparative evaluation. Price adjustment is implemented by an authority, and the consumer is primarily a passive participant in the process. Raising awareness, on the other hand, is an approach that engages consumers in this behavior change, and invites them into a dialogue.

I believe that when consumers are voluntarily engaged in this process, that change is more sustainable, as it does not rely on those in power but instead draws on the inherent social nature of learning experiences. Here I am borrowing from John Dewey's theory of education, which emphasizes the importance of learning in social contexts (Dworkin 1959, 23). This educational approach has been the central focus of a debate in American pedagogy in the past fifty years: the progressive, Deweyan claim is that when students engage in the learning process with their classmates, as opposed to being lectured to by their instructor, they learn more

because the process is experiential and social. The absence of this type of engagement in the market may be an important factor in the consumer/citizen conflict, as suggested here by Tania Brienco and Sigrid Stagl:

> The lack of active social engagement and collective decision-making continuously distorts socially optimal decisions. At the individual level, the incentives to adopt more sustainable behavior are in most countries weak
> (Brienco and Stagl 2006, 1542).

But rather than pursue an argument for the superiority of raising awareness over price adjustment, I would like to acknowledge that they can function symbiotically. If we look at the history of any great social change, we will see that that important change starts with a small group of citizens who work to raise the consciousness of the rest of the citizenry. And, in turn, a law is passed. This is the process that led to laws in the United States that gave greater rights and freedoms to children, African Americans, and women. Price adjusting obviously followed these laws accordingly, and in turn those adjusted prices compelled the citizenry to abide by the laws. For example, at some point the cost of labor for plantation owners must have increased to abide the abolition of slavery; the economy adjusted to the true cost of labor as a result of that shift in social values. And in turn that adjustment in cost reinforced the value shift. This process may be the same one that will spawn policies and price adjustments that in turn will protect environmental health and thus human health.

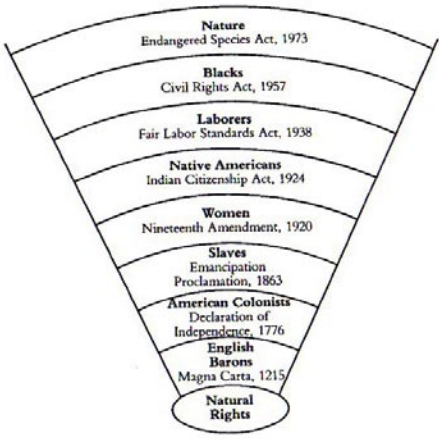
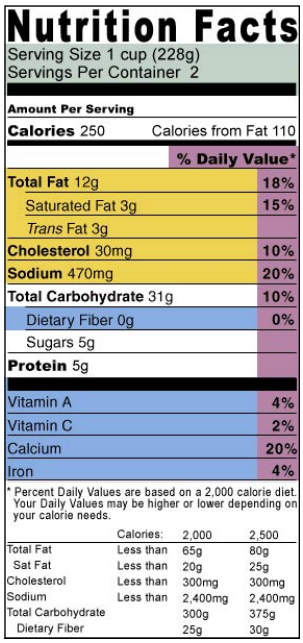


Figure 2. The expanding concept of rights. (Nash 1989, 7).

COMMON MISTAKES MADE IN AWARENESS-RAISING APPROACHES: A CRITIQUE OF ECO-LABELING

> …is it certain that only the volume of [environmental] education needs stepping up? Is something lacking in the content as well?
> (Leopold 1948, 3).

When consumers' awareness is raised, it is done as a result of a great increase in information, information disseminated by many different stake holders, such as NGOs and private companies, each with its own set of



Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250	Calories from Fat 110
	% Daily Value*
Total Fat 12g	**18%**
Saturated Fat 3g	**15%**
Trans Fat 3g	
Cholesterol 30mg	**10%**
Sodium 470mg	**20%**
Total Carbohydrate 31g	**10%**
Dietary Fiber 0g	**0%**
Sugars 5g	
Protein 5g	
Vitamin A	**4%**
Vitamin C	**2%**
Calcium	**20%**
Iron	**4%**

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Our Footprint Notre Empreinte

Environmental Impact Impact sur l'environnement

Energy to Produce: (per pair)*	2kWh
Énergie utilisée (par paire)*	2kWh
Renewable energy (Timberland-owned facilities):	9%
L'énergie renouvelable (sites appartenant à Timberland) :	9%

Community Impact Impact sur la communauté

Hours served in our communities:	119,776
Nombre total d'heures données :	119,776
% of factories assessed against code of conduct:*	100%
% d'usines évaluées pour leur conformité au code de conduite :*	100%
Child labor:*	0%
Main-d'oeuvre enfantine :*	0%

Manufactured Fabriqué à

Shingtak, China Shingtak, Chine

* metrics based on global footwear production for 2005
* informations fondées sur production totale de chaussures en 2005

FOR MORE INFORMATION VISIT WWW.TIMBERLAND.COM/CSRREPORT
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Figures 3 & 4. The image on top is an example of an FDA nutrition facts label. (http://www.cfsan.fda.gov/~dms/foodlab.html#twoparts)

The image below is an eco-label created by and used for Timberland shoes. (http://www.businessweek.com/innovate/content/may2007/id2007051_987701.htm)

motivations. So it's difficult, understandably, for consumers to know what information they can trust to be accurate. Especially vulnerable to this problem are consumers of products that affect the environment; when choosing among those products, consumers are commonly confused. Studies show that consumers are willing to pay for products that claim to be good for the environment, but the study also shows that they don't necessarily understand what all the eco-labeling means. In their paper "Product related environmental information to guide consumer purchases—a review and analysis of research on perceptions, understanding, and use among Nordic consumers" (2004), Charlottle Leire and Ake Thidell report that

> …despite high recognition and good consumer intentions, studies report the limited ability, interest and willingness among consumers to absorb and act upon [eco-labeling] information (Leire and Thidell 2004, 1062).

This confusion ultimately undermines the success of sustainability goals, and it reveals the common ineffectiveness of eco-labeling. A reason that labels are ineffective may be that they rely on an authoritarian communication technique and fail to engage consumers in their education. Thus, I argue, they fail to motivate consumers to resolve the citizen/consumer conflict mentioned at the beginning of this section. Many eco-labeling systems take their typographic cues from the design of FDA nutrition facts [insert image] a labeling system that has been in effect for many years and one which consumers tacitly believe conveys standardized accurate information. Home Depot, for example, uses such a labeling system. The company is appealing to consumers' perception of the FDA label's authority and standardization, and consumers in turn are looking to their labeling systems to be standardized so they can make accurate comparisons of competing products. But what they may not understand is that the criteria on this label is not standardized; it is written by Home Depot for their own products. So when consumers go to Wal-Mart and try to compare the eco-attributes of Wal-Mart products to those found at Home Depot, consumers are likely to be confused, since the criteria may not be parallel. Yet, consumers expect these labels to be standardized and accurate because they carry authoritative clout as a result of their style and design.

HOW TO DO IT RIGHT, A LEAD IN TO EXPERIENTIAL PEDAGOGY

A solution to this problem is not, as one might suspect, merely to standardize the labeling system. Labeling does not help the consumer fully understand how the making, consuming, and using of products affects environmental health. We cannot expect a mere "sticker" to encourage consumers to change their behavior. And I argue that the labeling approach fails to promote the larger goal of sustainability because it still uses an authoritarian pedagogy as opposed to a more democratic one. When product designers rely on an authoritative label—"look at my official-looking label, trust me, I'm legit"—green product designers and investors are back at square one because the consumer is still merely a passive participant. While some eco-labeling is helpful, consumers who are already on information overload, cannot be expected process the continuous flow of data coming at them. Thus, expressing a products benefits though design may help consumers to absorb information through using all of their senses.

Jack Elliot, writing about the inadequacies of green architecture, argues that "…those of us who have decided to take up the environmental cause are often ineffective at expressing our 'greenness' through our interventions. Our work mumbles, barely speaking of its underlying environmental agenda" Mumbling and Stumbling: Paradoxes in Green Design Practice (Elliot 2001, 1).

To apply his metaphor to eco-product designers, I would argue that green product designers need to communicate more clearly, to "speak up" so to speak, about the environmental benefits of their products, and they can do this with educational design principles, ones that invite the user into the dialogue.

When the sustainability information is communicated by way of engaging many senses through the product's design, the consumer can more likely understand a product's benefits and thus begin to resolve the disparity I referred to in the beginning of this section, between citizens' habitual consumer habits and their social obligations to environmental health. The

more consumers can be experientially engaged with the product, the more they will understand how their roles as consumers affect everyone's well being. This engagement and understanding is essential to promoting a shift among consumers that supports sustainable happiness.

Often this engaging approach is applied to the design of non-rival consumption activities such as community share programs. With my project I will take, what is perhaps, a more conservative approach and apply these democratic principles to a familiar mass produced and distributed product. I believe that such a product is in a prime position to function as an educational tool. While this product will not save the world on it's own, perhaps my design of this product can serve as a model for a new way of designing everyday products.

> The crisis of sustainability is more than simply an issue of poor technology; it has emerged as an extremely complex sociological dilemma, where the lifestyle that we have adopted is rapidly eroding our ability to survive. It is obvious, then, that to play a profound role in making sustainability a reality, one must persuade the general public to adopt sustainable behavior (Stegall, 2006, 57).

In the previous section, I discussed and compared two economic approaches to influencing consumer preferences as a way of, as Nathan Stegall states it, persuading the general public to adopt sustainable behavior: 1) price adjustment, which I argue is authoritarian, and 2) awareness-raising, which I argue is democratic. Yet, the current practice of eco-labeling as an awareness-raising mode of communication is limited. Here I will argue for a more experiential mode of communication drawing from the history of semiotics and pragmatist pedagogy.

In the following two sections I will first discuss a history of semiotics. Using the historical analyses of Victor Hugo (1802-1885), Theodore Adorno (1903-1969), and Umberto Eco (b. 1932), I will show the influence of the designed world on values and argue that in the world of art and design there's been a theoretical "shedding of matter" and, accordingly, an emergence of the importance of experience in the production of meaning. This emergence is characterized by the valuing of the consumption of experiences over the consumption of products, a valuing that has great potential to support sustainable consumption if the designer designs in a way that uses and promotes experience. That promotion will result in the use of less matter.

This shedding of matter coupled with a promotion of experience is supported by contemporary environmental economists as well. In Jeff Wagner's paper entitled "On the Economics of Sustainability," he states that the question to ask about sustainable consumption is not 'Should we consume less?' but rather 'What is it that we are consuming?' He agrees with the common understanding that the consumption of rival goods often results in the deterioration of the environment, and argues that in contrast the consumption of non-rival goods most often has minimal impact on the

environment and is ultimately more satisfying for the consumer and is thus sustainable (Wagner 2006, 659).

These kinds of goods are referred to by another economist, Jack Manno, as LCPs—low commodity goods. His description of such goods is that they require little input to produce yet yield a high user satisfaction (Manno 46).

Keeping in mind these contemporary economic theories and the theoretical evolution in semiotics that has already progressed, we can take advantage of the opportunity to achieve a convergence of social and economic sustainability goals. I will argue that this move toward experiential consumption is an opportunity that can be seen as a continuation of a development in the history of semiotics.

I will then explore the experiential pedagogies of John Dewey and Howard Gardner. Their pedagogy theories support the classroom application of this democratic approach. I will extend that discussion of classroom technique to the market through a consumer product that I have chosen to develop for this thesis, dish soap, and apply their theories as awareness-raising approaches to designing a consumer product, arguing that experiential learning is more effective than authoritarian learning. I will propose a way to integrate democratic and reflective pedagogies into design principles and thus into the market, arguing that designers should do so with intention, one way being via consumer products. I hope to educate product designers who already use responsible materials and processes to take advantage of the semiotic value of their designs to include these educational principles in their design practice.

In contemporary marketing literature there exists a body of work that argues that the marketing of experience is profoundly more effective than the marketing of products. This literature is aimed at developing brand loyalty in consumers for capital gains. But the same dynamic that makes experiential learning successful in marketing and education can function to serve goals that support environmental health. In fact, this valuing of experiential learning already seems to be appearing in the literature

of some environmental economists and designers. Tania Brienco and Sigrid Stagl, for example, in their essay "The Role of Social Processes for Sustainable Consumption," have commented on the lamentable absence of this democratic participation in the market:

> The disembeddedness of economies from the social world is having great impact on consumption problems. The growing separation between producers and consumers, the lack of social satisfiers, and the compromising of social welfare to economic performance have been major obstacles for achieving sustainability goals…. Consumption solutions require economic activity to be openly democratic, actively participative, and reflective of its goals in order to integrate social values, concerns, and needs
> (Brienco & Stagl 2006, 1550).

I agree, and I'm proposing in this thesis an intentional synthesis of these elements, experiential pedagogy and sustainable design, from these different disciplines. [I have not come across in my reading of sustainability literature a synthesis as intentional as mine.]

Our daily interaction with the world influences our values and behavior. In the next section I will show how this phenomenon is addressed through pedagogical approaches. I would like to extend these approaches to design principles, but first we need to examine some of the literature that discusses how design affects values. Once we understand well that concept, we can discuss how to shape the way design teaches through integrating experiential pedagogy with design principles.

DESIGN AND THE POWER OF MASS DISTRIBUTION

Many people place the beginning of the Industrial Revolution with Isaac Watt's steam engine driven textile mills in late 18th century Britain. Yes, this technology was the cause for a major shift from slow human labor production to high speed machine driven production, but an important shift regarding mass production also occurred—one that is more seminal to my analysis—much earlier, in 1450, with the invention of Gutenberg's printing press. In this shift, we see the influence that mass production has on human communication and values.

The nineteenth century writer Victor Hugo analyzes this shift in his book Notre Dame de Paris, in a famous chapter of that book titled "This Will Kill That." Hugo describes the fifteenth century transition from architecture to the printing press as a major shift in modes of cultural and political communication: a shift from massive and fixed spaces, which people were willing to travel long distances to see, to text on paper, which came to people where they were. Hugo wrote of this transition in grand spiritual terms:

> The invention of printing is the greatest event in history. It is the mother of revolution. It is the mode of expression of humanity which is totally renewed; it is human thought stripping off one form and donning another; it is the complete and definitive change of skin of that symbolical serpent which since the days of Adam has represented intelligence (Hugo 1917, 189).

His rendition of the evolutionary effect was not restricted to the terms of Christian mythology—he also harkened back to Greek mythology to describe its grandiosity:

> Human thought discovers a mode of perpetuating itself, not only more durable and more resisting than architecture, but still more simple and easy. Architecture is dethroned. Gutenberg's letters of lead are about to supersede Orpheus's letters of stone (189).

So why the superlative and mythical terms? His answer: thought almost overnight becomes ubiquitous—it can be dispensed to every corner of the earth; in his words, thought grew wings.

> In its printed form, thought is more imperishable than ever; it is volatile, irresistible, indestructible. It is mingled with the air. In the days of architecture it made a mountain of itself, and took powerful possession of a century and a place. Now it converts itself into a flock of birds, scatters itself to the four winds, and occupies all points of air and space at once (189).

For Hugo, the church, with its architectural cathedrals, had had a stronghold on knowledge, and this transition marked a profound liberation from that tyranny.

Though my vision may be somewhat muted in comparison to Hugo's, his is meaningful for me because like other progressive designers, I like to think of the production and distribution of consumer goods as having great potential for spreading ideas. I am especially taken with his metaphor that likens mass production and distribution to a flock of birds. I am struck by an element of that metaphor that implies the power of production and distribution to communicate, but even moreso by its implication that the communication has shed weight—the birds are almost weightless. I like how that quality connotes sustainability values, such as the importance of a product having little matter and thus no waste.

I realize that for many, this leap to sustainable design from Victor Hugo's vision of the lightness (and ease of distribution) of the printing press's mode of communication may seem arbitrary or flippant, but I would defend it by arguing that it is one of many instances that shows that there indeed has been a theoretical shedding of matter in the evolution of design and art history (fully taken advantage of by futurists and supporters of web 2.0 and nanotechnology).

I would also defend my insight with a reference to an essay that chronicles this transition in spiritual terms, "Philosophy of Fine Art," by the eighteenth century philosopher G. W. F. Hegel. Hegel argues that massive forms such as architecture and sculpture are at the bottom of the hierarchy of art, and intangible forms such as poetry are at the top. It is a transition, he argues, from the sensuous to the ideal, one that marks a positive development toward ideal truth.

> Its [architecture's] material is matter itself in its immediate externality as a mechanical heavy mass, and its forms remain the forms of inorganic nature, sent in order according to relations of the abstract Understanding, I.e. relations of symmetry. In this material and in these forms the Ideal as concrete spirituality, cannot be realized.
>
> Poetry is the universal art of the spirit which has become free in itself and which is not tied down for its realization to external sensuous material; instead, it launches out exclusively in the inner space in the inner time of ideas and feelings (Ross, ed. 1994. 154).

I am no spiritualist, but upon reading Hugo and Hegel and simultaneously realizing that the landfill is in the running for becoming the architecture of our time, and that industrial designers are in no small way responsible for this development, I saw these visions as inspirations for new design principles.

When I read Hegel's essay here in graduate school, in Tim Engstrom's course Aesthetic Theory and Philosophy of Art, Hegel's schema caught my attention and over the next two years—during which I became interested in sustainable design and in minimizing our impact on the planet, looking for ways to create less junk—I noticed over and again that this schema seemed to describe accurately what I was noticing in trends in mainstream marketing literature (not to be confused with design literature). In this mainstream marketing literature I saw that design was no longer being perceived as merely the making or designing of a thing, but that it has evolved into a process of designing something more abstract. And I will argue in the next section—on pedagogy—that the more abstract level we designers are moving toward is the designing of experiences. And furthermore, to recall Jeff Wagner's environmental economic argument that I discussed earlier, we are designing non-rival rather than rival goods.

DESIGN THAT CREATES FRENZY

While Hugo saw this development toward mass production and distribution as liberating, other theorists after him, most notably Marxists, have been less positive in their assessment of this transition. I will focus on one theorist in this category, Theodore Adorno (1903-1969), who argues in his essay "On Popular Music" that mass production creates bad taste, "mass stupidity," and mediocrity. Adorno uses his analysis of the effects of mass production on people's critical reception of popular music to critique the assumption that the typical modern relationship between manufacturer and consumer is a good one. In the following passage, Adorno is lamenting popular music's tendency to merely recreate musical patterns that the listener is already familiar with, a tendency that results in a failure to engage the imagination in any new or interesting way:

> It is precisely this relationship between the recognized and the new which is destroyed in popular music. Recognition becomes an end instead of a means. The recognition of the mechanically familiar in a hit tune leaves nothing which can be grasped as new by a linking of the various elements. As a matter of fact, the link between the elements is pre-given in popular music as much as, or even to a greater extent than, the elements are themselves. Hence, recognition and understanding must here coincide, whereas in serious music understanding is the act by which universal recognition leads to the emergence of something fundamentally new (Adorno 1941. para. 4).

A common defense of this quality of popular music argues that the market is merely responding to public demand. Adorno retorts that that logic is merely a pretext for shaping public taste for popular consumption:

> The promoters of commercialized entertainment exonerate themselves by referring to the fact that they are giving the masses what they want. This is an ideology appropriate to commercial purposes: the less the mass discriminates, the greater the possibility of selling cultural commodities indiscriminately. Yet this ideology of vested interest cannot be dismissed so easily. It is not possible completely to deny that mass consciousness can be molded by the operative agencies only because the masses "want this stuff" (para. 22).

Adorno then acutely analyzes the main problem with this one-way relationship between manufacturer and consumers, what defenders of this ideology claim is an inescapable condition of the market. There is even a common defense of this ideology among economists that cites a Platonic theory of division of labor, arguing that this ideological condition is one that follows from the fact that people have different capacities and skills and thus it is natural and proper that a few skilled specialists determine the consumer choices available to the masses. Adorno's critique of that ideology is that it prevents the masses from playing an ever-important active role in determining what their choices are in the market, a role that is essential in their development as autonomous human beings:

> Superficially, the thesis about the acceptance of the inescapable seems to indicate nothing more than the relinquishing of spontaneity: the subjects are deprived of

> any residues of free will with relation to popular music and tend to produce passive reactions to what is given them and to become mere centers of socially conditioned reflexes. The entomological term jitterbug underscores this. It refers to an insect who has the jitters, who is attracted passively by some given stimulus, such as light. The comparison of men with insects betokens the recognition that they have been deprived of autonomous will (para. 45).

I share Adorno's concerns that the people in charge of production, these "specialists," contribute to the diminishing of consumers' abilities to think critically about the choices they make, and I see this problem as at the center of the citizen-consumer conflict mentioned at the beginning of my thesis: consumers' tendency to make decisions incongruous with their moral obligations to society. I propose as a solution to this problem—drawing on Adorno's implicit faith in the masses and on the importance he places on the masses' engagement in determining their own choices—that producers invite consumers into an openly participative dialogue. And I believe that producers who choose to do so will be on the cutting edge of progressive design and marketing theory. I will now discuss a theoretical angle to this solution in the ideas of Umberto Eco.

DESIGN THAT PROMOTES CONVERSATION

Umberto Eco (b. 1932) argues that the art of every era is representative of the way reality is viewed in that era, such that prior to Copernicus "the closed single conception in a work…reflected the conception of the cosmos as a hierarchy of fixed, pre ordained orders" (Eco 1984, 57). And that since Copernicus art has been marked by "the rising interest in a psychology of impression and sensation, in short—an empiricism which converts the Aristotelian concept of real substance into a series of subjective perceptions by the viewer" (57). Eco argues that "by giving up the essential focusing center of the composition and the prescribed point of view for its viewer, aesthetic innovations were in fact mirroring the Copernican vision of the universe."

This historical analysis of aesthetic movements—in which he shows how artistic stances always correspond with developing scientific and epistemological ones—is important as it reveals the shift from a pre-Copernican art that employed a single and authoritarian (and limited) point of view to a heliocentric art in which multiple perspectives occur simultaneously and encourage, as a result, democratic engagement. This pluralistic model for the artist/viewer relationship, I argue, is an appropriate approach to sustainable design, a holistic discipline.

In Eco's analysis, this Copernican epistemological shift disrupts conventional concepts of cause and effect, resulting in what modern psychology and phenomenology terms as 'perceptive ambiguities.' Eco admits that it is tempting to perceive this new condition as a crisis, because it argues that we can't perceive anything with the old assurance that what we're perceiving is real. But he turns this assessment on its head:

> It would be quite natural for us to think that this flight away from the old, solid concept of necessity and a tendency toward the ambiguous and the indeterminate reflect a crisis of contemporary civilization, or on the other hand we might see these poetical systems in harmony with modern science as expressing the positive possibilities of thought and action made available to an individual who is open to the continuous renewal of his life patterns and cognitive processes (61).

It is this positive twist of Eco's that inspired me to see his analysis as applicable to my thesis. Eco goes on to discuss the kind of critical and interpretive position on artwork that is in accord with this positive stance of his. He refers to this kind of interpretation as open work. I would like to think that that term could be applied to progressive design.

The primary quality of open work that I am attracted to is its de-centering of authority. The designer—just as the artist or composer in Eco's analysis—is no longer the authoritative agent in the creative process, but instead, he or she has invited the consumer to participate in that process, and thus the consumer, through experience, becomes educated about that process. And when the consumer comes to understand the industrial process him

or herself, an understanding brought on by experience rather than an authoritative label, he or she is likely to make more socially responsible choices, and make them more often. Consumers become, like the designer, armed with a set of skills that allows them to make these socially responsible choices.

To understand further the nature and power of experiential learning, I will now discuss its primary advocate in 20th century pedagogical theory, John Dewey.

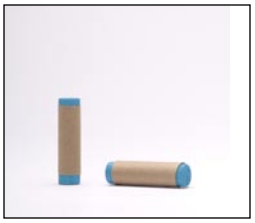
This image shows a side view of a conventional bottle of dishsoap.

> "I believe finally, that education must be conceived as a continuing reconstruction of experience; that the process and the goal of education are one and the same thing," John Dewey (Dworkin, Martin S., ed. 1959. 27).

American pragmatist John Dewey (1859-1952) believed deeply in the value of experiential education and pointed to the common ill-practice in education, in his time and still in ours, of lecturing on subjects in isolation from one another as a model destined for failure. Dewey believed, instead, that the classroom should be modeled after our social life, in which we experience many subjects simultaneously. I will argue that we should follow Dewey's approach and integrate awareness-raising strategies for influencing consumer preferences into our social lives. I believe that this pedagogical model is an appropriate one for promoting environmental values, for it requires the user to understand a problem from multiple perspectives and encourages them to see the relations between individual behavior and social life.

This Deweyan idea about education being a part of everyday experience eventually led me to choose dish soap as a channel for the message that promotes sustainable happiness. So much of eco-design is found in architecture and furnishings, high-end design that is not available across economic classes so I chose dish soap because it is one of those products that reaches across class boundaries. Thus, it provides a great opportunity for an experiential public education campaign. This channel allows the awareness-raising to be a daily experience in which the product can facilitate a sustainability dialogue that is develops over time.

I will now describe the basic components of the dish soap model that I am designing, as it's a slight diversion from the conventional product. The conventional product I am modeling this from, which I want to compete with, is made of 70% water (extravagant shipping volume) and uses a disposable plastic bottle. With my new product, I want to employ distribution methods and materials that are environmentally responsible. Thus, I identified the use of a durable bottle in combination with concentrated refills as the most eco-efficient configuration for this product.



The top image shows a durable bottle with a cap and a paper label and a point-of-purchase (POP) dispenser for the concentrate

The bottom image shows the wrapped concentrate.

More analysis of the physical benefits of this product will be discussed in the Life Cycle Analysis section of this paper. For now I will stick to a discussion about aesthetics. There are three components to this product: 1. a durable bottle with a cap and a paper label, 2. a pressed powder concentrate wrapped in a heat-soluble film and paper label and, 3. a point-of-purchase (POP) dispenser for the concentrate.

Returning to our discussion of aesthetics and open work, I appreciate how Dewey promotes the educational value of experience. But when I started to apply his pedagogy to my design theory, I sensed that his theory was limiting in its definition of learning experience, that it relied too much on kinesthetic experience at the exclusion of other learning orientations. Some contemporary design practice includes this wider range of orientations, breaking away from the Modernist design principle of one-size-fits-all. I wanted to maximize the range of learning orientations, so to expand my Deweyan approach I found a theorist I could look to, Howard Gardner (b. 1943).

Gardener's Theory of Multiple Intelligences claims that we are born with natural tendencies toward learning, and he identified eight intelligences, which I list here and then describe in further detail throughout this section: 1. Visual-Spatial, 2. Musical, 3. Verbal-Linguistic, 4. Logical-Mathematical, 5. Interpersonal, 6. Intrapersonal, 7. Bodily-Kinesthetic, and 8. Naturalist.

> Gardner sought to broaden the scope of human potential beyond the confines of the IQ score. He seriously questioned the validity of determining an individual's intelligence through the practice of taking a person out of his natural learning environment and asking him to do isolated tasks he'd never done before and probably would never choose to do again. Instead, Gardner suggested that intelligence has more to do with the capacity for (1) solving problems and (2) fashioning products in a context-rich and naturalistic setting (Armstrong 2000, 1).

The image on top shows a conventioanl soap bottle opn the left and my new bottle (with concentrate inside) on the right.

The bottom image shows dish soap for sale as a bulk item in a health food store in Ithaca, New York.

Gardner provides me with a wide range of learning orientations with which to build design principles for this project. Gardner's theory further allows me to design in a multi-faceted way, appealing to a diversity of intelligences both sensory and cognitive. Communicating through design in this way seems to complement sustainability problems, which requires us to be able to understand problems holistically; from multiple perspectives. And I argue that we need to develop our holistic thinking skills in order to understand the obstacles that keep us from achieving sustainable happiness.

Following is a list of some ways to think about dish soap in a multiple intelligence context.

> 1. VISUAL-SPATIAL INTELLIGENCE.
> The ability to perceive the visual-spatial world accurately (e.g., as a hunter, scout, or guide) and to perform transformations on those perceptions (e.g., as an interior decorator, architect, artist, or inventor). This intelligence involves sensitivity to color, line, shape, form, space, and the relationships that exist between these elements. It includes the capacity to visualize, to graphically represent visual or spatial ideas, and to orient oneself appropriately in a spatial matrix (2).

[Note: since the consumer's introduction to this product is visual—on the merchant shelf—this section is longer and more detailed than the others.]

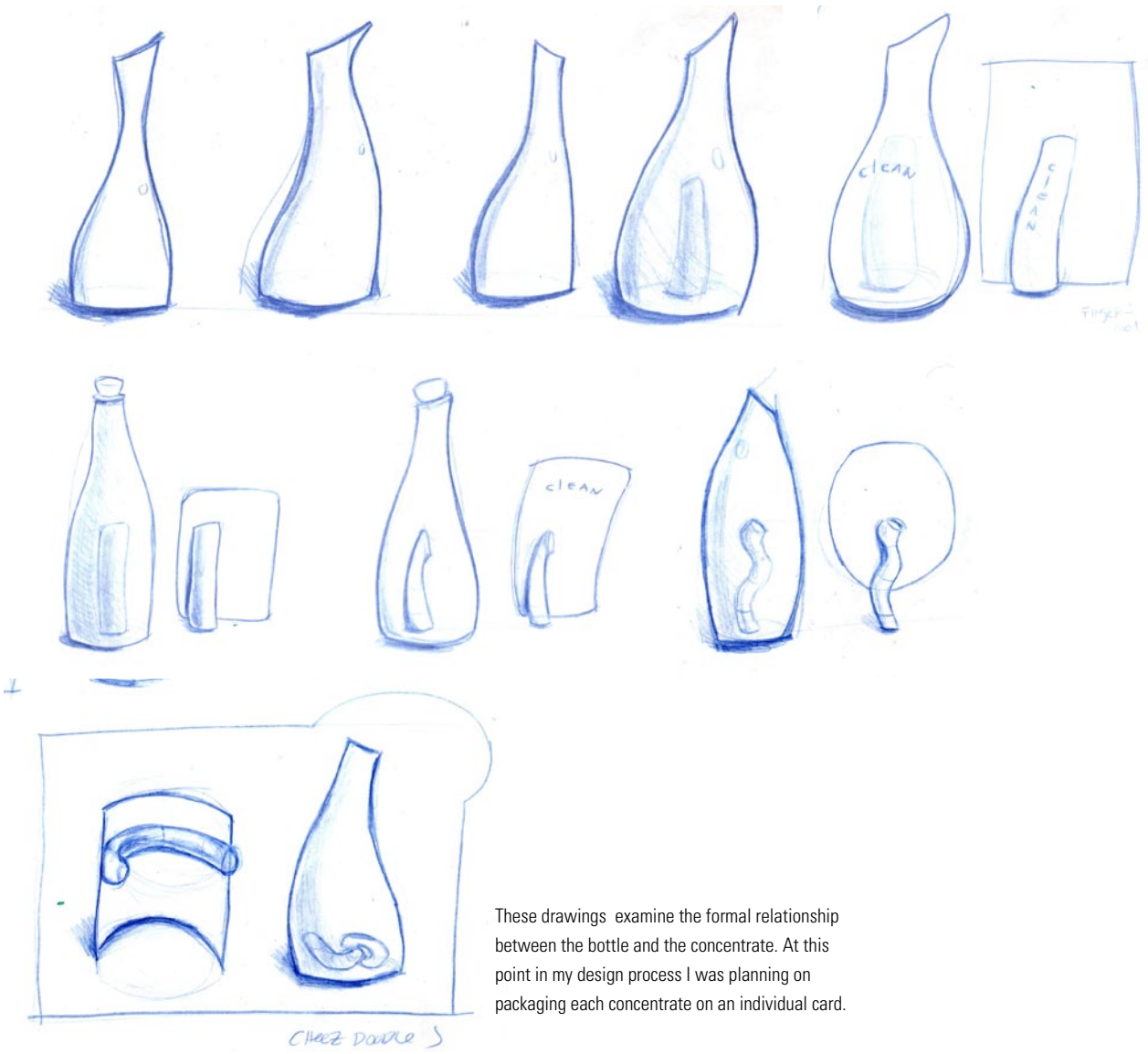
The Bottle. Unfortunately, eco-friendly products are typically placed in a separate, health-food section of the store, which has at least three negative consequences for their adoption by the consumer:

> a) this placement labels the new products get labeled as 'other', appropriate only for a select type of buyer;
>
> b) this placement disallows the consumer the opportunity to compare price and ingredients;
>
> c) this placement disallows the consumer to envision the new product replacing the old.

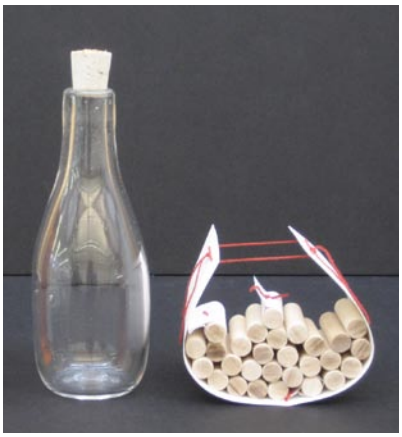
The image above shows a colorful array of dish soaps as they appear on the shelf in a mainstream super market.

The images to the left show a range of liquid dispensing bottles that without "waists."

To search for a timeless form for the soap bottle I did this study on a collection of antique glass vessels.



These drawings examine the formal relationship between the bottle and the concentrate. At this point in my design process I was planning on packaging each concentrate on an individual card.



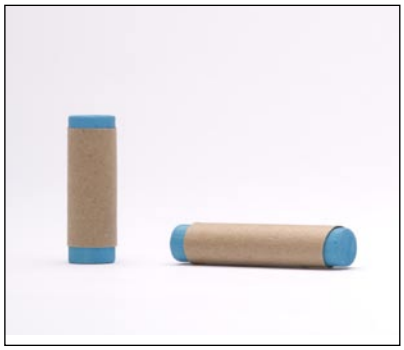
These 3D models show several iterations of the visual relationship between the bottle and the concentrate on the merchant shelf.

Therefore one of my first priorities was to design this product to be placed side by side on the merchant shelf with its conventional counterpart (e.g., Palmolive, Joy, Dawn). For this new placement to be effective, the new product had to adhere to the volume and height of the conventional product so that the new and the old products can sit next to one another on the merchant shelf. The visual design challenge for me, then, was to adhere to these spatial constraints and yet find a new form for the bottle that would represent a new definition of clean.

The visual semiotics of the conventional bottle are as follows: I read the form of the bottle as having a "waist" and "shoulders" that represent the stereotypical figure of a 1950s housewife and the formula is usually a florescent bright color. And as I read it, these characteristics originally carried associations with a post-WWII America: the bottle served as a visual mirror of the woman who was shopping and using the product, and it's a commonplace notion among designers that the colors of the formula were first introduced during that period along with other plastic products of those colors that were commonly introduced. Over the years we have unselfconsciously come to associate these signs with high quality cleaning products.

So when designing my new bottle, I set out to redefine what a quality cleaning product is and to create a new language with which to communicate to consumers those qualities. (Some of these qualities admittedly may have been chosen not because they represent something specific or positive, but merely because they are antithetical to the semiotics of the conventional product.) First, I focused on the bottle's posture: tall and balanced, signifying a proud, honest stance, implying that this product represents behavior that supports environmental health. Second, I decided the formula should be clear or pale in color, signifying that dyes are not "clean" because they often contain toxic chemicals.

The Label. Because this is a durable bottle that consumers buy once and then ideally keep forever, it is important that the label be durable or easy to remove. I decided to make it easily removable, so to hold it in place I



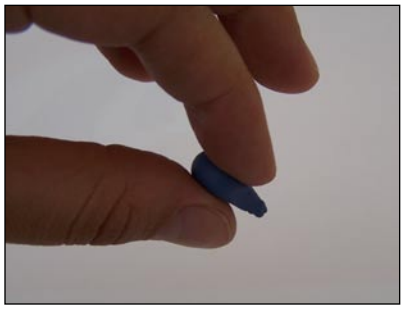
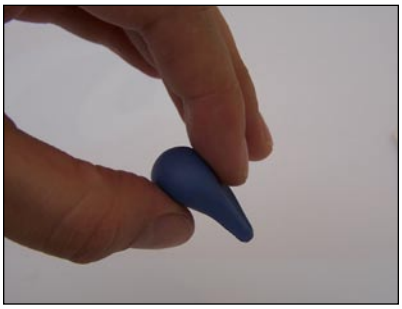
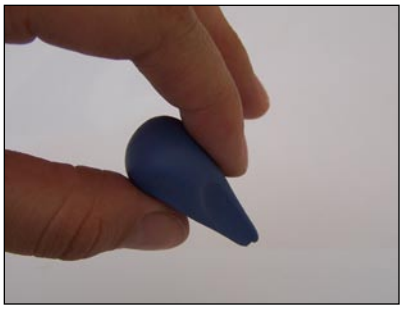
The images above show some sketch models for the concentrate package. The image on the bottom shows the packaging I have selected for my final design.

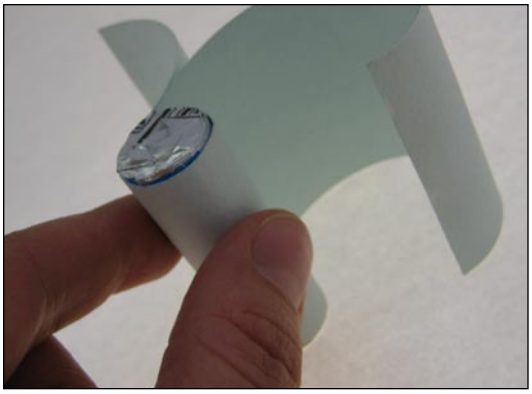
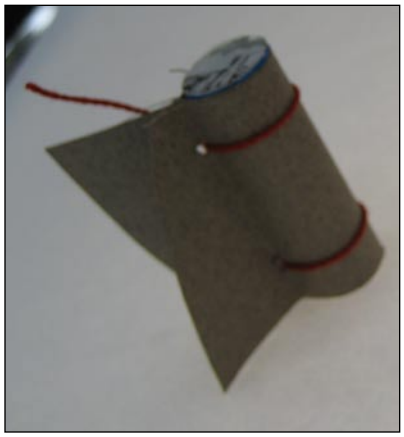
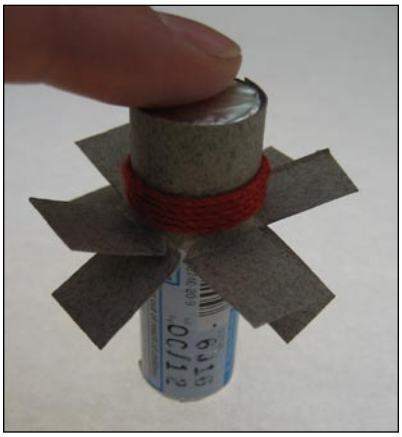
decided to use instead of glue, as is conventional, a mechanical connection. I will discuss this mechanism in detail in the kinesthetic intelligence section of this analysis. Now I will discuss my choices for the label's paper and color.

Brown kraft paper, when responsibly sourced, is the most environmentally benign paper produced as it does not require bleaching. Yet we normally associate the color white with clean. My challenge as a designer was to use the kraft paper in a way that helped the consumer to, again, create a new definition of clean. As I mentioned earlier, truly clean soap is not florescent in color, so it follows that clean paper is not bleached white—it is the color of wood pulp.

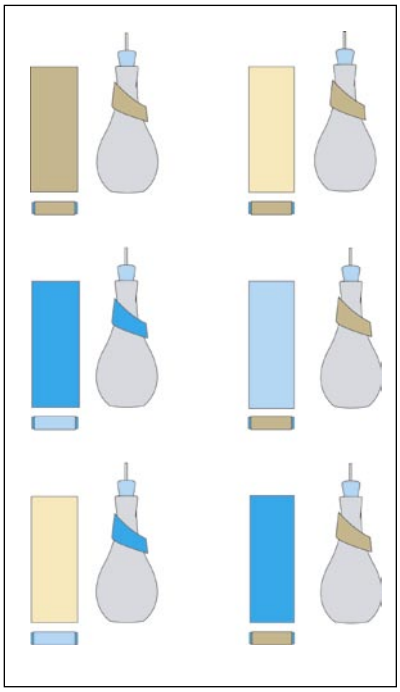
The Concentrate. After choosing the tablet-refill as the most eco-efficient model for this product, I consulted Nick Mahan, Director of Formulation at MethodHome, who responded enthusiastically, telling me of a few problems his company was trying to solve in developing a product similar to mine. One of these challenges that I want to mention here is that consumers expect to pay less for a concentrate, and if the company meets this expectation, then they have lowered the cost of their product and lost profits. For example, if the company sells ten bottles of soap to a family per year at $2.00 per bottle, the company has sold them $20 worth of product; but if the company switches to a concentrate, discounted, and the turn rate remains the same, then they have sold the family—at $2 for the bottle and $1 for 9 concentrates—only $11 worth of product. In that year the company has lost almost half the purchase price. Of course shipping the concentrate will generate some savings for the company but that savings may be negated by the additional costs required to produce a concentrate that involves more complex chemistry.

So the challenge with this new product is to design it in such a way as to teach the consumer that this smaller product has the same monetary value, not to mention more eco-value, as a 14 oz. bottle of soap. My first experiment was to place the capsule on a free-standing card to give it the same shelf-presence—the same height and width—as a bottle. But I abandoned that approach because I felt that it was deceitful, like a peacock

These sketch models explore variations of size and shape for the tiny concentrate and how these variations relate to the fingers.



Color studies for paper stock. I wanted to find a warm color to complement the blue I had chosen for the bottle top and concentrate.

showing off its feathers—it seemed too showy. So I decided I would try placing the capsule in a smaller context, one that is true to the size of the product; I designed a small paperboard box. But then I felt that context too was inadequate because it signified that a product was not valuable unless it was packaged.

During this process of searching for the appropriate package, I was frequently asked by colleagues why I didn't abandon the package design altogether and envision the concentrate as a bulk item. I resisted this suggestion primarily because I want the product in the same aisle in the store, for reasons I give on page 29.

To further explore how to make a small product appear valuable, I looked at other small products that we typically consider valuable: jewelry, high-end cosmetics, gourmet food items, etc. What I took away from many of these small products was an intense use of color. I had considered not using dye for the concentrate but eventually decided that indeed it could be useful, for the following reasons:

a) using a color such as blue that is conspicuously different than that used for candy, signals to the consumer that it is not an edible product;

b) using a saturated color for the concentrate, which the consumer witnesses changing from bright to pale when they drop it into water, instructs him or her about the relationship between dose and toxicity;

c) the color increases the product's attractiveness: the blue cylinder, a cool color, is wrapped partially in brown paper, a warm, complementary color, and thus, though small, it has a dynamic presence on the shelf, even from inside the point-of-purchase dispenser.

These qualities helped me begin to feel confident that the product will not necessarily need showy packaging, because its prime value is its eco-value—

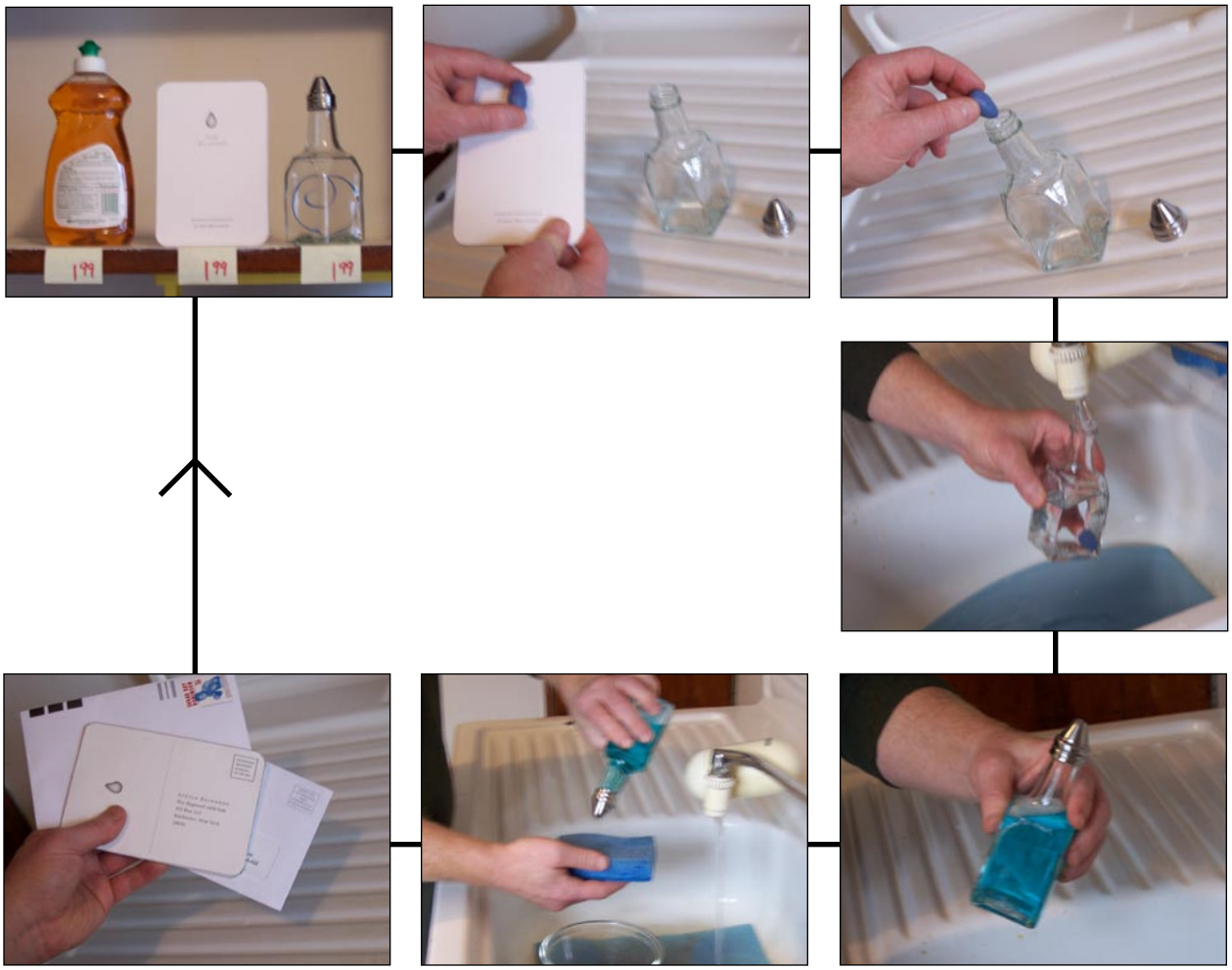
These images show some early sketch models for my Point-of-Purchase dispenser.

that its purpose on the one hand and its virtue on the other would be one and the same in consumers' minds. These three qualities are instrumental in achieving that goal by virtue of the product's minimal packaging. Small is beautiful, this product says, because small comes with no waste.
I decided to coat the tablet in a water-resistant heat-soluble film with a kraft-paper wrapper. It would be dispensed in a point-of-purchase display.

The Point-of-Purchase (POP) Dispenser. I approached the POP with the criterion that it should stand on the shelf next to the bottle (as opposed to a hang card or a bulk refill station), and that it have a visual relation to its accompanying bottle so that the consumer would know that the two products, the bottle and the tablet, were parts of a system. My first 3-D sketch was a tall box with a circular hole cut out in the front . Then I tried some more "dynamic" approaches in form, but eventually I came back to the box, mostly because this shape facilitated easy shipping. After conducting some color studies, I decided to use kraft paper for the entire system, which meant that the POP would be made of kraft paper board. I felt that that paper choice and color, along with the typography, would visually hold the products together well.

> 2. MUSICAL INTELLIGENCE.
> The capacity to perceive (e. g., as a music aficionado), discriminate (e. g., as a music critic), transform (e. g., as a composer), and express (e. g., as a performer) musical forms. This intelligence includes sensitivity to the rhythm, pitch or melody, and timbre or tone color of a musical piece. One can have a figural or "top-down?" understanding of music (global, intuitive), a formal or "bottom-up" understanding (analytic, technical), or both (2).

Musical intelligence is often understood as a person's sense of sound, but I believe that an integral part of that skill is a keen sense of temporality. As a musician I am often asked whether my musical training influences my design work, and after much thought I have concluded that because of that close relationship between music and time I believe I am sensitive to the design of an experience, which occurs in time, as opposed merely to the design of a static object.



This sequence of images shows an early draft of the user experience with this product from the merchant shelf, on the upper left, to mixing and using the soap to returning the packaging via U.S. mail.

So when designing this product, my objective is to create an experience in which the user can learn to enjoy a slow experience—because that experience has been designed to be pleasing—and in the process that user is learning to value time in a different way, not as something to be "saved," but rather as something to be happily spent. One factor that perpetuates our consumer frenzy is our valuing of convenience, and thus we privilege products that appear to save us time, such as microwave dinners and instant rice mixes. But these products, I argue, save us time only in the immediate sense; in a holistic context they cost us time by eroding our health. So I want this product to challenge that delusory valuing of convenience, and I propose that it does this by slightly slowing down the consumer's experience with the product. I propose that my product does this in these three following ways:

> a) upon purchase of the product the consumer must take the time to mix the formula and dissolve the concentrate, and then again when the bottle empties;
>
> b) because the formula is low in viscosity and thus with a conventional cap would pour quickly, I've designed the cap to dispense the formula slowly.;
>
> c) because the bottle is not plastic but glass, the consumer is unable to squeeze the bottle and must handle it slightly more cautiously, which handling takes a bit more time than otherwise.

My hope is that the periodic repetition of this slow experience will teach the consumer that his or her actions are involved in the life-cycle of a product. Jonathan Chapman, in his book *Emotionally Durable Design: Objects, Experiences, and Empathy*, refers to this design principle as a profound aspect of the consumer experience.

> Contrary to popular misconception, it is the subtle and more ephemeral user experiences that penetrate the psyche through the slow and steady passing of time....subtle and more ephemeral user experiences, such as those gained

> from gently refilling a fountain pen with ink, or perhaps re-honing the blade of a sushi knife on a well-worn whet stone, will be revisited time and time again, as with each visit the experience grows and evolves a little further....Insignificant as they may at first seem, these sub-conscious experiences may be the most potent and influential of all. They establish strong and durable connections within users, on both rational and emotional levels (Chapman 2005. 84).

He goes on to argue that in light of the significance of mundane tasks we designers should design our products to employ this principle to promote sustainable consumerism.

> 3. VERBAL-LINGUISTIC INTELLIGENCE.
> The capacity to use words effectively, whether orally (e. g., as a storyteller, orator, or politician) or in writing (e. g., as a poet, playwright, editor, or journalist). This intelligence includes the ability to manipulate the syntax or structure of language, the phonology or sounds of language, the semantics or meanings of language, and the pragmatic dimensions or practical uses of language. Some of these uses include rhetoric (using language to convince others to take a specific course of action), mnemonics (using language to remember information), explanation (using language to inform), and metalanguage (using language to talk about itself) (Armstrong, 2).

To engage the consumer's verbal and linguistic intelligence, I felt it was critical to use the appropriate language and typography. As I mention in the section on visual intelligence, I refrained from using flashy graphics to further boost the integrity and honesty of the product and instead surveyed a series of linguistic approaches:

a) *Truisms.* These I got from two female artists working in the 1980s, Barbara Kruger and Jenny Holzer, both conceptual artists who use texts in the public realm, such as bill boards, to make social statements. One example that I considered was the phrase "Clean Water is a Right." But I decided that this approach was too "closed," that it was impeding the consumer's engagement with the product. So instead I began considering a more open-ended approach.

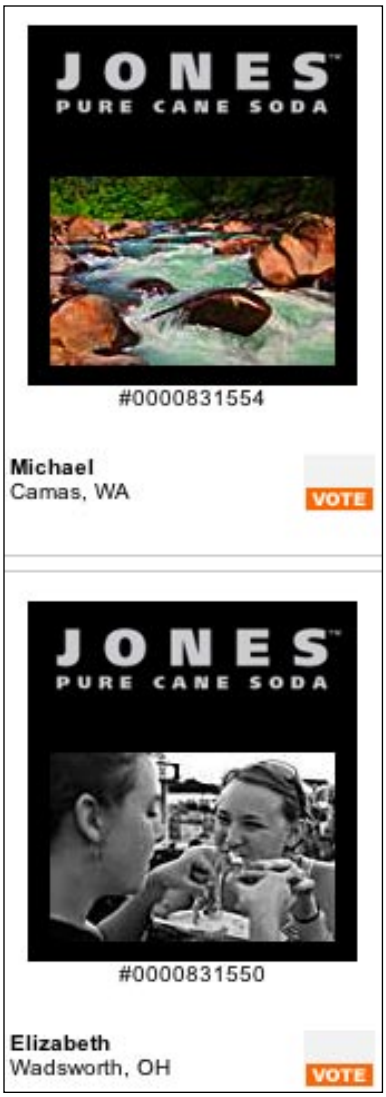


Figure 5. This photographs are submitted to Jones soda and posted on their website. Jones soda drinkers vote on their favorite images. http://www.jonessoda.com/gallery/index.php

b) *Open Questions.* This approach was inspired by Umberto Eco's essay "The Open Work," in which he argues that art can be experienced democratically as an interactive enterprise, a conversation, as it were, between artist and viewer. An example of an "open" phrase that I considered using, inspired by Eco's thesis, is the question "Where Does Clean Water Come From?" But it became apparent that this approach may frustrate the consumer, or that it may quell the enjoyment I wished to inspire with this product.

c) *Combined Approach.* This is a combination of the first two approaches. I decided that the on-shelf packaging could be authoritarian as long as it had a playful tone, so I created for the POP the phrase "You don't need more bottles, you just need more soap." And I decided that once the consumer has the product at home, the use of language can be more open-ended and interactive. My first attempt at this interactive element was to ask the user to fill out a survey on the back of the label and send it into the company, and the results of the survey would then be incorporated into the marketing campaign. But this approach seemed to me too demanding for the consumer and had a low likelihood of being filled out and mailed in. My next attempt was to combine with the packaging a blog, online element, and people's submissions to the blogs could be printed on the packaging, such that the packaging could then be partially created by users. A model for this approach is Jones soda, the labels for which contain photographs taken by users who have sent the photos to the company either electronically or by mail.

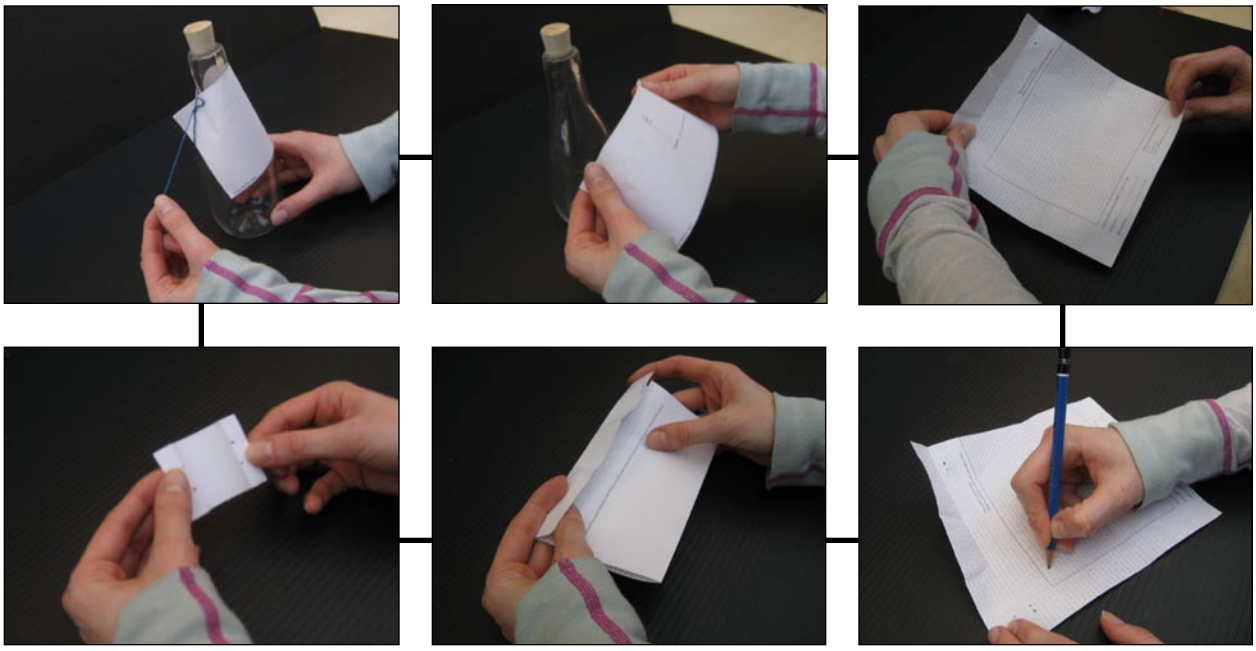
> 4. LOGICAL-MATHEMATICAL INTELLIGENCE.
> The capacity to use numbers effectively (e. g., as a mathematician, tax accountant, or statistician) and to reason well (e. g., as a scientist, computer programmer, or logician). This intelligence includes sensitivity to logical patterns and relationships, statements and propositions (if-then, cause-effect), functions, and other related abstractions. The kinds of processes used in the service of logical-mathematical intelligence include: categorization, classification, inference, generalization, calculation, and hypothesis testing (2).

With this product, this intelligence should be engaged when the consumer realizes that the concentrate has equal value to the conventional pre-mixed product. This realizaton can occur because the parts (accurate measure of concentrate and bottle volume) that make the product are visible and easy to understand. Additionally, the consumer may come to understand this value by way of the appeal to their linguistic intelligence in the phrase that is used on the POP, "You don't need more bottles, you just need more soap." This statement prompts a brief logical analysis that engages our reasoning.

One may detect in this part of my analysis that many of these appeals cross-reference one another. For example, the logical intelligence that I claim in the previous paragraph is engaged with the phrase "You don't need more bottles, you just need more soap" is obviously also a linguistic appeal. Similarly, when the user refills the bottle with the small concentrate over and again the appeal to logic will also be engaged both visually and kinesthetically (see #7. below). I would like to think that like a musical quartet the whole of these appeals will be greater than the sum of its parts; I hope that the interaction of these appeals will strengthen the overall educational effect of the product.

> 5. INTERPERSONAL INTELLIGENCE.
> The ability to perceive and make distinctions in the moods, intentions, motivations, and feelings of other people. This can include sensitivity to facial expressions, voice, and gestures; the capacity for discriminating among many different kinds of interpersonal cues; and the ability to respond effectively to those cues in some pragmatic way (e. g., to influence a group of people to follow a certain line of action) (2).

I hope to appeal to our sense of community with an element discussed above in the linguistic section in which the consumer is asked to write in a comment on why he or she loves clean water. These statements will then be integrated into the product's packaging and advertising, similar to the way consumer testimonials are often used in marketing campaigns; but rather than focusing on the value of the product these testimonials attest to the value of a natural resource, clean water. As I mentioned early in this thesis, I am working with the assumption that access to clean water



This sequence of images shows an early attempt to appeal to the interpersonal intelligence. In this iteration of the product, the label of the bottle had a "second life" as a self-mailing questionnaire which asked about the value of clean water. The user would mail in their response and, in turn, their statements would be incorporated into future packaging copy for the concentrate.

is a basic human right, so these testimonials constitute a dialogue among citizens that raises their consciousness about this right. And in turn by using the soap on a daily basis the users come to associate the use of the soap with that dialogue. Consumers become more thoughtful, citizen-minded people.

> 6. INTRAPERSONAL INTELLIGENCE.
> Self-knowledge and the ability to act adoptively on the basis of that knowledge. This intelligence includes having an accurate picture of oneself (one's strengths and limitations); awareness of inner moods, intentions, motivations, temperaments, and desires; and the capacity for self-discipline, self-understanding, and self-esteem (2).

Synergistic with the interpersonal appeal that I explain in the previous paragraph, this intelligence involves the personal reflection that is engaged in the act of washing dishes. The design of the experience with this product takes advantage of this activity by turning it into a time for meditation, offering a period of time, on a daily basis, for the consumer to reflect on issues associated with this product, such as clean water and the way one's actions affect it.

> 7. BODILY-KINESTHETIC INTELLIGENCE.
> Expertise in using one's whole body to express ideas and feelings (e. g., as an actor, a mime, an athlete, or a dancer) and facility in using one's hands to produce or transform things (e. g., as a craftsperson, sculptor, mechanic, or surgeon). This intelligence includes specific physical skills such as coordination, balance, dexterity, strength, flexibility, and speed, as well as proprioceptive, tactile, and haptic capacities (2).

The design approach for this intelligence involves attention to the user's physical interaction with the product.

The Label. As I mention above in the Visual Intelligence section, because this is a durable bottle that consumers buy once and then keep, ideally, forever, it is important that the label be either durable or easy to remove. I

The easy-to-remove label promotes the idea that glue is not necessary and, in fact, often degrades the integrity of paper that is destined for recycling.

chose to make it easy to remove, because I see the label as an opportunity to teach the consumer that designs for products that separate easily are more environmentally responsible than those that don't. I explored mechanical connections made with string and metal fasteners to hold the label on, but I felt that these options were overly complicated for the user to disassemble. [image]. So I decided to design a slot and tab into the paper label that can be easily loosened and removed.

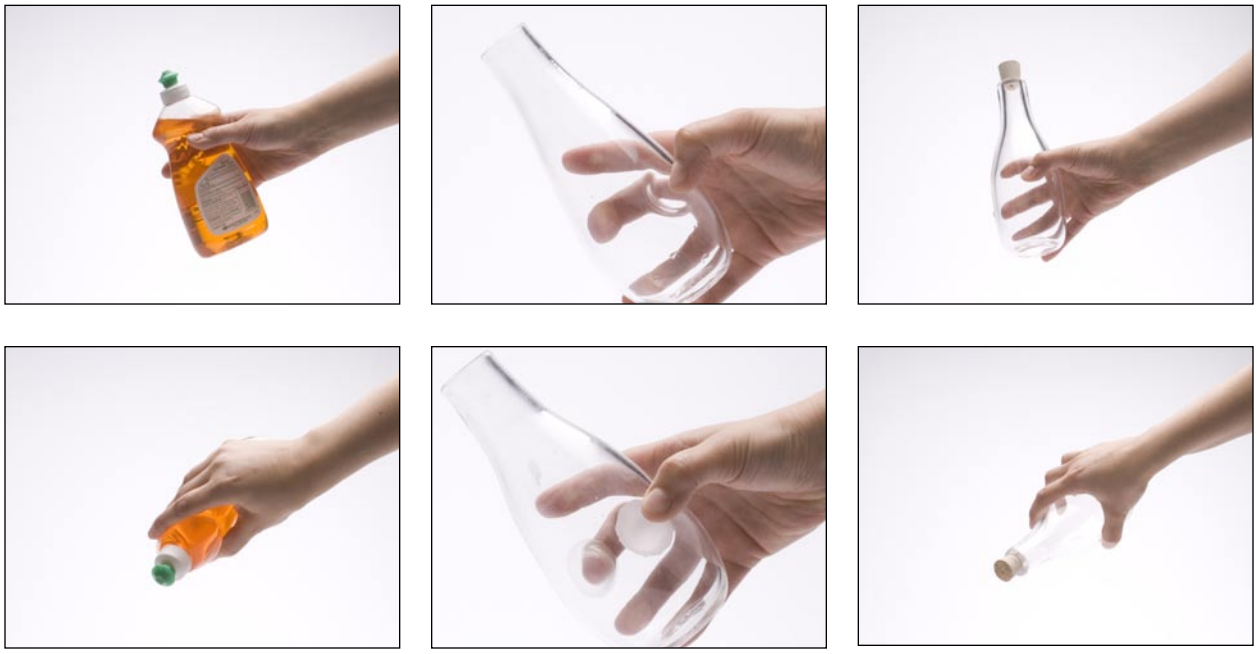
The Bottle. My exploration into the form of the bottle was influenced greatly by how the bottle would feel in ones hand. To do this I "sketched" with foam on the lathe. Once I found a form that felt how I wanted it to in my hand, I hired a glass blower to sketch in glass. 3D models of the bottle forms are shown on the following pages.

The Home Experience. The consumer takes this product home, removes the label, adds water to the bottle, and then uses the soap. I've designed this experience to interrupt what is normally a thoughtless experience with dish soap. The user is engaged by two kinesthetic elements, elements that call attention to the values I am promoting with the product (both are previously mentioned in the musical intelligence section):

a) *The mixing of the soap*: this experience compels the user to be conscious that they are mixing chemicals with water, an experience opposed to his or her previous unselfconscious use of conventional premixed soap.

b) *The use of the soap*: this experience involves two further kinesthetic engagements, the handling of the bottle, which is necessarily a careful handling because the bottle is glass; and the pouring of the formula, which is slow because this formula is less viscous than conventional formula and thus the cap is designed to dispense it slowly. The glass bottle is also rigid, and not squeezable like conventional soap bottle. Thus, this rigid material further interrupts the conventional tactile experience of washing dishes. This design for slowing the action down interrupts the typical mindlessness of this activity, positioning the user to reflect, again, on the influence of their actions on clean water.

These images show form studies that I made by spinning foam on the lathe.



These images show the ways that different forms influence the pouring motion.
All of the bottles shown here are my own sketch-models except for the
conventional soap bottle on the upper left.

It was often suggested that my design use a pump to dispense the formula, but I decided against it because I felt that the pump's ability to dispense the formula quickly would not serve my intention of slowing down the action. I could have slowed the action by using a self-foaming pump, but I felt that foam would misrepresent the integrity of the formula; as Roland Barthes wrote, "As for foam it is well known that it signifies luxury" (Barthes 1972).

> 8. NATURALIST INTELLIGENCE. Expertise in the recognition and classification of the numerous species, "the flora and fauna" of an individual's environment. This also includes sensitivity to other natural phenomena (e. g., cloud formations and mountains) and, in the case of those growing up in an urban environment, the capacity to discriminate among nonliving forms such as cars, sneakers, and music CD covers (Armstrong, 2).

This intelligence is not one of Gardner's original seven intelligences, and yet I feel it is an important one to address in this project. It is an intelligence that appeals to people's propensity to learn in and about natural settings. I feel that I am perhaps awakening the user's naturalist intelligence, his or her awareness of nature, by making apparent the effect of this domestic activity on the water cycle. This awakening begins in the store when the user reads the name of the product, which reads "Clean: dish soap for clean water." Then when the user mixes the concentrate with the water they are further attentive to how their actions affect the water cycle.

One of the challenges of concentrates proposed to me by Nick Mahan, at MethodHome was that different areas of the country have different water qualities, which affects the levels of concentrate necessary for the mix. Distribution of bio-regional appropriate laundry detergents is already practiced but "hidden" from the user. With this product I had hoped to place those variations in full view. I saw this placement as an opportunity to celebrate the unique qualities of one's own eco-system. At this time I have not yet found a way to make this quality visible, but I will keep this goal in mind for further development.

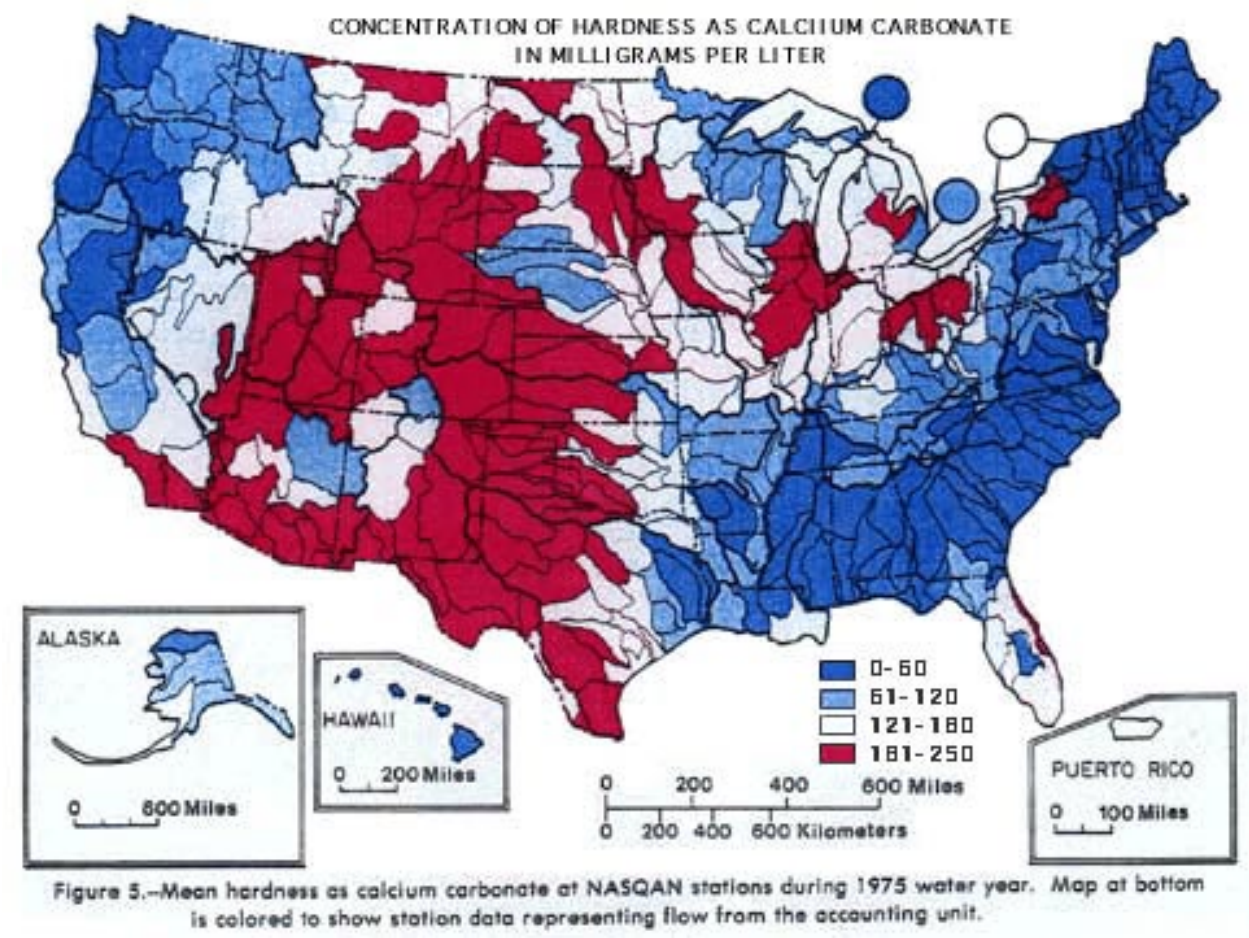


Figure 6. This map shows varying degrees of water hardness throughout the country. Concentrates sold in varying regions would correspond with these variations in water quality (http://water.usgs.gov/owq/map1.jpeg).

This sequence of images show the user experience from the merchant shelf on the upper left, to the mixing and using of the soap, to the online submission of user response, to the unwrapping of a new tablet.

Conclusion to pedagogical approach

The application of Howard Gardner's Multiple Intelligence theory to the design of this product and the design of the user experience provides a non-authoritarian learning experience for the user and, I believe, an effective method for promoting a shift in values and behavior that support environmental health.

I will close this section with a quote from David Tackacs' paper entitled "Positionality, Epistemology, and Social Justice in the Classroom" that sums up my position on the value of interactive pedagogy:

> When we ask students to learn to think for themselves and to understand themselves as thinkers—rather than telling them what to think and have them recite it back—we help foster habits of introspection, analysis, and open, joyous communication (Tackacs 2002. 169).

While I believe that the greatest strength of this thesis project is found in its analysis of semiotics and application of pedagogical principles, in other words the ideological value of the project, no eco-design paper would be complete without a list of the physical benefits of the product's design.

In this section I will provide a brief qualitative analysis of my product's impact on the environment and compare its qualities to that of conventional dish soap. For this analysis I will be using the "Eco-design Strategy Wheel" from the 2007 version of the Okala ecological design curriculum developed by Steve Belletire, Louise St. Pierre, and Philip White. This curriculum is supported by Eastman Chemical, Whirlpool, and the Industrial Designers Society of America (IDSA). (I am working with the vice president of education at IDSA, Edward Dorsa, on an initiative that would require the integration of Okala life-cycle tools into all student merit award presentations that are given at regional IDSA conferences.)

The checkpoints on the Okala strategy wheel are as follows: 1) Innovation, 2) Low-impact materials, 3) Optimized manufacturing, 4) Efficient distribution, 5) Low-impact use, 6) Optimized product lifetime, and 7) Optimized end-of-life.

I find that the strategy wheel is not only useful for auditing a product's environmental impact, but also as a tool to help designers find clearly marked entry points in which to explore opportunities for innovation and creativity.

1. INNOVATION
   - rethink how to provide the benefit
   - serve needs provided by associated products
   - anticipate technological change and build in flexibility
   - provide product as service
   - share among more users
   - design to mimic nature
   - use living organisms in product

   (Belletire, St Pierre, White, 34. 2007).

Figure 7. The Eco-design Strategy Wheel from the 2007 version of the Okala ecological design curriculum developed by Steve Belletire, Louise St. Pierre, and Philip White (33).

While the Okala strategy wheel is arranged in a circle, implying that there is no set beginning or end to this process, the model designates "Innovation" as a first step. If I were to adjust the design of this strategy wheel, I would probably place steps two through seven on the wheel and then place the wheel inside a larger circle entitled "Innovation" as innovation can happen at any stage in this process. For my project I believe that the strongest points of innovation, as far as minimizing the environmental impact of the product, occur in step 4) Efficient distribution and step 6) Optimized product lifetime.

2. LOW-IMAPCT MATERIALS
- avoid materials that damage human health, ecological health, or deplete resources
- use minimal materials
- use renewable resources
- use waste byproducts
- use thoroughly tested materials
- use recycled or reuse materials
(34).

I will list the materials that I chose for this product here:

a) kraft paper made from small diameter trees

b) sand-blasted glass for a durable, reusable bottle

c) a durable synthetic cork made from recycled materials

d) recycled aluminum for a durable pouring spout

e) eco-sensitive chemistry for the formula concentrate

f) heat activated protective film for the tablet made from algae

In the pedagogy section, I discuss some of these materials through an aesthetic lens. But these materials were also chosen because of their low impact on the environment. Small diameter kraft paper, which is used for the bottle's label, the POP box, and the concentrate's wrapper, is made from cut small trees that are a byproduct of forest management. The smaller trees are cut to maintain quality of life for larger trees in the forest. This kraft paper is also beneficial because it is not white and therefore does not require bleach for its production.

The glass for the bottle was chosen for its durability and rigidity. A visit to any antique shop tells us that glass ages well. Throughout this project, several critics expressed concern about a glass bottle in the kitchen. Even though we have many glass objects in our kitchen, the thought of using one for dishes, and for the regular act of washing dishes, seemed problematic to some. I tried to address this concern by sand-blasting the surface of the bottle, which provided a grippable surface. Still, if it turned out after a first production run that glass was a problem, then I would consider making the bottle out of poly-carbonate. I consulted a life cycle engineer, Dr. Ying Wang (March 4, 2007), about the environmental benefits of glass compared to poly carbonate. She concluded that the materials required similar energy input for production but, that ultimately a thick glass was more durable (and besides, on an aesthetic level she loved the glass bottles that I showed her!).

The chemistry for the formula was provided to me by Nick Mahan, director of formulation at MethodHome. I showed the ingredients to Dr. Wang to get a second opinion (she has a Ph.D. in chemistry) and she agreed that this was an appropriate formula. I will list the formula's ingredients from Mahan's e-mail here:

INGREDIENTS FOR CONCENTRATE
- high activity anionic surfactants in solid form (like SLES-sodium lauryl ether sulfate - coconut oil derived)
- nonionic surfactants (linear alcohol ethoxylates, maybe alkyl polyglucosides - coco/palm oil/corn or sugar beet derived)
- water conditioners (corn fermentation by-products and/or inorganics like sodium carbonate)
- fragrance if desired
- colorant if desired

(Nick Mahan, e-mail message to author, November 2, 2006)

Mahan warned me that such a concentrate would be corrosive to the touch, so it was important to find a material to coat or wrap it in that allowed the user to handle the concentrate without burning their skin. I consulted Dr. Wang, who suggested that I use a film made from Polyvinyl Alcohol which, she claimed, is "prepared by the hydrolysis of polyvinyl acetate, meaning

that it is environmentally friendly," (Wang, 2006). The practical benefits of this film are that it is resistant to moisture but will dissolve in warm water. Thus, the tablet would be protected while sitting in a grocery bag with refrigerated items that might have condensation, like frozen peas or milk. The concentrate could also be handled by a user with sweaty hands and still be protected. I checked in with Mahan about the PVA film. Thinking about his consumer base, an eco-minded group, he feared that if PVA were listed on the ingredients, then his customers might be offended. Mahan suggested, instead, the use of a film made from an alginate, processed algae extracts.

3. OPTIMIZED MANUFACTURING
- design for ease of production quality control
- minimize manufacturing waste
- minimize energy in production
- minimize number of production methods and operations
- minimize number of componants/materials

(Belletire, St Pierre, White, 34. 2007).

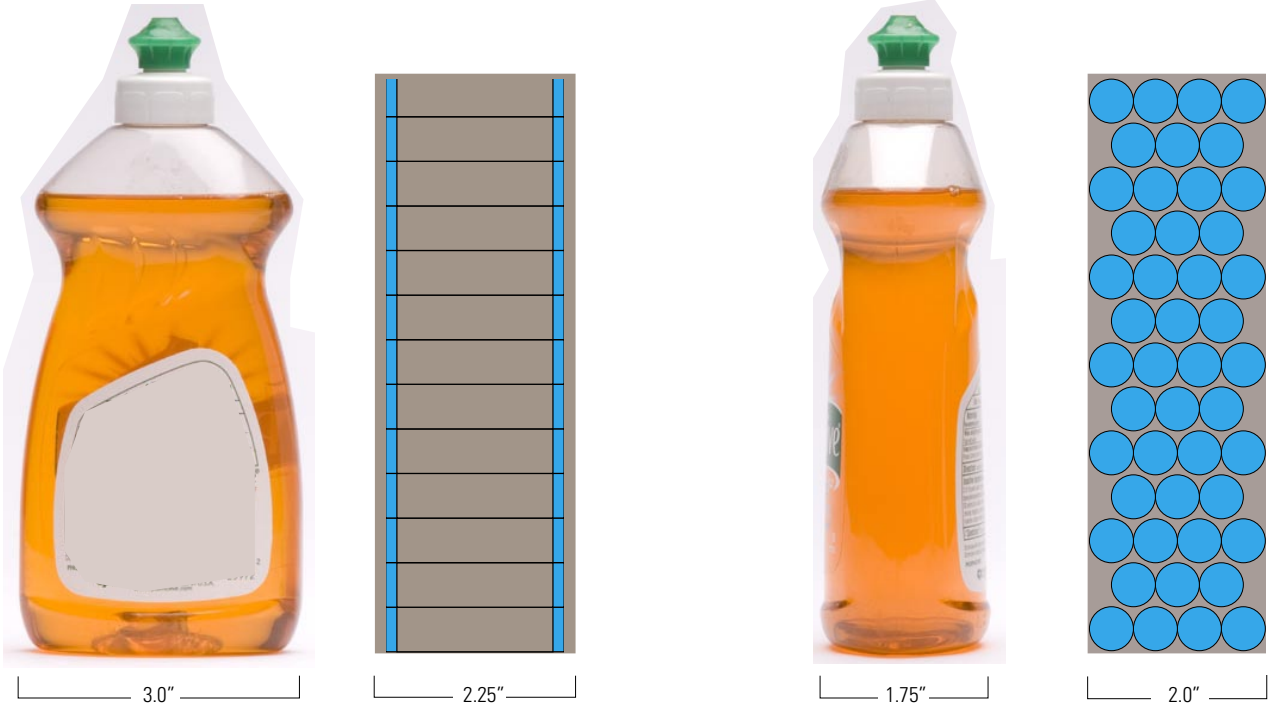
I believe that the greatest innovation in the category of optimized manufacturing comes with the reduction of materials used. The tiny pressed concentrate is replacing the injection-molded high-density polyethylene bottle produced by conventional dish soap manufacturers. The energy and tooling required to make a small pressed-powder cylinder seems to be much less than the use of repeated blow molding. Another environmentally friendly improvement in this product is the removal of glue from it; conventional labels for soap bottles are glued on, but on my product the labels are held on with a tab and slot mechanism. Although this mechanism means that a die cut is required for the label and that a machine with mechanical fingers might be required to place the labels on the bottle, a costly procedure, the label only employs one color ink as opposed to the standard minimum of four, which may make up for the energy and materials required for a glue-free label.

4. EFFICIENT DISTRIBUTION
- reduce product and packaging weight
- use reusable or recyclable packaging
- use an efficient transport system
- use local production and assembly
(34).

I believe that some of the greatest innovation for this product is made in the efficient distribution category. This innovation comes from the fact that I have drastically reduced the product's size by designing a concentrate. Conventional dish soap is 70% water and thus requires a much greater amount of cargo space. In addition to the water volume that conventional bottles must accommodate, conventional bottles are oddly shaped, meaning that they do not stack neatly together. The shape and the volume of conventional bottles are inefficient for compact shipping compared to the tiny, cylindrical concentrate.

As I mention above, different regions of the country have variations in water quality and thus require variations of density for the concentrate tablet. At one point I considered a hub and spoke production and distribution model. With this model there would be a manufacturing plant assigned to each region of the country and each plant would produce a concentrate that was appropriate for the water quality of that region. Thus, when it came time for distribution, the distance travelled would be less than if all of the products were shipped from a single location. I discussed this model with Dr. Yang and she felt that the tooling that would be required for the additional manufacturing plants would outweigh the benefits of shortening the distribution distances, especially when we consider the dramatic size reduction for this product. Thus, I decided to stick with a single manufacturing plant.

5. LOW-IMPACT USE
- minimize emissions/integrate cleaner or renewable energy sources
- reduce energy inefficiencies
- reduce water use inefficiencies
- reduce material use inefficiencies
(34).



The images here show the front and side views of the conventional bottle and the POP respectively. Note that the volume of one conventional bottle is nearly equal to that of 46 concentrate tablets.

Figure 8. Detail from Chris Jordan's photographic series entitled *Running the Numbers: An American Self-Portait.* Jordan's caption for this image: "Depicts two million plastic beverage bottles, the number used in the US every five minutes" (http://www.chrisjordan.com/).

The greatest innovation made in the low-impact use category comes with the re-use of a single durable bottle. Users avoid adding another bottle to their trash or recycling bin every time they run out of soap. Another innovation that falls under the low-impact use criteria is that each individual user is using their tap water to fill this bottle. So instead of the manufacturer shipping enormous volumes of water to add to the product in the factory, each user is taking on that responsibility. While at the end of the day the same amount of water is being used to dilute the soap, the source of that water is distributed and split up into small increments that span a much broader water supply and thus putting less stress on a single source of water.

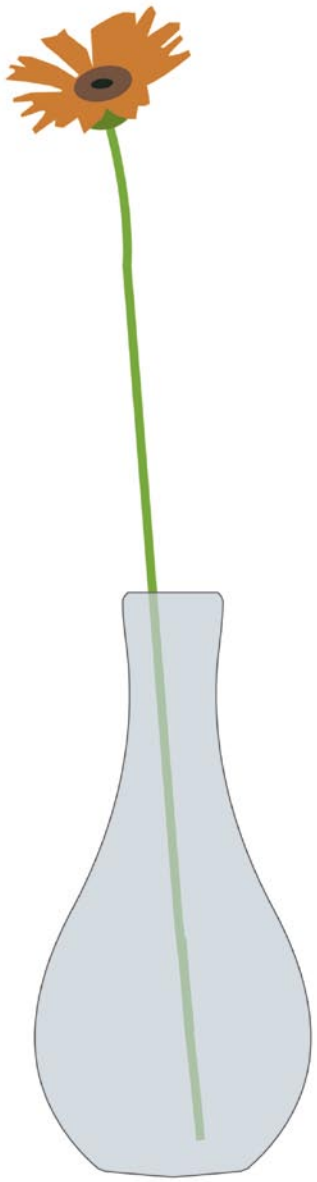
6. OPTIMIZED PRODUCT LIFETIME
- build in user's desire to care for product long term
- design for take-back programs
- build in durability
- design for maintenance and easy repair
- design for upgrades
- design for second life with different function
- create timeless look or fashion
(34).

Another area of this product's life cycle that I feel is innovative is the design of this product's lifetime. With a durable bottle and refill system, this product has built-in durability and is able to accept upgrades. We can say the bottle is the "hardware," so to speak, and the concentrate the "software"; the bottle will accommodate any improvements in the concentrate.

Some of the points from the Okala suggestions for this section are aesthetic suggestions such as the "building in the user's desire to care for the product long term" and to "create a timeless look or fashion." I feel that I have done that work and discuss it in the pedagogical section of this paper. But the fact that aesthetic principles are listed here in this life cycle model point to the fact that the physical properties of objects and the ideological properties of objects are often inseparable.

7. OPTIMIZED END-OF-LIFE
- integrate methods for product collection
- provide for ease of disassembly
- provide for recycling or downcycling
- design reuse, or "next life of product"
- provide for reuse of components
- provide ability to biodegrade
- provide for safe disposal

(34).



By designing glue-free labels, this product is easy to disassemble for recycling. Nor have I used ink printed directly on the bottle, which would require the bottle to take an acid bath before it was ground down for recycling. The kraft paper labels are biodegradable in theory, but a material is only biodegradable if properly disposed of. To make sure that the kraft paper is not disposed of in a plastic trash bag, which may preserve it forever, I have explored the idea of a take-back packaging incentive. The take-back system would ask the user to collect and mail in a designated number of labels to receive some kind of reward in return. Of course there is fuel energy spent in the returning of the paper to the manufacturer but perhaps, in this case, a hub and spoke system could be implemented for collection and proper disposal of the labels because very little equipment and space is required to collect and compost paper.

As for a second life for this product, the bottle could always be used as a bud vase!

As stated in the introduction of this paper, this project began with a philosophical question: What keeps us from achieving sustainable happiness, for ourselves and future generations? One obstacle is that not everyone has access to environmental health, and as consumers we support industrial practices and products that degrade the environment that provides for that health. And yet most of us would never knowingly make a decision that would cause harm to another person. I refer to this conundrum as the citizen/consumer conflict, and in this project I propose a resolution for it. The proposal is comprised of four analyses or topics: environmental economics, semiotic history of design, experiential pedagogy, and product life-cycle modeling. From these analyses I extracted design principles to apply to an everyday object, dish soap. Through the production, distribution, and use of this product I hope to begin the process of replacing values and behaviors that are harmful to the environment with values and behaviors that support environmental health, and help us to achieve happiness.

The final iteration of this system is shown here in a Photoshop rendering. In this drawing I have slimmed the neck of the bottle for easy handling and have fluted the top of the bottle slightly to hold the label in place for shipping.


clean
clean
you don't need more bottles
you just need more soap
clean
clean

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NOTE All images in this text were created by the author except when noted otherwise.

FIGURE 1 Roderick Nash. The evolution of ethics. (see reference list for details)

FIGURE 2 Roderick Nash. The expanding concept of rights. (see reference list for details)

FIGURE 3 FDA nutrition facts label. (http://www.cfsan.fda.gov/~dms/foodlab.html#twoparts).

FIGURE 4 Timberland shoes eco-label. (http://www.businessweek.com/innovate/content/may2007/id2007051_987701.htm).

FIGURE 5 Jones Soda.com. (http://www.jonessoda.com/gallery/index.php).

FIGURE 6 USGS map. (http://water.usgs.gov/owq/map1.jpeg).

FIGURE 7 Belletire, St. Pierre, and White. The Eco-design Strategy Wheel. (see reference list for details)

FIGURE 8 Chris Jordan. Running the Numbers: An American Self-Portait. (http://www.chrisjordan.com/).

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