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FORM, FUNCTION, EMOTION: DESIGNING FOR THE HUMAN EXPERIENCE

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ABSTRACT
The goal of this paper is to introduce an approach to teaching design as a cultural act of meaning-making. This has the potential benefit of making better-informed participants in the system of design, production, and consumption – creating discerning designers and consumers who are more sensitive to the world of products as artifacts. There is more to the success of a product than how it looks (form), or how it works (function). There is also the more sensitive aspect of how people feel about a product (emotion). While form, function, and emotion can be equally important in design, it is the synergy of the three that is essential to success. It could be argued that the most valuable skill of a designer is the ability to synthesize these diverse needs into cohesive solutions. To do this, it becomes useful to consider products as personalities, and to reflect on the relationships that we (as consumers) have with those personalities. Product personalities are communicated through the form language of product semantics, which involves the selective application of forms that signify desired attributes. In this way, designers are reconstructing meaning from the existing language of cultural forms, communicating with users through a system of non-verbal, and often pre-conscious signs, in order to create products that resonate with consumers.

Keywords: Industrial design, product semantics, emotional design

1 INTRODUCTION

The role of industrial design is to balance complex and frequently competing needs, and to specify cohesive and viable solutions for what is often a vague or unknown problem. There is more to the success of a product than how it looks (form) or how it works (function). There is also the more sensitive aspect of how people feel about a product (emotion) – based on appearance, use, history, and both personal and cultural associations. While form, function, and emotion can be equally important in design, it is the synergy of the three that is essential for success. It could be argued that the most valuable skill of a designer is the ability to synthesize these diverse needs into compelling solutions.
'Form, Function, Emotion' is the title of one section of an Introduction to Product Design course taught at Appalachian State University. The course is taught as a General Education class for non-majors, and is a required course for industrial design students. It is intended to provide an overview of the role and practice of industrial design, and to give students a greater appreciation of the products around them. The purpose of this particular section of the course is to deepen student's understanding of product design as a cultural act of meaning-making. This paper provides an overview of the concepts covered in this section of the course, and gives a brief summary of the curriculum used to address these concepts.

2 FUNCTION

For every product purchased, consumers have conscious functional needs, subconscious formal expectations, and often unconscious emotional concerns. Historically, industrial designers have been primarily responsible for addressing the form or appearance of a product. However, as Henry Petroski advocated, "…the complete industrial designer seeks to make objects easier to assemble, disassemble, maintain, and use, as well as to look at" [1].
Whether form follows function or vice versa, form and function are intimately intertwined in products. This is particularly true when 'function' is interpreted to include more than pure utility. In Emotional Design, Donald Norman discusses product interactions at three levels, *visceral*, *behavioural*, and *reflective*. Behavioural interaction is the area most closely aligned with traditional notions of function,

and Norman outlines three aspects of behavioural interaction: function, performance, and usability. Beyond 'Does it work?' (a question addressing function or utility), one might also ask 'How well does it work?' (addressing performance), and 'How easy is it to understand and use?' (addressing usability) [2]. Behavioural interaction emphasizes the use of objects, and includes the 'feel' of the product – e.g. how one hammer feels to use vs. another, or the satisfaction of using a high-quality tool. This type of consideration is outside of traditional notions of function and extends into the more sensitive side of human-product interaction under the purview of industrial design.

Another way to extend the view of 'function' in product design is described by Henry Petroski in The Evolution of Everyday Things. Instead of 'form follows function', he advocates a model of 'form follows failure'. In this model, failure can be about utility (a product no longer meets the utilitarian needs demanded), cultural (a product no longer meets the expectations of the people using it), or aesthetic (a product no longer fits in with the fashion of the time). When a product fails to meet it's intended purpose (in terms of utility, culture, or fashion), the design evolves to overcome the failure [3].

The Modernist tenet of 'form follows function' is simply too thin to cover the 'complete industrial designer' described by Dreyfuss. It can be argued that even the 'functionalist' aesthetics of Modernism were themselves driven more by cultural ideals of design and geometric abstraction than by utilitarian needs driving exterior forms. Many designs from this period were intended to communicate the 'universal' machine aesthetic, reflecting the promise of an egalitarian society stocked with efficiently mass-produced products that exemplified a true and unadulterated beauty. In this case, the function that the form is to follow was cultural, not utilitarian. Despite the Modernist goal of universal design, Petroski reminds us that the industrial designer will always have work to do: "Since nothing is perfect, and, indeed, since even our ideas of perfection are not static, everything is subject to change over time" [4].

3 FORM

3.1 Form as communication

Aesthetics reflect the *form* portion of the *form/function* discussion. However, form encompasses more than simple appearance – it is largely about communication. Communication was one of the five critical goals for industrial design outlined by Henry Dreyfuss in 1967, along with utility, appearance, ease of maintenance, and low costs. Communication, for Dreyfuss, was about brand communication and clearly expressing the "…corporate design philosophy and mission through the visual qualities of the product" [5]. Communication also shows up in his goal of 'ease of maintenance', which wasn't just about making a product easier to maintain, but included designing a product that *communicated* how it was to be maintained and repaired.

Communication in product design also reflects the pragmatics of function, and how the exterior form and human interface of a product can bolster usability, helping the user clearly understand how to operate a product. In Donald Norman's earlier book, The Psychopathology of Everyday Things, he outlines the elements of a design that are necessary for effective communication of product functionality: 1) Visibility, 2) Affordances, 3) Mapping, and 4) Feedback [6]. In the end, the appropriate application of these principles should allow the user to develop a working conceptual model of the product so they can understand cause and effect relationships. For example, consider a light-switch that turns a light on when lifted: the switch *affords* a simple up/down motion easily moved by a finger; *feedback* is provided by seeing the light come on; when the switch is lifted, the light is on, and this *mapping* parallels a conceptual model of raising energy. The only aspect lacking in this example is clear visibility – when the light is off, it is difficult to see the switch, though glowing switches have solved this.

3.2 Form as aesthetics

Our initial, and most raw perceptions of a product happen on a visceral level. According to Donald Norman, the visceral level of interaction is pre-wired, based on a raw preconscious response to a thing. The rush of sensations when riding a roller coaster is a visceral experience. Or the experience of seeing a product (in-person or on television) and having a gut reaction of "I want it", only later to be followed by "What is it?" - that is a visceral experience.

Part of product design is about making a product attractive, and appealing to the consumer at this gut/visceral level. Bright colours, sleek surfaces, and voluptuous curves are inherently compelling. Still, visceral interaction is not purely visual, it can encompass all of the senses – for example, a chef's presentation of a plate of food can entice us through the look, smell, and even sound before we are able to explore taste and touch, all of which have a visceral component.

Perceptions of form go far beyond the surface interaction at the visceral level. While attractiveness is skin deep, Norman explains that beauty operates on a higher level of interaction – the reflective. Beauty is about a more in-depth understanding of a thing based on past experience. Something that is viscerally unattractive at first can become the object of desire – connoisseurship of many kinds is based on this learned relationship through experience.

3.3 Form as language

Form is more than the visceral appearance of a thing or the pragmatic communication of functional attributes. It is also about a visual language of cultural signs – in the world of product design, that language is known as *product semantics*. Product semantics is adapted from semiotics, the study of signs and signifiers in cultural texts (originally in literature, but later in all types of cultural output, from television shows to physical products) [7]. Product semantics is about the careful considerations of the formal attributes of a product and what these tell us about the product and its' cultural context.

In The Evolution of Useful Things, Petroski outlines the history a fork as a protagonist in the complex and slow-moving evolution of human artifacts. He notes that, "A knife and fork are not merely utensils for eating. They are utensils for eating in a society in which eating is done with a knife and a fork. And that is a special kind of society" [8]. Similarly, in The Language of Things, Sudjic explains that "…it is possible, from a careful examination of a spoon to understand the kind of city that the society that had produced it would build" [9]. Products are signifiers within a cultural context, both the result and the conveyor of the memes of that culture. And everyday products, such as a spoon or fork, are no less significant in their cultural transmissions than are architectural structures, literary texts, or works of art.

The signs and signifiers of product semantics are socially constructed, similar to words in a language that only have value through a shared meaning. The meanings associated with a product are propagated through the interconnected relationship between the product and the culture that produces and uses it. For example, a key to a car is meaningless unless one understands the functional concept of *key+lock* as well as the *car+ignition*. Further, the cultural concept of *keyholder=owner* signifies an important relationship between the user and the product. The cultural meaning of such a product depends on one's experience and understanding of related products, materials, forms, etc. A digital key fob with a glossy BMW logo communicates one set of messages about the keyholder, whereas an old-fashioned metal key with an imprinted Honda logo signifies a very different set of messages. Or consider a custom silver and wood key fob for a hand-built Gumbert Apollo supercar – the key alone has a $7,000 price tag. (See Figure 1, below) What does that product say about the one who holds it? How does it communicate those messages, and to whom? This happens through the signs contained in the object and the meanings they signify within the culture.

Figure 1. Keys and Associated Cars

Designing a product involves the selective application of signs, or forms that represent/signify desired attributes. In doing this, designers are reconstructing meaning in a self-conscious way, making meaning from the existing language of cultural forms, communicating with users through a system of non-verbal indicators.
Signifiers of cultural meaning operate on the *reflective* level, dependent on how one perceives themselves in relation to that which is signified. The designer's task is to align the appropriate signs with the end user who perceives the appropriate signified.

4 EMOTION

4.1 The creation of meaning

Product design involves consciously tailoring the signs and signifiers of a design to the values and perceptions of an end user. In that effort, designers must be sensitive to the specific sub-group or target market for whom they are designing, and therefore spend much of their time trying to understand the values, lifestyles, relationships, and activities of their audience.
Defining the end-user depends on the level of interaction desired for the product. Following Donald Norman's model, as one moves up through higher-order levels of interaction – from visceral, to behavioural, to reflective – the design tends to become more constrained because the size of the audience shrinks. The higher up the level of interaction, the more emotionally-connected the user is to the product, and the more specifically tailored the design has to be in order to develop that attachment.
While the goal may be to design for personal meaning and emotional resonance, the capacity to develop such traits in a mass-product is limited. Through his research on meaningful objects in peoples homes, Csikszentmihalyi discovered that what made objects special had less to do with the object than with the story, experience, or occasion the object recalled [10]. Attractiveness is visceral but beauty is reflective, and ugly things can become beautiful to someone based on personal memories and other associations. As Norman explains, "Our attachment is really not to the thing, it is to the relationship, to the meanings and feelings the thing represents" [11]. Because of this, it can become impossible to design for the consumer because the life experience of individuals is too disparate, and the way they attribute meaning is too distinct.
It is possible, however, to communicate through culturally meaningful signs, especially those with which a market segment is likely to have a shared history. For example, the creation of the new VW Beetle in the late 1990's was a reinterpretation of the nostalgic 1970's icon for the aging (and better-endowed) baby-boomers that experienced the first Beetles/Beatles. It is also possible to leave space for personal connections – the idea of mass-customization is one way to allow customers a sense of control, ownership, and individual expression through their products.
The shopping experience for many products is often a visceral one, based on perceptions of attractiveness, feelings of comfort, as well as desire and the satisfaction of desire through the purchase exchange. But the favourite pair of jeans, kitsch souvenirs, and cherished heirlooms are imbued with value based on personal history. Between these extremes is where the designer works with the language of form to find resonance with the end user.

4.2 Maintaining Trust

Part of how we develop emotional relationships with inanimate products is similar to how we develop connections to people – through trust. As John Thackara explains, "Trust accrues through time and is built during encounter and interaction between people…" [12]. Trust also accrues through time and is built through interactions with a *product* or *brand*. Over time, one comes to presume a certain type of experience, learns what to expect from it, and projects that experience into the future. As we build these relationships, we become invested in the way things are, hesitant to allow them to change.
While designers work to envision the future, their innovation is bookended by two limiting factors: 1) There is nothing new. "Everything new is really just an addition to or modification of something that already exists" [13]. Or, from an anthropological perspective, "…novel artifacts can only arise from antecedent artifacts" [14]. 2) People are suspect of anything too unusual. For example, one might know what a computer mouse is from regular use; they understand what it does, where the buttons are, how it feels, etc. Any significant deviation from such a learned archetype will be viewed with skepticism, and it will require the user to recalibrate their interaction and expectations of the product (in form and function), as well as to build a new relationship with the product (emotion). Consumers

have a limit to how far-reaching an innovative product can be while still presenting a viable solution that fits into their world. Loewy summarized the phenomenon with the acronym MAYA, standing for 'most advanced yet acceptable' [15].

This suspicion of the unfamiliar is partly due to product semantics and the investment that consumers have made in understanding things as they are. Trying to sell someone a blender that doesn't reference their idea of a blender is like trying to speak to them in a foreign language – there is no shared collection of signifiers, and relative comparisons to past experience (reflective interaction) is impossible. Therefore, designers have to be fluent in product semantics in order to communicate appropriate clues and position a product relative to the known language of trusted forms. Their task is to incorporate cultural and personal signifiers appropriate to the target audience in order to develop a resonance with the perceptions and values of that audience.

While the average consumer may not be aware of (or admit to) the subconscious associations affecting their purchasing decisions (e.g. would my parents approve of this car, will I fit in with my friends with these shoes), they are part of a constant internal conversation that determines the external persona one projects through the products with which they surround themselves. As Norman writes, "…psychological perceptions determine what people will buy" [16]. And the products one chooses reflect an identity back to oneself as well as projects an identity to others. Interestingly, those two identities are often distinct, and the designer must consider the product semantics along both channels of communication, internal and external.

5 FORM + FUNCTION + EMOTION

Product design is a cultural act of meaning-making, and such an act operates simultaneously on multiple levels. Form first addresses aesthetics and the visceral sense of attractiveness. When considered further, form is also about communication – of functional cues, of product/brand identity, and product semantics within a larger cultural context. Function, in design, is about user interaction and the fit and feel of a product. Function addresses utility (does it work), performance (does it feel good and work well), and usability (is it easy to understand and does it do what you expect). Emotion is about the self-identity tied to a product, the reflective personal and cultural considerations – does it convey the right message; does it reflect the desired attributes about one's identity and persona?

Designers are responsible for considering products on all of these levels and to synthesize the many competing needs of a design into a single holistic vision. To do this, it becomes useful to consider products as personalities, and to reflect on the relationships that we (as consumers) have with those product personalities. "But like a human personality, once established, all aspects of a design must support the intended personality structure" [17]. Every detail (form, transition, radius, proportion, texture, colour, material etc.) should work together to support the unified vision of the design. That vision should address the form, function, and emotional characteristics of a design, and should be informed by a clear understanding of whom the product is for and what semantic details resonate with them. Such a design effort involves creating products that use appropriate semantics in order to signify reflective experience of a specific end user, and give the product more presence than pure aesthetics or utility can do.

A designer can obsess about such details on a product for months or years strictly to tune the design to a target market. In the end, however, if the designer has done their job well, then their efforts will go largely unnoticed. If the design is successful, the product just seems to make sense: the form resonates with the user, the function is intuitive and appropriate, and the user can enjoy it for what it does without being distracted by how it does it. The design provides the appropriate subconscious cues that allow the user to adopt the product and integrate it into their life. The personality of the product compliments the personality of the user, and a new relationship has begun.

6 TEACHING FORM, FUNCTION, EMOTION

As mentioned, this convergence of topics is covered in one section of an Introduction to Product Design course, which lasts approximately three weeks. A group of readings is distributed electronically, and lectures on each individual reading are presented along with videos and product samples (See Table 1). This builds a foundation of conceptual understanding, from which students are asked to examine other products.

To assess understanding of this type of critical evaluation of a product, students complete a 3-4 page written essay analyzing an everyday product. Each student is asked to pick a commonplace product

that they own, and one that is relatively simple, such as a toothbrush or flashlight. In their essay, they address the following topics: 1) Review the history and evolution of the product, using Petroski's description of the evolution of a fork as an example; 2) Analyze the user interface of the product, using Norman's Psychopathology of Everyday Things as an example, discussing the *visibility, affordances, mapping,* and *feedback* involved in the *conceptual model* of the product; and 3) Discuss the emotional relationship with the product, analyzing the interaction with the product on three levels, *visceral, behavioural,* and *reflective*, as outlined by Norman in Emotional Design. With section 3, they are specifically asked to discuss the sentimental and identity-projecting attributes of the product, looking at what the product says about them to others and to themselves.

As part of the assignment, to both develop better writing skills and expose students to each-other's paper topics, students exchange papers within a group and have two other students edit a working draft. This has proven to be a useful step to engage students in a more intimate discussion about the subjects of the course (as they work together to understand the more conceptual aspects, such as visceral vs. behavioural interaction) and the topics of their papers (as they read an in-depth analysis of another everyday product they may own).

Table 1. Curriculum Sequence

Day	Reading	Lecture	Video
1	Petroski, Ch.1 [1]	Evolution of an everyday product	Philippe Starck *TED talk*
2	Petroski, Ch.2 [1]	Form Follows Failure – incremental design	
3	Norman, Everyday Things, Ch.1 [6]	User Interactions & User Interface Design	Eames *SX70* Polaroid video
4	Norman, Emotional Design, Ch.1-2 [2]	Emotional Design – visceral, behavioural, reflective	
5			*Objectified*, directed by Gary Hustwit

Through other sections of this course, students gain a better understanding of the practice and history of Industrial Design. However, through this section, and in particular through the essay assignment, students are challenged to reconsider the manufactured world around them and what significance their products have in their lives – their emotional relationships with daily objects of use. In doing this, product design shifts from an external practice of creation and production, to a more internal actuality of experience and expression.

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