DNA as a Metaphor for Design

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The completion of the human genome project in 2003 changed the way modern society views the world on a fundamental level. The DNA metaphor, now quite prevalent in the hard and soft sciences, has recently made its way into the business-consulting world where terms such as 'Organizational DNA' and 'DNA Management' have come into use. Design as well has embraced the DNA metaphor in brand development known as 'Brand DNA.' As product and brand design further evolve into a single transdisciplinary field within the information network economy, the DNA metaphor will begin to better address the complexities of embedded information in the designing of artifacts. The DNA metaphor is most appropriate for design due to the fact that it provides a teleological as well as socio-economic lens through which the relationship between designers (producers) and users (consumers) can be viewed, analyzed, and potentially changed.

Metaphors and Their Use

The use of metaphor is widely practiced in a variety of sciences. There has been a dramatic increase in literature regarding metaphor use in general and in the sciences (Bradie 1999). Avise (2001, p. 87) states that, "The hope for any metaphor in science is that it may bring otherwise unfamiliar subjects to life, make connections not otherwise apparent, and stimulate fruitful inquiry." Bradie (1999, p. 160) defines metaphor in reference to Black's "interaction" view (Black 1955, 1993) and states, "Interaction metaphors are 'based' on analogies and similarities, but unlike mere comparisons, the interaction metaphors 'create' or 'induce' similarities and analogies." Bradie (1999, p. 160, italics added) goes on to state that, "a metaphor consists of (1) a principal subject *P*: (2) a secondary subject *S*; (3) a set of implications *I* associated with *S*; and (4) a set of attributes that *P* acquires in virtue of our looking at *P* through the lens of *S*." Coyne (1995) states that;

> "[a]ccording to the interactionist theory, the metaphor works by projecting a set of 'associated implications' onto the primary subject…The two subjects interact in several ways. The primary subject incites the hearer to select some of the secondary subject's properties; being functional, having inputs and outputs, and so on. The metaphor constructs a parallel 'implication complex' that can fit the primary subject…" (p. 258)

From the interactionist point of view, metaphors affect both primary as well as secondary subjects in which both primary and secondary subjects are seen in light of each other. In essence metaphors help to make associations and to bring formal structure to the 'real world systems' that we are trying to understand and explain (Bradie 1999).

As with the sciences, design also widely uses metaphor to understand and explain concepts. Although design is not considered a "science'" per say, the process of design very closely resembles the experimental process of the sciences (Jonas 2001). According to Jonas (2001, p 66) it can be said that, "While design, in fact, is a cross-discipline and integrates various fields, it cannot be basic to everything else. Instead, it should be conceived as an expert discipline of a special kind: for integration, relation, and meaning." Coyne (1995, p. 295) corroborates Jonas' view on design by stating that, " the metaphoric view of design points to design as a richly collaborative activity." Coyne further elaborates on the process of design and states:

"Design becomes a process of comparing the efficacy of metaphors rather than matching

solutions to problems through objective criteria. A metaphorical approach to design can be cast in much looser and pragmatic terms that the idea of method suggests." (p. 250) Metaphor usage actually transcends disciplinary boundaries and can be seen as an integral part of how the mind works. Lakoff (1980, paragraph 1) states that, "metaphor is pervasive in everyday life, not just in language but in thought and action. Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature." According to Yanov (1996, paragraph 8), "metaphors as literary devices constitute a subset of the more general human cognitive activity." Yanov (1996) goes on to state;

> "When we consider the link between perception and action, metaphors which initially appear to be merely descriptive may acquire a prescriptive aspect. No longer are we only presenting new insights into a situation; we are also suggesting the possibility of action in response to the situation described by the metaphor." (Paragraph 10)

As Yanov (1996) points out, metaphor can function not only to make associations between primary and secondary subjects but can also function in a "prescriptive" manner in which specific actions can be taken regarding the secondary subject's implications to the primary subject's situation. In other words, metaphor can be used in design as a method to affect change based on newly configured perspectives applied to, using Bradie's words, the "real world system" existing in design.

Metaphor Use in Brand Design

There are many metaphors used in the communication of branding theories and concepts. David Aaker, noted marketing strategist, refers to a brand as being like a ship (Aaker, 1996). He describes the ship metaphor in terms of a naval vessel that is guided by a brand manager or "captain" approaching a battle (Aaker, 1996). War machine and military metaphors were extensively used in the past and are grounded in the traditional marketing practices of competition between brands. Competition in traditional marketing practices sets the features and benefits of one brand against that of a rival brand (Schmitt, 1999). The ship metaphor for brand fails to address consumer involvement in what makes up a brand in that it only depicts a brand as a vehicle solely designed to fight the competition. Duane Knapp, in the Brand Mindset™, refers to a brand as a "building." He further elaborates on this metaphor by noting that both buildings and brands are perceived in terms of their "architecture" (Knapp, 2000). Although the building metaphor references the many individuals involved in its construction as well as those for whom it was built, it suggests that brands are static non-living entities that must whether the external forces ultimately subject to deterioration and eventually requiring restoration or demolition.

Other well used brand metaphors such as umbrella brands, product brands, endorser brands and source brands refer to specific types of brands that exist in the wide spectrum of brands (Kapferer 1998). These metaphors fail to encompass the width and breadth of what a brand stands for due to the fact that they are so specific with regards to the various brand and product relationships.

The Influence of Genetic Research

There is no doubt that genetic research has influenced modern society. There are countless books and articles on the subject of genetic research and its ultimate impact on society. Jeremy Rifkin, noted author of *The Biotech Century,* writes;

> "In popular culture, the biology of the gene is being quickly subsumed by the sociology of the gene. The gene as a producer of images is taking on a social and political role every bit as important as its role as a producer of protein (Rifkin, 1998)." (p. 225)

According to Rifkin (1998), the biotech revolution is "the coming together of the information sciences and life sciences- the computer and the gene- into a single technological and

commercial revolution" and marks a new era in human development and history. In relating genetic research and cultural change to the information age Castells (1996) writes;

> "The ongoing convergence between different technological fields in the information paradigm results from their shared logic of information generation, a logic that is most apparent in the working of DNA and in natural evolution and that is increasingly replicated in the most advanced information systems, as chips, computers, and software reach new frontiers of speed, storage capacity, and flexible treatment of information from multiple sources." (pp. 63–64)

Castells' (1996) use of the DNA metaphor in describing the similarities between information generation and the natural sciences illustrates Rifkin's (1998) notion of the "sociology of the gene'" in popular culture. According to Castells (2004, p. 12), "While genetic engineering is often considered as an independent process from the information technology revolution, it is not." Castells (2004, p. 12) goes on to state that, "…genetic engineering is both an information and a communication technology, very much as digital technology."

So pervasive is the DNA metaphor that even digital information itself is now seen in terms of the gene. The connections between the DNA metaphor and digital information are summed up by the writings of Nicholas Negroponte in his book Being Digital. In it Negroponte contrasts an economy based on atoms with one based on bits. Negroponte (1995, p. 14) writes, "[a] bit has no color, size, or weight, and it can travel at the speed of light. It is the smallest atomic element in the DNA of information." Rifkin, Castells, and Negroponte each make reference to the profound influences genetic research has had on society not only in terms of how such technologies have increased our abilities to manipulate the world and our surroundings but also in terms of how we view other facets of society, technology, and culture.

The past decade of genetic research has lead to the acceptance of the DNA metaphor in the field of design. Out of the variety of metaphors for the relationship between products and brands emerges the "Brand DNA" metaphor (Upshaw 1997, Kapferer 1998, Marsden 2000, Gad 2001, Greenberg 2003). Thomas Gad, in 4-D Branding, writes of the "genetic programming that creates brands" which he refers to as "Brand Codes." Gad (2001) states that the "Brand Code" is equivalent to business DNA and by establishing it one can "futurize" a brand. Kapferer (1998, p. 53) states that "[a] brand is both the memory and the future of its products" and that the analogy of brand with genetic memory or codes are "central to understanding how brands function." Brand DNA can be defined as the words and perceptions of users contained in memory over time (Greenberg 2003, Marsden 2000). The brand DNA metaphor not only references the user or consumer's involvement in the brand and product relationship, it also alludes to a dynamic evolving entity that lives and adapts to its environment.

DNA as an Information System

There is much debate in genetic research regarding DNA and the information contained within it. Information concepts are broken down into the two "rough'" categories of *causal* and *intentional* information (Griffiths 2001). Causal information concepts are based on mathematical information theories in which only the quantity of information within a system is measured (Griffiths 2001). According to Griffiths (2001);

> "Information flows over a channel connecting two systems, a receiver that contains the information and a sender, the system that the information is about. There is a channel between two systems when the state of the sender can be discovered by observing the state of affairs with which it reliably correlates at the other end of the channel." (pp. 396–397)

Giffiths (2001, p. 396) states that, "[t]he quantity of information in a system can be understood roughly as the amount of order in that system, or the inverse of the entropy (disorder) that all

closed physical systems accumulate over time." Various articles and books have been written about the causal informational aspects of DNA. Rifkin (1998) quotes French biologist Pierre Grassè regarding his view of DNA as the "depository and distributor of the information" in which he contends that its "code" represents the "intelligence of the species." Rifkin goes on to write;

> "Grassè concludes that the living organism, like the computer, has 'to be programmed and fed with external information in order for novelties to emerge.' The picture he sketches is a cybernetic model of life; a circular process in which the genes, the organism, and the environment continually feed information back and forth, allowing the organism to regulate itself in response to changing external cues." (p.189)

Rifkin (1998, p. 184) elaborates on the cybernetic organism and states that it is an "integrated system" marked by "[t]he constant feedback of new information from the environment and the continual readjustment of the system to the environment…" Rifkin (1998) goes on to refer to the field of bioinformatics and states that researchers are only now compiling what he calls 'biological databanks' filled with genetic information from millions of years of evolution. Both Rifkin and Grassè represent what Griffiths refers to as the "conventional" view of causal information aspects of DNA in which only the quantitative state of information within the system is of concern.

The second rough category of information concepts is intentional information (Griffiths, 2001). Intentional information concepts are concepts based on semantic information (Griffiths, 2001, Godfrey-Smith, 1999a, b). Intentional information concepts generally concern themselves with the content or meaning of the information (Griffiths, 2001). The specific distinction of intentional information is that it can misrepresent information (Griffiths, 2001; Millikan, 2004). According to Griffiths (2001, p. 397), "Genetic information is usually described as if it made sense to speak of a phenotype misinterpreting the message in the gene and hence appears to be intentional information." Griffiths (2001, p. 397) goes on to state that, "The most promising attempts to give a naturalistic account of intentional information [in genetics] are the so-called 'teleosemantic' theories…according to which a sign represents whatever evolution designed it to represent."

Teleological Theory and Teleosemantics

The American Heritage Dictionary of the English Language, Fourth Edition Copyright 2000 defines 'teleology' as "The use of ultimate purpose or design as a means of explaining phenomena." Ruth Millikan, noted philosopher of biology and author of Varieties of Meaning, applies information theory in the study of genes in order to build her case for a teleological theory of intentional representation. Theories for intentional information or signs are frequently considered teleological theories of content (Milikan 2004). Neander (2004, paragraph 4) states, "Teleological theories can also be informational theories. The notion of information is variously defined, but roughly speaking a type of state (event, etc.) is said to carry information about some other state (event, etc.) when it is caused by it or corresponds to it." According to Neander (2004, paragraph 1), "Teleological theories of mental content try to explain the contents of mental representations by appealing to a teleological notion of function." Neander (2004) goes on to state;

> "According to teleological theories of content, what a representation represents depends on the functions of the systems that use or…produce the representation. The relevant notion of function is said to be the one that is used in biology and neurobiology in attributing functions to components of organisms…Proponents of teleological theories of content generally understand this notion to be the notion of what something was selected for, either by ordinary natural selection or by some other natural process of selection." (paragraph 2)

Neander (2004) points out that representations or intentional information depend on the functions of the systems that produce and use such information. Teleological theory, as it applies to design, has to do with the design process and its functions. Jonas (2001) states that;

> "A hypothetical abstract definition might describe design as a permanent sequence of decisions to reduce contingency at the individual, organizational, and social levels. The function of each decision is to define and, subsequently, to eliminate alternatives and absorb uncertainty in order to create novelty. In order to do this on a rational, meaningful basis, it is necessary to have feedback cycles established between theory and practice, and between the forward and backward perspectives. This really is not new, but known as forecasting (deterministic), planning/backcasting (teleologic), scenario-building (prospective) or, more generally, learning." (p. 67)

Jonas (2001) makes reference to the necessity of "feedback" cycles and defines design planning and backcasting as teleological activities. Neander (2004) references product design in her explanation of teleological theory and the "function" of intentional information. Neander (2004) states;

> "Teleological contexts are ones in which there is reference to ends or goals, and relevant talk of functions seems to be teleological in this sense, because, for example, when we say that it is the function of the heart to pump blood, this seems equivalent to saying that hearts are for pumping blood or are there to pump blood…Crucially, however, the relevant concept of function is not purposive. Purposes are intentional phenomena, so such a concept would not serve in a naturalistic theory of content if it were. There is a closely related concept of an artifact's function that is purposive: for example, when we say that moving the cursor is the function of the mouse, we seem to mean that this is what its designers designed it or intended it to do." (paragraph 15)

With regards to teleological theory, Neander (2004) makes the case that "functions" are "purposive" when explaining designed artifacts. In other words teleological theories have at their core the notion that functional standards can derive semantic standards.

In essence, teleological theories in genetic research aim at making 'intentional' the vast amounts of information expressed by the gene into the physical characteristics or phenotypes of an organism (Griffiths 2001, Milikan 2004, Neander 2004). In design, teleological theories deal with the teleologic function of design theory in practice through feedback cycles (Jonas 2001) and the teleological notion of function and purpose of designed artifacts (Neander 2004).

According to Neander (2004, paragraph 33), "The term "teleosemantics" is used to refer to the class of theories of mental content that use a teleological notion of function." Neander (2004, paragraph 33) goes on to state that, "Teleosemantics is best understood as a general strategy for underwriting the normative nature of content, rather than any particular theory." Millikan (2004) writes;

> "'Teleosemantics,' as it is sometimes called, is a theory only of how representations can be false or mistaken...Teleosemantic theories are piggyback theories. They must ride on more basic theories of representation, perhaps causal theories, or picture theories, or informational theories, or some combination of these." (Chapter 5, p. 1)

Teleosemantic theory generally serves as a means to elucidate an "involvement" relationship between organisms and their environments (Godfrey-Smith 2003) within the framework of what Millikan (2003) refers to as information "intentionality" or what Godfrey-Smith (2003) refers to as the "basic representational model." Godfrey-Smith (2003) references and elaborates on Millikan's teleosemantic theory and states;

> "… that an indicative intentional icon is a structure that 'stands midway' between producer and consumer mechanisms that can both be characterized in terms of biological function. The consumer mechanisms modify their activities in response to the state of the icon in a way that only leads systematically to the performance of the consumers' biological functions if a particular state of the world obtains. That state is (roughly) the content of the icon." (p. 23)

Millikan refers to an "indicative intentional icon" which Godfrey-Smith (2003, p. 22) defines as any number of "semantically evaluable phenomena" such as bee dances, language sentences and

human beliefs. According to Godfrey-Smith (2003, p. 23) what teleosemantic theory involves "in abstract terms, is a combination of the basic representational model plus a feedback process, in which relations between actions produced and the state of the world can shape the representation-using mechanisms." In other words, representational or intentional information is communicated through the gene (producers) and is expressed by the organism or parts of the organism (consumers) through phenotypes that are then selected by natural selection (environmental influences) hence modifying the organism over time in a feedback process. This notion of a "producer/consumer" relationship and their "feedback process" that Millikan and Godfrey-Smith refer to in the explanation of teleosemantic theory parallels the producer (designer) and consumer (user) relationship in designing and the planning/backasting teleologic feedback cycles presented by Jonas (2001).

Millikan (2003) goes on to use product design in explaining the natural selection of intentional information or "representations" within a system;

> "Compare the design of a camera or of a calculator. The camera is not designed, specifically, to take any particular picture that it takes, nor is the calculator designed, specifically, to make one particular calculation rather than another. Still, when the camera is working right, it was designed to turn out each picture that it turns out given its input. And the calculator that is working right gives each individual result in accordance with design, again, depending on its input. An explicit intention does what intentions were designed to do when it initiates its own fulfillment." (Chapter 1, p. 4)

In other words an explicit intention is fulfilled when, through design, the explicit intention is initiated. Another way of looking at it is that design fulfills explicit intentions in a kind of self-fulfilling prophecy whereby the designer embeds intentional information (meanings) into product attributes and it is these attributes that end up fulfilling the original intentions through their interpretation and use by consumers.

Product Semantics

The act of embedding symbolic meaning into product attributes is often referred to as product semantics (Stokholm 2004, Cagan & Vogel 2002, Lenau & Boelskifte 2004, Krippendorff and Butter 1984, 1993). Krippendorff and Butter (1984) define product semantics as;

> "…the study of the symbolic qualities of man-made forms in the context of their use and the application of this knowledge to industrial design. It takes into account not only the physical and physiological functions, but also the psychological, social and cultural context, which we call the symbolic environment." (p. 4)

Krippendorff and Butter (1993, p. 32) state that, "…design concerns can no longer be limited to isolated products; they must acknowledge the context of larger ecologies of artifacts bound together by a network of meanings." Krippendorff and Butter (1993) in their explanation of product semantics application in industrial design state;

> "…the authority of industrial designers lies in their ability to understand others' understanding, in their ability to negotiate the meanings artifacts have for clients and users, and in their ability to delegate an appreciable portion of design decisions to others, enabling them to realize themselves in whatever industry can manufacture." (p.34)

Krippendorff and Butter (1993) go on to state that the mantra of product semantics is not "form follows function" but rather "form follows meaning" and that designers are part of a two-part equation of designer and user. According to Krippendorff and Butter (1993);

> "In the language of product semantics, meanings are said to arise when we see something in the context of its possible uses, when we place our sensations (of what designers may call form) into the context of the cognitive models we have constructed to cope with similar situations. Meanings inform us of what we could do and whether we can do what we are disposed to do." (p. 33)

Krippendorff and Butter (1993) further sight design methods of embedding meaning into products. Krippendorff and Butter (1993, p. 36) describe the method of "semantic transfer" and that through an analysis of verbal images the designer is able to create "objects that express word meanings without alluding to functional aspects of a desired product."

The Transfer of Memes

There are several parallels between the interactions within DNA and human interaction in society. Avise (2001, pp. 86–87) describes the inner workings of the gene as "a social collective whose DNA sequences display intricate divisions of labor and functional collaborations, yet that maintain partial autonomies of fate…resulting in occasional conflicts of interest…many types of DNA behavior roughly mirror those of humans bound in tight social arrangements." Likewise human interaction and the transfer of ideas have been described in terms of the gene. Richard Dawkins, noted biologist and author of The Selfish Gene, coined the term 'meme' which is now defined in the American Heritage Dictionary of the English Language, Fourth Edition Copyright 2000 as "A unit of cultural information, such as a cultural practice or idea, that is transmitted verbally or by repeated action from one mind to another." WordNet® 2.0, Copyright 2003 Princeton University defines 'memes' as, "a cultural unit (an idea or value or pattern of behavior) that is passed from one generation to another by non-genetic means (as by imitation); 'memes are the cultural counterpart of genes'." Dawkins (1976) states,

> "Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperms or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation." (Chapter 11, paragraph 10)

Dawkins points out the similarities between the transfer and propagation of ideas or memes to that of genes further emphasizing the parallels between DNA and society and culture. In relating memes to the designing of products Marsden (2000, paragraph 1) refers to memes as being "[l]ike a kind of semantic DNA" and states that "…clusters of memes in the semantic networks of memory provide a recipe of meaning, allowing [designers] to imbibe objects, including trademarks, with meaning."

Millikan uses a consumer-based approach to the understanding of the gene in which she argues that a concentration on the consumption of representations is more important than one on production (Neander 2004). Millikan's 'consumer-based' approach likens the inner workings of organisms in the production of phenomes and their subsequent consumption to producers and consumers of information in society. Milikan references Dawkins' 'memes' and suggests that there is a specific interrelationship between memes and genes. Millkan (2004) states;

> "Given that the capacity to replicate memes (cultural artifacts), found only feebly when at all in other species, is clearly genetically determined, memes are dependent for their proliferation on the cooperation of the genes in a way that is deeply asymmetric. If the genes that replicate memes are not helped but hindered by these memes, they will disappear from the gene pool. Similarly, if genes for increasing meme production do not consequently increase their own production, they will not increase in the gene pool." (Chapter 2, p. 2)

Millikan basically proposes the notion that some genes aid in the production of memes and consequently if these meme producing genes do not in turn propagate themselves they will cease to exist. The notion of a genetic relationship between human DNA and material culture is provocative in that it further grays the boundaries in the dispute between nature and nurture.

Nature versus Nurture

The age-old dispute in Biology and Psychology regarding the relationship of nature versus nurture very much exists today in modern genetics. Rifkin (1998, p. 9) states that, "…a spate of new scientific studies on the genetic basis of human behavior and the new sociobiology that favors nature over nurture are providing a cultural context for the widespread acceptance of the new biotechnologies." Rifkin (1998) goes on to state;

> "…a new cosmological narrative about evolution is beginning to challenge the neo-Darwinian citadel with a view of nature that is compatible with the operating assumptions of the new technologies and the new global economy. The new ideas about nature provide the legitimizing framework for the Biotech Century by suggesting that the new way we are reorganizing our economy and society are amplifications of nature's own principles and practices and therefore, justifiable." (p. 9)

Rifkin contends that new concepts of nature redefine our own position in society and that ultimately they are used to justify our technological and economic pursuits and activities. Conversely, Millikan (2004) uses her producer/consumer approach to show the similarities between society and the inner workings of gene phenome expression. Millikan (2004) writes of the two ways in which natural or intentional signs (the information imbedded within the gene) can be expressed through the organism in its environment;

> "First, it might be that the producer is the one primarily responsible for making the sign correspond to the world. Then the sign vicariously guides the consumer in relation to the signified as the consumer performs some task mutually beneficial to itself and its producer. These are descriptive intentional signs. They are designed to stand in for world affairs, typically affairs outside the organism, and to vary according to these world affairs, controlling the animal's internal or external behavior as needed to adjust to these world affairs." (Chapter 6, p. 5)

Here, Millikan describes how genes can be solely responsible for state of the organism within the environment. Millikan's producer/consumer approach illustrates the 'nature' of what designers do in the production of memes with what an organism naturally does in the production of intentional signs. The meanings designers imbue into artifacts must correspond to the world of the consumer just an organism's natural signs correspond to "world affairs." Designer's intentions can be seen in terms of the "nature" of the artifacts they design and what meanings designers imbue them with.

Millikan (2004) goes on to describe the second way in which intentional signs are expressed by organisms;

> "Second, the consumer may be the one primarily responsible for making the world correspond to the sign. Then the producer's job is to make the sign be such that when the consumer has produced the signified world affair, the result is mutually beneficial to itself and to the consumer. These are directive intentional signs. Directive signs guide the consumer in the production of world affairs that vary according to how the signs themselves vary. They are blueprints for what is to be constructed or brought about." (Chapter 6, p. 5)

Here, Millikan expands on the 'nurture' aspect of intentional signs where organisms and their environment determine whether or not a sign corresponds to the world. This directly parallels how consumers or users of artifacts often determine the meanings of those artifacts influenced by their individual cultural environments.

The nature/nurture paradox in design parallels that of the sciences in that the "nature" of an artifact or its physical traits are influenced by the "nurture" aspect or material culture (its acceptance within culture). The meanings or memes imbued within artifacts by designers through semantics are still ultimately subject to cultural acceptance and or influence. A value or idea communicated through design, much like the intentional information embedded within the protein sequences of DNA, must be subject to its environment throughout its transferal and interpretation.

Conclusion

The pervasive use of metaphor in design as well as in both the hard and soft sciences relates to the way in which metaphors help to make connections between sometimes seemingly different subjects in the pursuit of understanding and knowledge. Metaphors not only provide novel ways of describing situations they also may be used to analyze and to possibly change those situations.

The profound influence of genetic research has given birth to the DNA metaphor that proliferates within the sciences and that has recently surfaced in design through branding. The DNA metaphor for brand best illustrates the multifaceted aspects of brands and depicts brands in light of living, breathing and evolving organisms able to adapt to their environments. As new theories of DNA begin to mature more applications for the DNA metaphor will arise. One example is the development of information theory in genetic research. Informational theories of DNA have initiated further connections between the inner workings of organisms and that of man in society. The 'teleosemantic' theories in biology and psychology that reference the relationship between producers and consumers in genetic terms parallel the producer (designer) and consumer (user) relationship in designing. The intentional information theorized in DNA can be likened to the intentional brand information imbued into artifacts through design. Design, in fact, transfers the belief systems of brands to consumers through the production of artifacts imbued with cultural meanings in a teleosemantic framework. This transfer of information utilizes the teleological feedback systems that designers employ in the understanding and changing of cultural values that ultimately lead to socio-economic change within our evolving network society. DNA as a metaphor for design will help to bridge the many disciplines continually being involved in the field by providing designers with a more dynamic way of understanding their role in the design process as well as their specific influence and impact on society.

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