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APPROACH: ROMANCING THE INANIMATE

by

JULIA GRAY HINES

Under the Direction of Michael A. White Jr.

ABSTRACT

Objects intended as elements in interior spaces generally do a great job of meeting the standard criteria of form and function, but they can do more. By becoming something other than what they normally are, common elements can change a viewer's response to the space itself. This subtle but unexpected expression by an object impacts the viewer on many levels, heightening awareness and changing the viewer's cognitive interpretation of the space itself. This document examines the activation of space through objects capable of responding to a viewer's presence, using as a focus a light fixture that uses motion sensors to trigger sequential lighting responses in different locations, which move from low to high activity states. This object and its changing states are designed to engage viewers and provoke interaction. Such a reaction fundamentally reshapes the space the light fixture inhabits by actively transforming it into a playfully experiential environment.

INDEX WORDS: Julia Gray Hines, Engagement, Interaction, Interactive chandelier, Lighting design, Chrysalis

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JULIA GRAY HINES

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Fine Arts

in the College of Arts and Sciences

Georgia State University

2013

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Julia Gray Hines
2013

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1 INTRODUCTION

This document examines the activation of space through objects capable of responding to a viewer's presence in that environment. The focus of the study is a light fixture that uses motion sensors to trigger sequential lighting responses in three different locations that move from "low-activity" to "high-activity" states. This object and its changing states are designed to engage viewers and provoke interaction between the two. Such a reaction fundamentally reshapes the space the light fixture inhabits by transforming it into a playful experiential environment.

Objects intended as elements created for interior spaces generally do a great job of meeting the standard criteria of form and function, but they can do more. Because they are in public locations, commonly found elements in commercial interiors provide a well-placed opportunity for creating experiences that engage the viewer on other levels. Expected elements can change a viewer's response to the space itself by becoming something other than what they normally are. This subtle but unexpected expression by an object impacts the viewer by heightening awareness and ultimately changing the viewer's cognitive interpretation of the object and its environment.

As an interior designer of public spaces, in addition to public safety and spatial functionality, a large part of my job is to create rich environments that engage as many senses as I can. My task is to create spaces that people will choose to be in and any gathering place in a hospitality context should attract, engage, comfort and possibly entertain. Emotion plays heavily into these very human responses and the tools of interior design; color, materials, lighting, connections with adjacent spaces and with the world outdoors all contribute to the overall effectiveness of a space's design solutions.

The questions posed as catalyst to this thesis project revolve around the benefit of interactivity as a function of a designed object and whether its inclusion can stimulate interaction with viewers, activating the space by providing an unexpected but delightful experience. Will the

object's unexpected response to a viewer engage people with each other? Will it cause viewers to be more interested in the object itself and inspect it long enough to consider its other qualities? Will it change viewer's preconceived notions about chandeliers? As these responses take place in people's heads, they are hard to quantify.

The challenge in this project is proving in an incontrovertible manner the efficacy of the responsive elements built into the light fixture. Such a conclusive result would require a behavioral study of enormous scale, including a large sample size taken from different geographical locations and control groups for each segment to glean any statistically significant results. This type of study is possible, but is clearly impractical for the purposes of this paper. What I did instead was turn to theoretical models to inform my exploration.

Emotions themselves are impossible to document, but there is much evidence of their neurological impacts on the brain. Marketing studies give insight into the process of seduction, suggesting a complexity beyond mere visual appeal and function of an object. Theoretical models of education and of human centered computer interface are not a perfect match for drawing conclusions about interaction with my object, but through analogy, they provide a strong foundation for understanding engagement, one of the key elements in my experiment. The appropriateness of studies related to the psychology of responsiveness is easy to understand but studies of computer science have proved to be just as informative to this study as that field is focused on understanding how people interact with a complex object, essentially the experiment I am conducting.

1.1 Emotion in Design

Rob Walker is a writer and observer of popular culture in relation to consumer buying habits. He authored The New York Times Magazine column *Consumed*, and has written or edited several books about consumer behavior, in addition to others on disparate subjects including a line of comic books and a satire of business world mechanisms and the people who partake in them.

Walker, along with Editor Joshua Glenn, devised a creative experiment to test the hypothesis “Stories are such a powerful driver of emotional value that their effect on any given object’s subjective value can actually be measured objectively”. (Walker 2012 introduction)

To examine the truth to this claim, Walker and Glenn obtained one hundred insignificant objects (in terms of market value) by purchasing junk, odd lots and trinkets at thrift stores and garage sales. The median price paid for each was \$1.29 and the upper limit was set at \$4.00. All objects were to be small enough to hold in the palm of a hand, easily shippable and the sort of thing intended to sit decoratively on a shelf. To avoid skewing results, nothing particularly useful such as clothing, books or record albums was allowed. Anything that could be considered artwork was also banned from the experiment, the researcher’s rationale being that art objects were intended to be significant, therefore could not fall under the descriptor “insignificant”. One hundred writers were then each given an object and asked to create a short story with the object being a central part of the narrative. Each story was subsequently used as the item’s description when offered for sale on EBay. The researchers made full disclosure of the fact that the account of an object was fictional by naming the writer and they included a website address where anyone with interest could go to learn more about the experiment. Each object was listed on EBay for seven days with the starting price of the auction being the low price actually paid.

The results of this ploy speak for themselves. The researchers had purchased a cast metal boot for the price of \$3.00. The companion tale by author Bruce Sterling describes its former connection to the fictional Confederate war hero Major Chatham Roberdeau Wheat. The text does not actually claim this boot to be an original of the gift “Wheat” gave to his loyal troops, merely implies it. What the story does do is make romantic claims for a group of the original boot objects as possibly Masonic symbols, rosary type elements to aid in prayer or maybe as talismen of mysterious voodoo connections due to “Wheat’s” Louisiana heritage. The formerly \$3.00 object resold for \$86.00 at auction.

Another \$3.00 purchase, a plastic yellow hairdryer in its battered case sold for \$15.49 after its purchaser read that the hairdryer was the only item spared from a fire. A new hairdryer of its equal would presumably have cost less in a retail store. A very new looking monkey hand puppet brought \$47.50 after Dara Horn's story connected it to an unfinished Franz Kafka manuscript entitled *Metamorphosis II: Monkey Puppet*, declaring it the work he was struggling with at the time of his death, later burned by Kafka's executor at the request of his will. (See Figure 1) The puppet unaccompanied by such a seductive literary past life had been purchased for a mere \$2.99.



Figure 1. "Kafka's" Monkey Puppet from the Significant Objects project

Source: [Http://significantobjects.com](http://significantobjects.com)
(Accessed 5/1/2013).

The total price initially paid for the group of objects was \$128.00, but when the auctions closed, those same objects had sold for a collective \$3,612.51. The fictional narratives had boosted the "value" of the objects to third time buyers by more than 2,700% above the original cost paid by the second hand buyers (the researchers). The implication is that the

emotional connection formed between a stranger and

the characters in the story was of stronger value than was the reality of an object's monetary value.

I think the results of this experiment strongly demonstrate the clear tie between emotions and particular objects that trigger them. In this circumstance, the objects became more important through their distant engagement with what the object represented to others, this even when the account was clearly labeled as fictional. Objects with these emotional ties were now monetarily worth more than they had been at the thrift shop.

The researchers used financial software to crunch the numbers and attempt to determine patterns isolating factors that created higher purchase prices so as to pick out trends. They categorized each story as "hot" (with action words like murder or with intimations of clear familiar ties such as the word brother) or as "cold" (requiring the reader to creatively imagine those types of

connections because they were not explicitly provided). The numbers revealed neither to be a standout predictor of eventual purchase value. An object's type (figurine, toy, kitchen item) was not revealed to make a difference in the data either, nor was the fame of the author of the story. One finding that did seem to make a slight difference was that of "significance-types", categories the researchers took from the stories themselves as opposed to associations of the objects. Objects that were built up to be fossils, evidence from a crime or public event, or totems which in the researcher's definition "offer wisdom from the natural world" fared much better financially than the other two types of talisman containing some sort of magic or purported idols. Though buyers did not seem to show hesitation in believing in the associations of an object with a clear history, they may have been a little more skeptical of buying into an intimation of magical or protective qualities imbued in the object.

One interesting addition to the study was the later experiment with a "mystery object" offered for sale. The story, authored by Ben Greenman, revolved around a mysterious object whose identity was still unknown to the seller; just the circumstances of its discovery were available. The photo shown with it was simply a blank envelope, which contained some sort of indistinguishable object. It sold for \$103.50.

Another distinctive sale was the one that produced the largest numerical value jump in purchase price of all. This was merely a mass produced globe paperweight with an accompanying faux sentimental story about its significance to the "seller", but in this context it brought a whopping \$197.50 at auction. The assumed catalyst here was that unlike the others, this story was presented online in the form of a handwritten note on paper. The conclusion I come to is that buyers clearly perceive an item to have more value if it had history and/or had ties to other people's emotional engagement in that particular object.

Eva Zeisel, one of the early pioneers in the field of product design billed herself not as a potter or as an industrial designer but as "a maker of things" (Johnstone documentary 2002) Zeisel

was the driving force behind curvy tableware that was unlike anything else currently in production in the 1930's. Her work's unique place in mass product design was primarily because straight lines are easier to manufacture, therefore were rarely made. Her work was featured in a 1946 show at New York's Museum of Modern Art, their first show ever to feature a female designer. In her 2004 book, published shortly before her death at age 105, Zeisel asserts that the language of design "is not meant for monologues, or for self-expression, but to speak to others". (Zeisel 2004 p.13) She speaks of the process of designing in terms of a conversation, a personal dialogue between maker and the thing being made so as to create an object that communicates with others. The designer is responsible for the activities of imagining, visualizing and making critical decisions; line and form are the tools through which designers communicate feelings to the viewer. Zeisel call this "the magic of the language of design" (Zeisel 2004 p.14) and elevates designers to the status of "the authors of our physical culture." (Zeisel 2004 p.25)

Her approach is very tied to the emotional effects an object creates and her relationships with objects take on the tone of a convivial friendship. In her world forms "talk to us through their shapes, contours, color, weight, temperature, surface, sound and most clearly, their associations". (Zeisel 2004 p.14) Paola Antonelli, curator of architecture and design at MOMA credits the product's ability to speak to the emotional center of a home as key to their popularity. "It's easy to do something stunning that stays in a collector's cabinet. But her designs reached people at the table, where they gather." (Hamilton 2011) Some surmise that her difficult year as prisoner in a Nazi concentration camp, much of which was spent in solitary confinement may have contributed to Zeisel's eventual deliberate celebration of the "playful pursuit of beauty" (Zeisel 2004 p.25) and her encouragement of flamboyant and extraordinary sights as necessary training for a designer's eye. She was outspoken about the damaging effects of the moralistic theories of the early 20th century and declared them too stringent and rule-based ways of thinking that served to bring the joy of aesthetic play to a screeching halt. She openly declared her commitment to the "freedom to

search for delight in lines and forms” (Zeisel 2004 p.25) as the appropriate response of a contemporary designer to the restrictive exercises of the modern movement. Zeisel clearly believed that objects can elicit emotions and that they can inspire us, transporting us to the past with joyful tenderness or can provoke the opposite effects of shock and annoyance. Whether a positive or negative response ultimately occurs, she strongly believed that people are intimately tied to the objects they encounter. Emotion is strongly tied to design and are unique to each individual as everyone brings with them their own past experience, preconceived associations, and whether conscious and unconscious, their own baggage that affects their perceptions. Because of this difference in experiences, people will connect with what they encounter in different ways. Each brings with them their own “soul”. Zeisel made a strong case for her point of view; “you need to make soul contact” (Johnstone documentary 2002) was her advice to designers. But how do design objects contact the soul?

Donald Norman feels there is a clear connection between positive connections with aesthetically pleasing objects and the psyche. His work delves into the field of cognitive psychology and the two-part information processing system that makes up emotions.

The Affective System makes quick judgments, which help us determine whether situations are dangerous or safe, good or bad. This is where neurochemicals are released into various parts of the brain and muscles are prepared for potential responsive actions. The affective responses are there to help us survive in situations where one may need to respond before there is time to process all the facts. Survival trumps understanding in terms of importance in the brain, a state some researchers call the “reptilian brain”.

The Cognitive System is where the brain interprets and makes sense of the world, the rational processing of information for understanding and emotion is the confluence of these two systems, the conscious experience of affect when it includes the attribution of the cause, identifying the object/source of the response; in other words affect with the inclusion of cognition is emotion.

Sometimes affect can drive cognition. Fear is a good example of this, as demonstrated by the fight or flight response of a squirrel. The squirrel skitters away from an approaching human whether or not there is any danger posed by the upcoming encounter; his affective system is creating emotions and taking over his behavior without his cognitive system intervening. Once he has processed the stimulus and determined the human is not a threat he returns to the spot and goes about his business of burying nuts.

Much of human behavior is subconscious or as Norman terms it “beneath conscious awareness”. (Norman 2004 p11) Consciousness comes later, both in the larger evolution of species and in the way the brain processes information. Many judgments have already been made by the affective system before they reach consciousness, so emotions seem to be the area both between and encompassing the two systems, each emotion possessing both an affective and a cognitive component. The response of the affective system can be either a conscious or unconscious one, but most frequently it is the latter. The affective system interacts with creativity by changing its focus from the tense anxiousness of feeling endangered (negative) that requires narrow concentration on one thing until resolution is reached (finding the means of survival) to the much broader (positive) neurotransmitting state that doesn’t need to focus so intensely so can be more open, allowing the distraction of other thoughts in to be considered as possible directions. This is why a positive emotional state; a literal open mind, is best for creating, considering and appreciating. A negative emotional state is best only for very narrow finite problem solving situations. Emotion drives and directs the level of attention available. This also explains why criticism during the open minded creative process can halt that creativity as the brain moves instantly into the narrower focused state so that it can solve the newly introduced problem.

The ability to process information in this manner controls some very basic abilities that speak to functional concerns beyond the emotional. The researcher Antonio Damasio conducted a study of people whose only physical handicap was some form of brain injury that impaired the

portions of the brain responsible for emotions. (from Norman 2004 p.12) He discovered that though all were intelligent enough to make decisions, their injuries made it so that they simply could not will themselves to do so. Simple things that are quick and easy choices for most of us such as what to eat, what products to use and whether they wanted to sit in chair A or chair B, were not ones they could make. They understood a chair was needed for sitting, and could verbalize the need to make a decision over which chair to sit in, but they simply could not make the choice of which one they would rather sit in.

The most common cycle in the emotional process is that emotional reaction (affect) occurs before understanding (cognition) even has time to occur. But what about daydreaming and imagining? The act of designing, which involves visualizing what doesn't yet exist? That is cognition taking the lead.

One celled organisms have brains and functioning response systems that respond to the threats (predators, climate) and opportunities (food) that guarantee their survival in the world, but human's systems can accomplish much more complex things. Humans differ in that we are both conscious of our role in the larger world and can reflect on experiences or past actions, ultimately having the opportunity to learn from the past experience and prepare ourselves for responding differently the next time. Through this reflection and alteration pattern we develop abilities and improve behavior, allowing a child's cacophonous horn blowing to evolve into the control that is syncopated jazz music. The ability to create what doesn't exist stems from the ability we have for learning, assessing and improving. Our appreciation for art and designed objects comes out of developing sensitivity (learning) through the process of assessing.

Norman's studies of emotion, conducted with his colleagues at the psychology department of Northwestern University go on to delineate different levels in the brain which are responsible for more complex accomplishments. The Visceral Level of the brain is that which is prewired, with automatic responses (the state of affective processing). The Behavioral Level contains the processes

needed for us to control our everyday behavior and the Reflective Level is where conscious consideration and assessment of behavior and outcome takes place. The researchers use the metaphor of levels as a categorization to refer to particular areas of the brain where function takes place and to rank them in sophistication, which includes their importance to evolution in addition to complexity. The reflective is a higher level of functioning than the behavioral, which is in turn higher than visceral level functioning; they are not referring to physical striations.

In reading these descriptions, I was struck by how similar those processes are to a typical design activity (I use the terms art and design interchangeably here). An artist could start with an action intended to provoke visceral response. I know a lot of artists who begin a painting with a purely automatic mark; a thwack of paint or a swoosh of watery ink on the canvas as a way of initiating an artwork. This step of removing the conscious hand in mark making gives them something to assess, respond to and then consciously guide from that point on. Norman cautions that though the reflective level claims the position of the highest level of thought, it does not directly respond to sensory input and it doesn't directly control behavior, it's role is as a mechanism to influence behavior as a result of observing and assessing. Though he isolates their responsibilities, the three levels of thought are pretty deeply intertwined. In this example, either the behavioral or the visceral level can control the hand's movement with the paintbrush, it is the reflective level that will determine what the next move should be to construct the painting that achieves the result the artist desires.

1.2 Interest in Lighting Effects

The seed of this project was the idea of taking an object from the common vocabulary of interior design, like a hanging light fixture, and making it more interesting. A light fixture typically does two things; it provides light on some level when on and functions as a decorative contribution to an interior when off, not much is asked of it. Adding an interactive component, meaning the light fixture and its audience would enter into some form of relationship beyond these basic provisions

intrigued me because the idea tight-roped the line between a light fixture and an art project.

I recently ran into an example of a light fixture that satisfied my sense of what qualities can make a light fixture more interesting in a private home. The owners, who possessed an appreciation for quirky qualities, had recently purchased the piece at an art gallery. It was a hanging sculpture by the Taiwanese artist Shih Chieh Huang that seemed part gizmo, part toy and it lit up too. When the sculpture was turned on, tiny fans inflated plastic baggies of various shapes which increased the size of the object two fold. These fans then reversed direction and the baggie appendages deflated, causing the piece to spin a bit. A small video screen showed a filmed set of real eyeballs opening and closing on a loop. Colored lights came on and off and changed luminance as they were obscured and revealed by the baggies motion as it all very slowly spun. It was aesthetically cacophonous with exposed wires and cables and it was quite unlike anything I had ever seen, officially a light fixture but very unique and a whole lot of fun. (See Figure 2)



Figure 2. Chandeliers by Shih Chieh Huang

Source: <http://www.messymix.com/photo pages>
(Accessed 5/1/2013)

When I was a child, my father used to laugh at what he called my Rube Goldberg contraptions. Rube Goldberg was a comic illustrator in the 1940's whose sketches depicted complicated machinery that put a lot of work into a task whose end result produced very little

effect. The silliness both amused and inspired me. In particular I took pride in my custom made machine for turning off my bedroom's overhead light without getting out of bed. It featured a bamboo backscratcher, barbecue skewers, a wooden ruler and a rock from the garden, all fastened together with copious amounts of string and glue; the building materials of an 8 year old. When I pulled the string by the bed, it caused a chain of events that led to the rock falling off it's precarious perch in the cradle of the backscratcher, the weight of which flipped off the light switch by the door. It worked successfully about a third of the time, usually causing me to get out of bed repeatedly to reset it and try again. It's inconsistency made it quite useless for the intended function, but I joyfully repeated the process every night. It had value for me because it was interactive and just plain fun. Design school and adulthood later taught me that all the extraneous bits of flotsam and jetsam in that assemblage reduced it to being just a hodge-podge that functioned and paring elements down to only those necessary was always the goal in design... except in chandeliers.

Though I have never considered myself to be a stylistically traditional designer, I have always had a soft spot for overblown, Versailles worthy chandeliers. Part of my engagement is the visual joy to be found in lots and lots of point light sources. Chandeliers seem to differ from other types of lights mainly in that instead of just providing light, they break up the light through a variety of means. Crystals actually serve a purpose beyond the decorative as the facets refract, reflect and change the color spectrum of light, multiplying the emission to provide the illusion of many more light sources than are there.

I lived near Disneyland as a child so went for nearly every birthday. My favorite part was not Cinderella's Castle or the rides, I was most drawn to the magic of thousands of tiny Christmas lights strung in the trees as we first walked in, which baffled my parents. The firefly lighting effects found in one of the Disney restaurants made another deep impression. The swamp theme included Spanish moss and faux fireflies darting by the tables, the motion of which was a key part of the enchantment.

Fireworks are a similar display of lights and movement that change over time and move through space. Their purpose is simply to bring delight and encourage celebration. Fireworks captured the fancy of the painter James McNeil Whistler in the mid 19th century as a subject for 10 years as he painted the beautiful *Nocturnes* series. Sparkling lights have always been a bit of an obsession for me, making them twinkle or move just adds more pleasure to the experience.

My thesis will explore engagement with objects and will document my attempts to create interactive chandeliers myself.

1.3 Chandeliers

Author D. Sprung Kurilecz describes the day the chandeliers reached their branches out like tentacles and clambered down from their ceiling stations to take over the town in his short story.

“The chandeliers swirled their arms and wires above our heads and snaked down and lingered in front of our faces. We swatted them away but bulbous ends peered at us, boldly inching closer, tickling and annoying.” (Kurilecz 2008 p48) In his story, the occupants of the town had to abandon their homes to escape the treachery of the personified interlopers who took over everything.

“Seeing the ruined neighborhoods made us wonder how, in those early days, we could have mistaken chandelier malice for curiosity or illusion.” (Kurilecz 2008 p48) Menace aside, there is a lingering sense of wasteful ostentation associated with the word chandelier, probably rightfully earned as a result of the fixture type’s early history. Chandeliers of the 18th century were a way for wealthy people to demonstrate their status, as nighttime illumination was very expensive. As less affluent families clustered around a single flame upon the fall of darkness, others proclaimed their wealth by setting hundreds of candles ablaze at once. The simple arrangement of the formerly X shaped hanging candle supports of the Middle Ages eventually morphed into exuberant displays of multi tiered arms dripping with light-refracting lead glass crystals. Versailles’ Hall of Mirrors extends the decadence of 1000 candles in 17 crystal chandeliers by reflecting them in equally ornate gilded mirrors, together creating a dizzying display of excess. (See Figure 3)



Figure 3. Versailles Palace, Paris.

Source: http://www.parisdigest.com/photos/hall_of_mirrors.jpg.
(Accessed 5/1/2013)

Apart from their associations with visual drama, chandeliers provide needed light from multiple small sources whether they are candles, gas flames or bulbs all supported by a fixed overhead point. By virtue of being overhead, they reserve needed floor space in public areas like churches for circulation and seating functions while keeping flames and electricity safely out of reach so when efficient light sources are used, they do serve practical purposes in modern life.

In interior spaces, chandeliers are commonly seen providing emphasis to a gathering place. Centered over dining tables, arrayed in bays in ballroom ceilings or used as indication of a destination arrived in a high ceilinged entryway, some create ambient light and others cast fractal patterns that dance on the walls.



Figure 4. Ingo Maurer "Zettel'z Chandelier

Medium: stainless steel, frosted glass, halogen bulb, Japanese paper (31 of 80 sheets printed with love letters in various languages).

Source: <http://www.creative-germany.travel/en/design-en/ingo-maurer-3>



Figure 5. Dale Chihuly

Permanent installation at the Victoria & Albert Museum, London

Medium: stainless steel, blown glass

Source:

<http://www.flickr.com/photos/barbstur/356512425>

(Accessed 5/1/2013)

In the last few decades, chandeliers have been a temptation not to be passed up by designers and artists looking for new mediums and platforms of expression. German born Ingo Maurer is an example of a modern practitioner who has made a fine career out of artistic expression through light fixtures. His success at closing the gap between art and product design is evident in his recently being featured in a solo retrospective at the Cooper Hewitt Museum in New York, a branch of the Smithsonian collection of national museums. His work also permanently resides in The Vitra Museum and The Museum of Modern Art. (See Figure 4)

Dale Chihuly is a Seattle based glassblower of great renown whose career success can also be attributed to his unique take on the chandelier. Chihuly pushes the traditional definition by placing his light sources outside of the chandelier body so that the light is not actually emitting from the fixture, but illuminates it nonetheless. The external light permeates the colored glass such that

it glows. (See Illustration 5) Chihuly also changes the vocabulary from multiple tiers of symmetrical arms into elegantly articulated organic forms of blown glass, carefully choreographed into enormous clusters of luminous color.

Using the word chandelier to describe my light objects is intentional. The word seems to have fallen into disrepute because of its former associations and our modern day leanings towards a sleeker aesthetic. My intent in applying the label to my pieces is to aid Maurer and Chihuly in their resuscitation of it for use in modern environments.

2 PROCESS

There has been debate between those involved in art as to whether an artwork should be required to hold its own in a room, unencumbered by explanations or whether the experience is richer when the process and reference materials are included in the exhibit. Cindy Sherman has stated that she wants to make art that is “relatable work that doesn’t require prior study to appreciate”. (Meagher 2002 p18) While I applaud the democratizing nature of that statement, I am torn between the two poles of thought in that sometimes it really aids in comprehension of the piece but it also carries the danger of being used as a crutch which allows the artist an “out” to not creating a work that can stand on it’s own. As a viewer, sometimes I feel it informs me to know about the artist and the artist’s intentions (or a curator’s interpretation of them) and other times allows me to fall back on familiarity and prior knowledge of that artist and time period without granting the work the objectivity of a removal from pre conceived ideas. Some artwork is more about the process than the outcome. Other artwork is created in a more intuitive manner and the process is quite internal to the artist’s head. My intention with this particular body of work is to integrate the process into the piece by creating an interaction between the viewer and the artwork itself such that it not only stands on it’s own, but speaks for itself...literally.

Approach has several goals, foremost of which is to provide an experiential exhibit for the

viewer. This is done by providing the unexpected condition of having an everyday object change in response to the approach of a viewer in what would normally have been an expected circumstance. A public space with a chandelier in the center is a familiar context, but is one where this type of object does not normally exhibit such behavior. My hope is to provide a richer experience of the simple act of walking into a room with a centrally located light fixture.

My intention in suggesting an active life force (the insect) within an object the viewer knows to be inanimate (a light fixture) is for them to create a relationship with the object through the mechanism of response that would not otherwise exist. This response would initially be surprise (the unconscious affective function) followed by the reflective function of intrigue (either conscious or unconscious) leading to the cognitive end goal of understanding. Unrelated to the experiment is my desire to create a sense of enchantment or delight for viewers coupled with enticing a desire in them to repeat the process of interacting with the object.

Inherent in this experience is the potential for creating chain reactions. A reaction “by” the inanimate object causes a reciprocal response in a human viewer, the sequence of which creates interaction between viewers themselves in casual connections that would not otherwise have occurred. This exchange is stimulated by the potential for acknowledgement of this odd phenomenon they are presently experiencing, which is toying with their perceptions of how such things usually go. Such an exchange further activates the space and turns all into participants both in the experience and of the experiment. This resulting interaction can also serve as a hook to entice viewers into closer examination of the chandelier, either out of heightened curiosity or as an aid to help each other reach understanding of the situation at hand.

The Approach exhibit was originally conceived as creating two different types of interaction between the viewer and object, one in which the action is forced upon the viewer and a second that requires choice for participation. Each object changes in some way in response to the viewer’s presence.



Figure 4. Approach Chandelier 2012
photo by J. Hines



Figure 5. Approach Chandelier
photo by J. Hines

In the first piece, twelve molded forms hang from long strands in an aesthetically ordered clump, a familiar form of currently popular light fixtures, which are usually marketed as modern interpretations of the chandelier. The chrysalis imagery was chosen primarily because I wanted the object to have a sense of being asleep or dormant then come alive when approached. A chrysalis naturally treads the line between being a creature that is alive and responsive and one that is functionally dead. On a more practical note, a closed form works well as a light fixture as it easily hides exposed bulbs, a key element in visual comfort and overall effect in lighting design.

Chrysalis forms are interesting to me in that they are literally formed by their contents (they are spun by their inhabitants) so are reflective of their origins but ultimately end up being very different from their starting point. Formally, the shapes are intriguing as each species takes on a distinguishable form and coloration, often rather alien looking, with odd decorative elements (gold dots on pale green monarch forms are an example) thrown in to the mix.

The lifespan of this stage of Lepidoptera development can be anywhere from two weeks to ten months, depending on the species and several species do exhibit defense mechanisms while in the

pupa stage such as making clicking noises or wriggling to scare away predators. That this chosen form illustrates something most people are familiar with is just coincidental in this context.

The molded forms of my chandelier are each about twelve inches long and four inches wide and the clump together is about seven feet high by three feet at its widest point. (Figure 6,7) The three forms at the very bottom of the clump are broken, as if the contents had already either escaped or been harmed. (Figure 8)

In its relaxed state, (Figure 9) sensuously colored aqua light is used to entice viewers to approach the chandelier.

Each of the other nine initially seems to be inert, but responds when the viewer gets within approximately five feet of the fixture by seemingly springing to life. This alert phase expresses itself as the fixture very suddenly lighting up with bright white light coming from inside each of the “disturbed” forms. This all-on position is one of three light effect phases it will go through in response to the viewer entering the objects “cone of vision” (in reality the thirty degree cone of a passive infrared sensor). The light (a series of fourteen individually controllable LEDs) projects from the very inside of the form, which reveals a colorful tangle of wings and body inside indicating the insect present. (Figure 10)



Figure 6. Detail of "emerged" forms

Photo: J. Hines

The second stage of the light effect appears as a frantic yellow heartbeat, a movement indicative of the specific animal inside which is halfway between a caterpillar and a butterfly, when the Lepidoptera order is in its state most vulnerable to predation. (Figure 11) The panic state is brief, giving way to a slow breathing effect as the animal adjusts to the viewer's presence and acquiesces to coexisting, having decided the viewer is not a threat. The color of this state is a deep blue. (Figure 12)



Figure 7. Sleeping state

photo: J. Hines

This calm deep breathing state continues until the viewer retreats by more than five feet, effectively leaving the insect's presence, then after a few more breathes the breathing effect drops back down to it's undisturbed state, just a very low level internal glow. If the viewer comes back into the five-foot cone, the whole process begins again.

Three infrared sensors placed on the ceiling allow the group of nine "live insects" to respond at different times so as the viewer moves around the object, different parts of it respond as they are each approached. For the exhibit it will hang in the

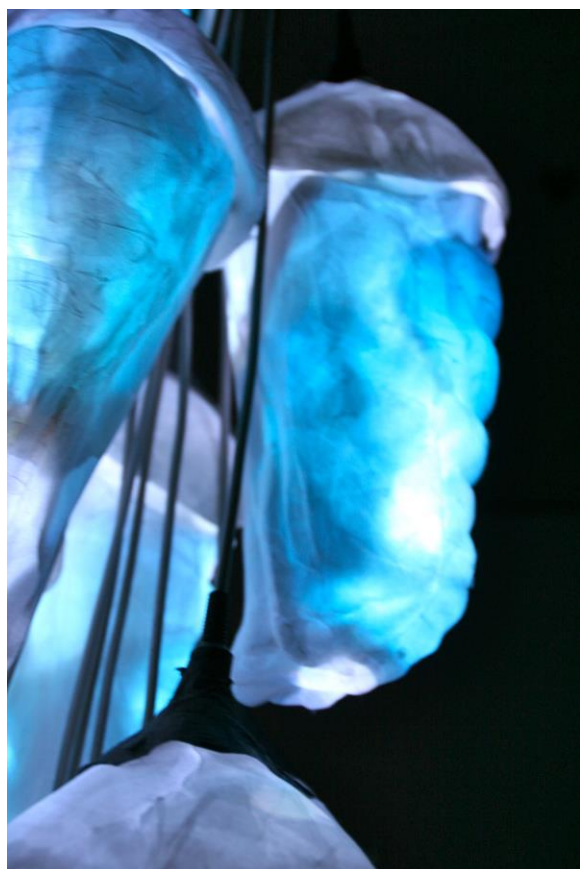


Figure 8. Startled state

photo: J. Hines



center of an otherwise fairly empty gallery which will allow access all around it. The three empty chrysalis cases have no life form inside so accordingly do not light up, but their absence gives viewers a question to ponder.

The always-on low light feature functions as a seduction to the viewer to initially approach the piece, as an unlit object in a darkened room would have little capability to attract a viewer to its proximity. The broken forms are meant to imply a fortuitous ending when the viewer realizes they are looking at more than one stage of the development and the escapees from the bottom three chrysalises have successfully emerged, but

Figure 11. Heartbeat state

photo: J. Hines

leaves

unanswered the question of what then became of them.

The second piece provides an opportunity for comparison because it requires the viewer to physically interact with it in order to initiate the action. In the first piece, the viewer unknowingly instigates the relationship; it is the object that defines the terms. With the second piece, the viewer gets to choose whether they want to initiate the relationship or not. With each circumstance



Figure 12. Breathing state

photo: J. Hines

there is a time period that must elapse in order for the viewer to gain full understanding of the terms being presented.

The second piece consists of arms in three concentric circles, tiered in a loose imitation of the easily recognized traditional chandelier form. Each tier holds dimly lit electric candles (again the always on element to initiate interest), which is also a reference to traditional chandelier vocabulary. This fixture is hung higher than the former so as to put in appropriate reach a series of ball chain pulls, like one would see in a bare bulb type closet light, each of which is finished with a dangling tassel to entice a pull. When the viewer tugs on a chain (as one would often be required to do in order to turn on a closet light bulb), a tiny fan goes on which quickly inflates a limp dangling lump of fabric into a joyous and colorful appendage that extends about a foot above. Each pulled chain brings to life another colorful billowing form which together significantly increase the density and height of the fixture overall to enliven it's presence. The fans blow until each chain is again pulled to stop the action, at which time the fabric balloons deflate back into lifeless puddles. Due to unforeseen constraints, this piece was not in the gallery show.

City planners have recognized the value public artwork brings to their environments and have often supported those efforts with funding. Public art instigates debate and dialog between people, drawing tourists and truly enriching the experience of walking down the street. A work of art is often well received by some and disliked by others, a controversy which gives rise to observations that free speech is alive and well, even when involving taxpayers money. There is an embedded sense of ownership among residents of a city's public spaces. Discourse and controversy are encouraged in this context as it causes residents to interact.

Extending the idea of public sculpture to that of a functional chandelier in a public space that works in the same manner to enliven the discourse of those encountering it seems like a positive pursuit that enriches the experience of being in a city environment and in that particular space. The encouraged interactivity that is the core of these pieces supports the idea that

community is created through shared experiences. I would love to see these types of interactive pieces in an airport, where there are both people in a hurry and people killing time, allowing opportunities for passive observer or for participatory roles. A hospitality environment such as a hotel lobby would be another appropriate location for a functional interactive art piece because it could serve as a demarcation of the point of arrival, which is often the chandelier's role in a public space while simultaneously providing an element of experiential play.

The medium of a light fixture was chosen to demonstrate these ideas because of its omnipresence in public environments, which gives it a clear association with interior design, and for its appropriateness as a vehicle for creating a computer controlled environment which was necessary to control the functionality of the responses. The form of a chandelier was chosen because its associations with status make for a fun play on social norms, and because it offered potential for meeting my goal of making an experiential environment that evokes positive emotions, particularly joyfulness and delight. With this particular vocabulary, I also got to indulge my intrigue of multiple light sources, putting that obsession into physical form.

2.1 Interaction

A majority of the literature on interaction involves either its role in computer user interface or its necessity in the education process, which is often also centered on computer technology. The Association for Computing Machinery created its first Computer Classification System (The ACM CCS) in 1998 as taxonomy to aid searches of its own digital archives of scholarly papers. It has since been adopted as a general classification system for categorizing facets of study that relate to computing. The system's 2012 revision places the section title Interactivity in computing under the larger category of Human-Centered Computing, then further breaks it down into four specific subtopics. These are Interaction Design Process and Methods, Interaction Design Theory, Concepts and Paradigms, Empirical Studies in Interaction Design and Systems and Tools for Interaction Design. Two of those categories pull up a null entry with a message informing the searcher that

there are no recent papers displayed under that subcategory because it is one of the many new concepts introduced in the 2012 CCS that had no equivalent in the previous version. I found this odd as interactivity seems to be an advantage to computer use that was immediately obvious from the start. Perhaps it was considered more of a byproduct of the functions of computing and was not singled out as a standalone facet to be studied until very recently. As my study concerns itself with humans interacting with a designed object employing applied computer technology, this seemed a logical subject to investigate.

The CSS places computer art under Applied Computing/Arts and Humanities/Fine Arts (a branch it shares with Performing Arts). The ACM Multimedia Conference, held annually in Singapore seeks submission of art works and technical papers by artists about their work to its Interactive Art Program whose stated goal is to “bring together the arts and multimedia communities to create the stage to explore, discuss, and push the limits for the advancement of both multimedia technology through the arts, and the arts through multimedia technology.” (ACM website) So the connection between art, computers and interaction being seen as tied together is strong.

Fernanda Viegas is an IBM computer scientist whose research focuses on the social, collaborative and artistic aspects of visualization. She and her colleagues at IBM’s experimental research division have developed *Many Eyes*, a free website available on the Internet where people can upload data sets of their choosing and with just a few simple mouse clicks create visualizations in the form of colorful charts that allow users to flip through a variety of ways of viewing their data results in a very quick manner. A user can organize the output into relationships between data points such as scatterplots, matrixes or network diagrams, or quickly reorganize into bar charts, bubble charts or block histograms to show comparisons between sets of values. They can choose display methods that track rises and falls over time such as line graphs and stacking graphs, or branching tree diagrams and pie charts that allow one to see all the parts as a whole. In all there are

fourteen basic forms in which results can be returned, each with options for customization. Appropriate datasets can also be mapped, combining numeric data with geographical information to learn for example how many people in England own their homes, separated by county. *Many Eyes* can even handle text exclusively with no accompanying numerical data and generate clouds for words, tags or two word combinations. It can create complicated phrase nets, diagramming the relationships between words in a poem, story or Beatles song.

An article authored by Viegas and four others involved in the project describes their surprise at some of the resulting data mapping subjects that have appeared in the tool's memory. As the project is an experiment, data is required to be left available on the site, so a private dataset once uploaded becomes available as a modeling base for anyone who wants to utilize it.

Many Eyes was initiated as a study to explore how people employ visualization tools. Making the tool available to the general public opened up the field of usage possibilities to a much wider variety of potential users than is the norm in research visualizations as such applications are usually purpose built for specific industries and users.

Viegas and team were able compile a body of results that showed a surprising amount of variety in the types of data users wanted to model. They learned that the majority of users did not have pure data analysis and computation in mind when utilizing the tool. In among the datasets documenting global warming studies and population density maps, an unexpected number utilized the tools as a means of creative expression using the software as a spur to playful analysis of data, such as the user offered assessment of the contents of his freezer.

The site has a social component built in. Users can comment on other's visualizations or datasets; with a snapshot of the visualization in the state they had viewed it included in the message for reference. Games have spontaneously started among site visitors who have used other's datasets, such as a list of the fifty most popular books, to personalize the results and represent the scatterplot highlighting books from the list they have also read. One user graphed his

social networking contacts to create a network map of all his connections, generating much commentary from those included about their relative social importance as represented by the size of their dot. One gentleman's scatterplot offering *420,000 years of CO2 Levels and Temp* sparked political debate in the response comments and caused others to note patterns in the data such as the fact that high CO2 levels seem to often precede significant changes in temperature that they had never observed until other's manipulations of the original dataset brought it to their attention. This simple game like site is successfully using data to create reasons for people to interact.

The researchers' intent to study how users employ applications brought some unexpected and amusing results. It showed what types of data people were most interested in playing with. The topics most graphed were those whose subject was some facet of contemporary society such as demographics (14%), followed closely by economics (12.7%) and obscured or anonymous data sets of a user's own personal metrics of interest that they wanted to explore but not share understanding of with the world (12.4%). I assume that the later figure may also contain data sets where the users were simply interested in the creation of the visualization itself as opposed to the results of the data once mapped or graphed. Arts and Culture (10.8%), New Media & Web (10.3) and Science (10.0%) were also strongly represented interests. I found it telling that subjects often referred to in a statistical context such as sports (4.2%) and surveys (0.5%) ranked significantly low. Technology itself as a topic didn't bode much interest either in this obviously technological tool at 6.6% of the total. (Data from Viegas et al 2008) The study demonstrates a direct route from an independent technological tool to amused interaction between strangers resulting in a creative product.

Daniel Berlyne's work benefits the field of "New Experimental Aesthetics". (Berlyne 1974) Though generally concerned with the effects of art and beauty, the field is very broad and draws its conclusions from sources that range from philosophical interpretation and observational methods to the empirically controlled experiments of the behavioral sciences. Berlyne seeks to explain

behaviors in relation to artistic production by examining causal factors, using scientific models to provide quantifiable metrics for such intangibles as uncertainty, perceived complexity and what he calls “interestingness”. These become the variables of his experiments and looking for combinations of these that will give consistent results his task. A definitive answer to these questions could give insight into a repeatable formula for attention retention, a psychological resource that any advertiser would covet. One of his most concrete measuring tools is “looking time”, meaning the amount of time a viewer voluntarily spends with their attention focused on a visual object (light fixture, sculpture, painting, photographic image, color etc.) Berlyne’s experiments turned up parallels between an object’s uninteresting-interesting scale and it’s level of uncertainty (unfamiliarity). He found patterns that showed Interestingness is high when something is uncertain but also has the prospect of certainty being quickly obtained through intellectual or perceptual processes. Findings on whether an object’s complexity factored into more or less interest exhibited by a viewer were inconclusive as sometimes more complex stimulation was sought out and at other times it wasn’t. It did seem that curiosity waned when a viewer’s gaining more familiarity with it easily solved the complex problem presented.

Berlyne separated response into two phases: arousal and evocation. If the stimulus to arouse a response occurs, the response was considered to be effectively aroused, whether the actual response took place or not. Arousal is the motivation to respond, evocation is the action the arousal has motivated. A high arousal potential in an object (or experience) gives more motivation for responding. Arousal potential can be seen as interest, intrigue or engagement of a person in a presented object, all elements of interest to my study. Over the years of his work, Berlyne redefined the variables in his study, but complexity, uncertainty, surprise and novelty figured prominently in all of them and interestingness occurred as either a variable or a resultant. Berlyne looked for collations or pairs that together contributed to consistent response patterns and published his findings with the disclaimer that the area of study needed much more experimentation, but showed

that the more complex, uncertain and novel the stimuli, the greater the level of arousal existed, manifesting itself in a greater motivation to respond.

The intent of Berlyne's studies eventually expanded the determinants used so as to determine preference, looking at what causes one choice to be made over another. Preference to respond or not is determined by an object's arousal potential. These later experiments added factors describing physical properties of the stimulus such as intensity, hue, pitch and luminance and ecological properties such as associations, meaningfulness and learned value in relation to an object or image. His findings led him to postulate that more arousal leads to more pleasure, interest and desire up to a point, then displeasure or avoidance begins to set in. Berlyne points to a U shaped curve as a descriptive analysis. Preference it turns out is not easy thing to figure out.

Like with any theorist, Berlyne's ideas have both supporters and detractors. Martindale, Moore and Borkum cite other studies that do not support Berlyne's theories. Nedungadi and Hutchinson intentionally set out to prove him wrong. Martindale and Moore's 1988 studies using color and music as stimuli indicate that preference is more strongly tied to an object's meaning than just to its arousal potential factors. The previously described marketing study using 100 hundred objects lends strong support to this idea. The researchers point to Mussinger and Kessen's 1964 studies which led to the conclusion that simple polygons were preferred over complex ones because people could easily identify them as familiar geometrical shapes but interestingly, complex polygons were preferred over mildly complicated ones because of their associations with fanciful objects and with natural forms. Meaningfulness mattered. Prototypicality, which is the associative strength between a category and how representative an object is of its category, also had strong effect, standing in direct opposition to Berlyne's assertions of novelty and complexity being the main motivators. Kaplan and Wendt (from Martindale 1990) showed in 1972 that content of a visual image was more important than its formal qualities except when that viewer is particularly educated in art, which flips the results. Nedungadi and Hutchinson found that meaningfulness was

most important to viewers of representational paintings. When they repeated the experiment with abstract paintings, complexity mattered more to the viewers. The conclusion here can only be that an individual's visual preference and what captures their interest are phenomena not easily repeated or explained.

2.2 Interactivity as a Teaching Tool

Computer interactivity is the closest cousin to a simulated other being, so the computer's application to effective independent learning has been the subject of much study.

Interactivity goes beyond just pointing and clicking, a dialog must be created between the user and the data. This makes the process ideal for use as an educational tool because it can make the learning process engaging for the user and because the computer's feedback can be varied in response to the user's input. This customizes the experience to best benefit the user's needs, effectively personalizing the exchange.

In his article "Interactivity, a Forgotten Art?" Rod Sims feels that interaction is integral to success in any instructional practice and that a developer's creation of interactivity in an instructional product can indeed be perceived as an art form because "it requires a comprehensive range of skills, including an understanding of the learner, an appreciation of software engineering capabilities, the importance of rigorous instructional design and the application of appropriate graphical interfaces." (Sims 1997 p.1)

An early adopter of the idea of using computers as cognitive tools, David Jonassen (who unfortunately died during midway through the writing of this work) was the director of the Center For Study of Problem Solving at the University of Missouri. He described interactive education as "implying an activity between two organisms, and with a computer-based application, involving the learner in a true dialog. If this dialog is successful, a quality interaction results." (Jonassen 1988 p.97)

Jonassen believed that computers by themselves are lousy teachers. "They should be used

to engage students in critical thinking by functioning as knowledge representation formalisms (i.e. mindtools)” (quote from his website) His textbook on what he refers to as mindtools contains a chapter on creating computer models to capture and index stories. This models human experiences as one would a mathematical calculation.

In their book *Interactive Media Instruction*, Schwier and Misanchuk create a detailed account of computer/human interaction intended for learning, placing the instructional qualities onto three specific dimensions: **Levels** (reactive, proactive and mutual) **Functions** (confirmation, pacing, navigation, inquiry and elaboration) and **Transactions** (keyboard, touch screen, mouse and voice). As this study was conducted in 1993, I would add sensor input, joystick control and biofeedback to the list of transactions. Rhodes and Azbell describe the same three levels of interactivity in relation to user control in the article they authored for a training and development journal. The **Reactive** level provides the user with very little control over the process; the program controls the options and feedback. The **Coactive** (mutual) level allows the user to control the sequence, pace and style in which the information is delivered. The **Proactive** level gives the user the most control, allowing them to make decisions on both the structure and the content of information provided. The activity levels here refer to both the navigation and the customization of the product, but don't take into account the success of the cognitive processing in the mind of the user.

Though both texts seem to assert that the more interactivity possible in an educational learning process, the higher the quality of instruction is, Spector argues in *Integrating and Humanizing the Process of Automating Instructional Design* that more interactivity does not necessarily equate to more learning. He agrees, “Creating more conversational interfaces should enhance the level of interactions in courseware” but cautions that in regards to learning effectiveness “the critical factor is more likely the learner’s mental engagement or involvement with the subject matter”. (both quotes Spector 1995 p 531) So in order to be effective, an interactive

product must engage.

Sims feels educational effectiveness is enhanced with more content- directed communication between the computer and the user and the visual appeal of the product is less important. He uses seven communication categories to classify elements that can be integrated into the development process, but feels each of these activity types should not happen in isolation. Functions are either **independent**, meaning they behave in the same manner on each encounter with a user (my chandelier fits into this category) or are **consequential** where the functionality changes in response to the previous actions or the performance of the user.

Object Interactivity is what Schwier and Misanchuk term Proactive level with Inquiry function. This simple function refers to the user activating an object by clicking on it or pressing a button. The object responds when selected with some sort of audio-visual action. The functionality of this object can be varied based on consequential factors such as that particular users prior responses when presented with that or other objects encountered previously.

Linear Interactivity refers to instructional material presented in a predetermined linear sequence. Users move forwards or backwards through the content with no options for response specific feedback. This Reactive/Pacing method is sometimes given the self-descriptive title of electronic page turning. Sims recommends limiting use of this simple interaction because the level of learner control is limited and learner initiated branching is not possible here. Overuse of this method would create a dull experience that doesn't take advantage of the breadth of possibilities available. **Support Interactivity** allows the user to receive performance support such as help messages or more complex tutorials. This form of reactive inquiry offers the opportunity to include just general help or more context specific support.

Update Interactivity is the first process where a dialog is initiated between the user and the content. In this process, the computer application generates a question or problem to be solved, the user responds and the computer generates feedback (an update) in relation to the users

response. An example of this is a question posed, answered, the response judged and responded to. The update can be a simple text response or a complex conditional response, even one that incorporates artificial intelligence components. Engagement is highest when the responses appear to be individualized, based on the current user's response. Sims cautions that the quality and format of media provided will affect the overall effectiveness of the instruction here.

Construct Interactivity takes updates a step further. It requires an environment where the user must manipulate components, often in a specific order, to achieve the specific goal required. My second chandelier project would fit into this categorization. This method lends itself well to simulated environments such as learning to fly a plane without leaving the ground. **Reflective Interactivity**, also a Proactive/Elaboration method, records the user's responses and allows them to compare their responses to those of others. Instead of simply judging an answer as right or wrong, this method allows the user to reflect on their given response, subsequently using their own judgment to decide if it was the best answer. Sims gives the example of reflective interactivity used well in a program where the user is presented with and responds to multiple situations where negotiation is required. The user then can compare their responses to each situation with both the responses of other students and to those of subject experts. I can see this as an appropriate approach for teaching law or other subjects that don't have clearly defined right or wrong answers. **Hyperlinked Interactivity** is a Proactive/Navigational approach that allows the user non-linear free choice in their travel through a sea of offered information. Sims points out the necessity of upkeep in ensuring all links are continually functional to maintain the engagement level that encourages continued exploration.

Simulation Interactivity can be of the Reactive or Mutual/Elaboration levels. This option allows the user's selections to determine the training sequence and can be strategized such that the user cannot progress until they have mastered a given task, cannot receive an update until they correctly complete the task or can simulate the effect their choice would actually have on a real life

situation. Crashing a simulated plane would certainly cause a user to rethink his piloting decisions. In this case, the negative result of the user's choice significantly reinforces the information to be learned, reinforcing this product's success as a learning tool.

Non-Immersive Contextual Interactivity combines any combination of the previously described interactive options to create a virtual training environment, which takes the process all the way up Schwier and Misanchuk's chain to firmly land at the Mutual/Elaboration level. Tasks the user undertakes mimic the actual working environment. This approach is ideal for training purposes as the user can interact with simulations (crash the plane), receive responses (forgot to account for wind shear effect) and then explore the tasks further through added information they are either provided automatically or allowed the choice of accessing. I have heard this process also referred to as CBT or Computer Based Training when utilized in a vocational context. **Immersive Virtual Interactivity** takes Mutual/Elaboration into a complete virtual world that responds to his movements or actions. The user is visually inside the cockpit, the controls actually respond to his hand movements through wired gloves and instead of being informed of the plane crashed, he "experiences" it, perhaps affording him the opportunity to pre-emptively correct for wind shear and save himself. This is essentially gaming with an instructive purpose.

2.3 Interactivity as art

Activity has always held interest for artists. Interaction between people as depicted in genre paintings gives us glimpses into the societal roles of the past. The Italian Futurist movement of the early twentieth century centered on motion. Inspired by the new fast locomotive engines and the increasingly fast pace of city life, the main intent was to depict the time based concept of motion in a medium that didn't easily lend itself to that purpose; paint on canvas. Giacomo Balla's painting from 1912, *Dynamism of a Dog on a Leash* is a great example of this. In painting his dog, he creates the illusion of motion through a series of repeated depictions of the dog's legs, incrementally following the path each leg would take if it were in motion. New forms of transportation at that time

were changing the experiences of the middle class, as travel was newly available to them. Lower and middle-income people were gaining more control over the environments they could choose to experience so novel environments and ideas were being sought out.

The 1878 photographs by Edward Muybridge, whose version of capturing motion on film had him setting up twelve cameras on trip cords to take sequential still shots of horses in motion were greatly influential on many artists work including Marcel Duchamp's controversial 1912 *Nude Descending a Staircase*. This interest in activity and motion seems to be the first step towards interactive art, which is the medium I am interested in testing.

Interest in capturing action with cameras has since moved on to interest in creating action with computers. Duchamp, along with Man Ray made an early foray into interactive art with their 1920 *Rotary Glass Plates (Precision Optics)* sculpture. This piece consisted of large painted plates on a motor. The interaction came in that that viewer had to physically flip a switch to turn it on, and then had to get out of the way of the rapidly spinning discs before he got hit by them. The motion of spinning effected change on the pattern painted on the discs. Does Duchamp and Man Ray's piece qualify as interactive art? In my mind interaction does not necessarily need technology to capitalize on the intrigue of audience involvement, an assertion the continued popularity of this particular art piece supports.

As Peter Sellars points out in his forward to Chris Salter's *Entangled*, the early twentieth century modes of mass media were ideal tools for supporting fascist regimes because communication only flowed one way, heightening the possibilities for control without reciprocation or global witness. Sellars sees this as laying the foundations for "corporate brainwashing and the marketing of desire, craving and domination fantasies that have proliferated into our current cultural miasma of virtual realities" (Salter 2010 from forward p.x) Maybe things are not quite so grim, but the adoption of new connective media can a double-edged sword.

On the one hand, technology has lifted the veil of secrecy in controlled spectatorship as the

World Wide Web, as the name implies, is a global and universally accessible tool, thereby giving voice and projection capabilities to a world theater that very quickly takes note. On the other, it has created covert and omnipresent opportunities for watching.

Artists have been early adopters of new technologies, using whatever is the new technology of their era to describe both the angst and anxieties of a rapidly changing world and the *joie de vivre* of their time. Technology in itself is of course a neutral tool of expression; it is the motives and means of utilization that determine the outcome of its use.

Andrea Lau and Andrew Vande Moere identify a few factors pushing the growth and importance of visual information aesthetics in popular culture. Software availability and the growing online community that encourages sharing knowledge are the primary reasons. Internet speed and distribution have allowed access to data, and data is now readily available for individuals to create, collect and share vast libraries of information and imagery with others in disparate locations. The interdisciplinary skills now encouraged in design school curriculums are allowing new designers to cross boundaries between fields and develop novel techniques. Aesthetics are also evolving, driven by a new appreciation for technological possibilities and a focus on collaboration and comment. Interaction through invitation to comment on material offered on the Internet has become commonplace, even the online news networks solicit responses from the general public. It seems online dialog makes the ideas of others more accessible and the popularity of blogs implies an interest in the nuances of strangers personal lives formerly reserved only for the famous.

A crossover between the fields of Information Visualization, which turns data into insight for specific purposes and pure artwork is what Pousman and Stasko of the GVU Center at Georgia Institute of Technology and Michael Mateas of UC Santa Cruz refer to as Artistic Infovis.¹ In contrast to InfoVis, which uses visual means to facilitate understanding of functional information, Artistic Infovis works “problematize our everyday conceptions”. (Pousman et al 2007) Works that fall

¹ This term originally coined by F. Viegas and M. Wattenberg

under this categorization use data itself as a medium for creating something new. Often the viewer is an active participant in the how the information is presented or how the work functions. The goal of such works seems not to come to a specific conclusion through the presentation of data, but to provoke thoughtful dialogue and new ways of looking at things stimulated by the data.

Sellars used a wonderful little phrase also in *Entangled*. He described the new media available to artists as enabling possibilities for “the reorganization of human interaction and the reimagination of interrelatedness”. (Salter 2010 forward p. xi)

3 CONCLUSIONS

My purpose in designing the Approach exhibit was to see for myself whether such an object could indeed provide the experience I hoped such an element could offer. Though it runs counter to some critic’s notions of what comprises “serious art”, I have always believed there is value in just generating pleasure. Whether it is through objects or environments, creating a positive focus for someone who encounters a work or space seems to me a small but valuable service to offer the world.

Why choose chandeliers as a medium for this exploration? Since the need for dozens of candles to light a room well enough to read by is no longer a real condition, chandeliers are not necessary just to provide light anymore; more efficient light sources can do a better job of that. The beauty for me of chandeliers as a medium for exploring these ideas is that because of their past associations with extravagance and the possibilities for providing many light sources and odd or inventive decorative elements, they are a little gateway between fantasy and reality. If well done, they can straddle the line between functional interior object and hanging sculpture and can be used as a lure to force unsuspecting viewers into thinking about other ideas that might be represented. As an example, the subtext of my chrysalis chandelier is to consider the fragility of the natural

environment, but a viewer would not pick up on that from a distance, the specific reference of the form only comes into play when it is approached.

My research on this topic demonstrates that emotional value through stories and associations surrounding an object enhance its appeal and perceived monetary value. Responsiveness can be a purely unconscious affect and the “startle” state of my object is intended to speak to this visceral process. The brain responds to such an event with a flood of chemicals, often before it fully comprehends the situation it is responding to. In this condition, response is not a conscious decision but happens as a function of the stimuli presented. Cognition puts one back in control of their responses to objects and allows for subsequent and more complex responses to occur, such as recognizing the pattern of “behavior” and its intended reference to a live creature’s similar behavior in the second two states of my object’s programmed responses. The ability to contemplate and address an object’s effect on its surroundings is a complex process, but necessary for appreciating the subtleties and intentions of an art object.

Particularly evident in education studies, interaction has been shown to be a key element in engagement and engagement has been shown to benefit learning. The computer can provide both opportunities for people to engage with knowledge and to engage with each other in meaningful exchange. Technological tools can stimulate interaction, discussion and novel utilization among strangers, ultimately evolving into something completely unintended by the developer of the tool as evidenced in the Many Eyes experiment and in artworks that employ technology to create new meanings out of computer generated data.

My complex software driven responsive chandelier project seeks to investigate interaction, engagement and activating space through the object’s responsiveness to the space’s inhabitants. That the object casts colored light in changing patterns is an additional means for activating the space as was the decision to put earth on the gallery floor and moss on the ceiling so as to create a further connection between the object and the planes that define the room itself. Due to its location

in the center of the gallery viewers were able to walk completely around the object, potentially interacting with three different sensors each of which caused effects to occur in different parts of the chandelier.

“Emotions and feelings result from the internal representations that we make of thoughts, people, external objects and experiences”. (Van Gorp 2012 p.23) Because a person’s emotions and judgment are unique and internal, there is no accurate gage available to me to physically measure levels of responsiveness and I cannot assert in any meaningful way the specificity of viewer’s responses to the show, but I am confident I created possibilities for people to experience the space in new way when the object unexpectedly created actions in response to their own actions. The empty gallery space was taken from very minimal activation with low arousal potential to one of significant motivation for interaction with the addition of the designed object. Whether the evoked response was positive, negative or neutral, a response to the stimulus took place by people simply entering the gallery. If for even a few viewers I can cause a response that culminates in intrigue, delight, heightened interest and enjoyment of a formerly empty space based on my object’s presence, I have both created a positive effect and one that meets my goal.

BIBLIOGRAPHY

- ACM Multimedia conference website (accessed January 9, 2013)
<http://acmmm05.comp.nus.edu.sg/artprogram.htm>
- Berlyne, D.E. *Studies in the New Experimental Aesthetics* Washington: Hemisphere Publishing, 1974
- Gilliver, R.S. and B. Randall, Y.M. Pok. "Learning in Cyberspace: Shaping the Future." *Journal of Computer Assisted Learning* 14 (1998): 212-222.
- Hardwick, Claire. "A comparison of possible markers for chandelier cartridges in rat medial prefrontal cortex and hippocampus" *Brain Research Magazine* 1031:238-44. 2005
- Hamilton, William. "Eva Zeisel, Ceramic Artists and Designer Dies at 105" *The New York Times* (December 30, 2011) Obituary section
- Jonassen, David. *Instructional Designs for Microcomputer Courseware*. Hillsdale, NJ: Lawrence Erlbaum, 1988
- Jonassen, David E. *Modeling with Technology: Mindtools for Conceptual Change, 3rd Ed.* Pearson Education Inc., 2005
- Jonassen, David E. Website (accessed January 9, 2013)
<http://web.missouri.edu/jonassend/mindtools.html>
- Johnstone, Jyll (Director). "Throwing Curves". Documentary Film on the life of Eva Zeisel. USA, 2002
- Kurilecz, D. Sprung. "The Attack of The Chandeliers" *American Letters and Commentary* Issue 20 (2008) 48
- Lau, Andrea and Andrew Vande Moere. "Towards a Model of Information Aesthetics in Information Visualization" *IEEE Computer Graphics and Applications* (Sept/Oct 2009)
- Liu, Tzu-Chien and Yi-Chun Lin, Meng-Jung Tsai, Fred Paas. "Split-attention and Redundancy

Effects on Mobile Learning in Physical Environments.” *Computers & Education* 58 no. 1 (January 2012): 172-180.

- Many Eyes website (accessed December 27, 2012) <http://www-958.ibm.com/software/analytics/manyeyes>
- Matindale, Colin and Kathleen Moore, Jonathan Borkum. “Aesthetic Preferences: Anomalous Findings in Berlyne’s Psychobiological Theory” *American Journal of Psychology* 103, no. 1 (Spring 1990): University of Illinois Press
- Meagher, Michelle. “Would the Real Cindy Sherman Please Stand Up? Encounters between Cindy Sherman and Feminist Art Theory” *Women: a Cultural Review* 13, no. 1 (March 2002) 18-36
- Nedungadi, Prakesh and J. Wesley Hutchinson. “The Prototypicality of Brands: Relationships with Brand Awareness, Preference and Usage” *Association for Consumer Research* 12, (1985): 490-503 From conference proceedings
- Norman, Donald A. *Emotional Design: Why We Love (or hate) Everyday Things*. New York: Basic Books, 2004
- Pousman, Z. and J. Stasko, M. Mateas. “Casual Information Visualization: Depictions of Data in Everyday Life.” (2007) Online white paper procured via ACM Digital Library
- Rhodes, D.M. and J.W. Azbell. “Designing Interactive Video Instruction Professionally.” *Training and Development Journal* 39 no. 12 (1985): 31-33
- Salter, Chris. *Entangled: Technology and the Transformation of Performance* Cambridge: MIT Press, 2010
- Schwier, R.A. & Misanchuk, E. *Interactive Multimedia Instruction*. Englewood Cliffs, NJ: Educational Technology Publications, 1993
- Sims, Roderick. “Seven Levels of Interactivity: Implications for the development of Multimedia Education and Training,” *Proceedings of the Asia Pacific Information Technology*

in Training and Education Conference 3 (1994)

- Sims, Roderick. "Interactivity: A Forgotten Art?" (January 27, 1997)
<http://intro.base.org/docs/interact> (accessed 12/25/2012).
- Spector, M.J. *Integrating and Humanizing the Process of Automating Instructional Design*, in R.D. Tennyson & A.E. Barron (Eds), *Automating Instructional Design: Computer-Based Development and Delivery Tools*. Berlin: Springer-Verlag, 1995
- Van Gorp, Trevor and Edie Adams. *Design for Emotion*. Waltham, MA: Elsevier, 2012
- Viégas, Fernanda B. and Martin Wattenberg, Matt McKeon, Frank van Ham, Jesse Kriss. "Harry Potter and the Meat-Filled Freezer: A Case Study of Spontaneous Usage of Visualization Tools" *HICSS (2008)* http://thevcl.com/papers/viegas_et_al_hicss08.pdf (accessed December 12, 2012)
- Walker, Edward L. *Motivation and Emotion* 4, no. 2 (1980): 105-111 Klumer Academic Publishers
- Walker, Rob and Joshua Glenn. *Significant Objects*. Fantagraphic Books, 2012
- Wynn, S. "Interactive Multimedia Ensuring Motivation of the Learner" (1996)
<http://www.bs.ac.cowan.edu.au/misforum/swynn.html> (accessed December 2, 2012)
- Zeisel, Eva *On Design: The Magic Language of Things*. New York: Peter Mayer Publishers, 2004

APPENDIX A
Photographs from Installation



Figure 13. Visitor experiencing exhibit
Photo: J. Hines



Figure 14. Chandelier shown in various states
Photos: J. Hines



Figure 15. Multiple sensors trip at differing times
Photos: J. Hines



Figure 16. Details of Design Development Wall
Photos: J. Hines



Figure 17.
Details of Design Development Wall
Photos: J. Hines



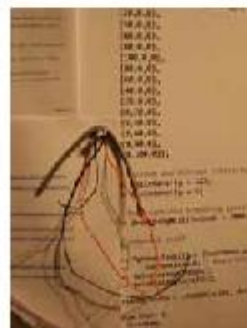


Figure 18.
Details of Electronics &
Programming Wall
Photos: J. Hines

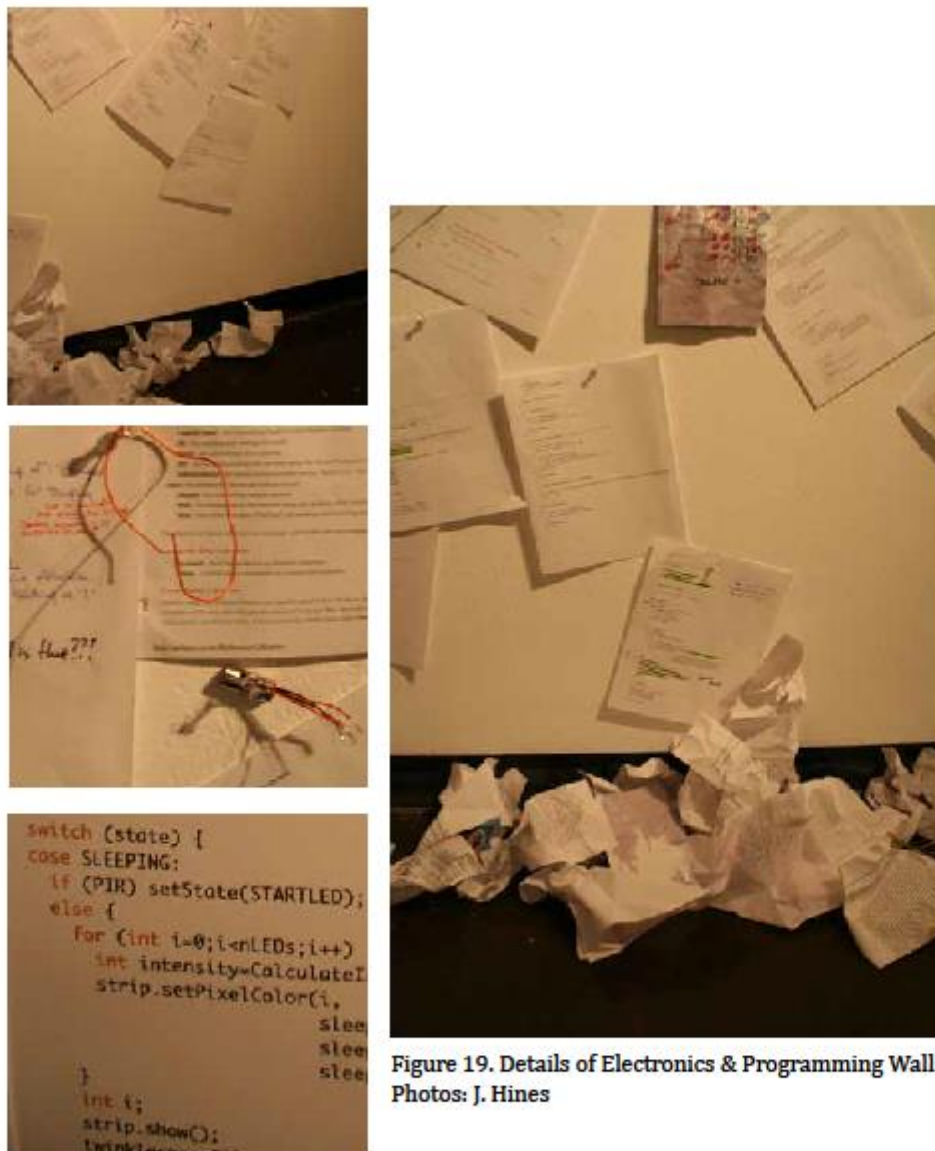


Figure 19. Details of Electronics & Programming Wall
Photos: J. Hines



Figure 20. Breathing- early prototype sconce
Photo: J. Hines

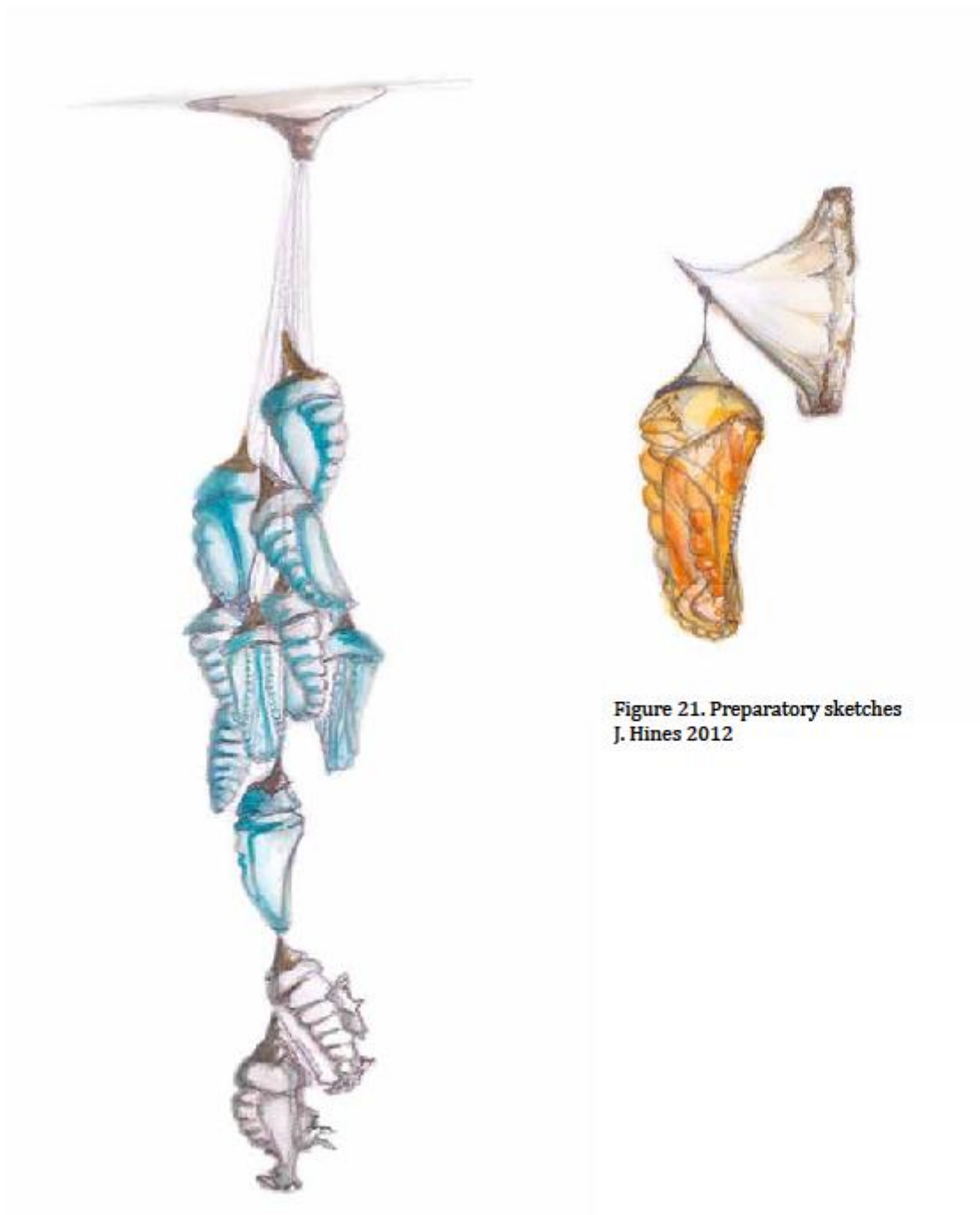


Figure 21. Preparatory sketches
J. Hines 2012