Designing for Delight

The Role of Wonder, Discovery, Invention & Ingenuity in Exhibit Design

by Marti Louw

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School of Design
Carnegie Mellon University
Pittsburgh, Pennsylvania

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Abstract

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By pursing delight as a design goal in the creation of exhibits about science and nature, I believe we can solve the 'edutainment' dilemma that plagues producers of informal educational media both in and outside the museum. My experiences suggest that a hybridized notion of education and entertainment is a misguided design goal and that by designing for delight instead, we encourage learning and the creation of memorable experiences. In this paper, I show how delight figures into rhetorical demonstrations of nature and the design of exhibits.

To build an understanding of the aesthetics of delight in the museum experience, I explore three key concepts: nature as a subject matter, rhetoric as a method and delight as a design goal. Based on readings and research in museums, I propose a rhetorical framework by which to identify delight in exhibits about nature. In the first part of the paper, I suggest that delight is the fulfillment of the human desire to know; and that in nature it takes the aesthetic forms of wonder, discovery, invention and ingenuity. These delights of knowledge also feature in explanation and can be identified by the master tropes of metaphor, metonymy, synecdoche and irony. The master tropes, as essential figures of thought, offer a compass by which to locate ideas of nature and the means by which they are communicated in the rich multimodal media of interactive exhibits. By designing for delight, we can return to the enlightenment roots of the museum as a place of wonder and memorable experience.

Part One: Background

Most of us can remember the childhood excitement of visiting a museum. Many of us can recall favorite exhibits—perhaps the great dinosaur skeletons which hinted at a bygone age when creatures grew much bigger, or maybe the trace a long swinging pendulum left behind in the sand as the earth spun beneath it, or for some a floating armada of moon jellies gently beating against the current in their glass cage. These sights filled our young eyes with wonder and curiosity about the natural world around us and were often the places where we encountered our first scientific explanations.

Despite their seeming value, museums struggle to stay relevant and keep their audience returning.[1] New forms of media challenge museums to update their exhibition formats to compete for audience attention. But how should they compete; what knowledge should they try to communicate; and in what form should they communicate that knowledge? Buzzwords such as *interactive* and *hands-on* exhibits that emphasize goal-oriented, discovery-based, and free choice learning models are bandied about as key concepts that exhibit designers should draw upon to create successful educational exhibits.[2] [3] Yet, these models alone fail to fully capture the aesthetic dimension of the museum experience and its power to draw and hold audience attention. To stay current science and natural history museums have attempted to shed their image as musty old places one visits on school field trips. In the makeover attempt many institutions have moved away from collections and traditional glass case exhibition formats. Real objects have given way to moving electronic images and interactive amusements. To attract a young, media-savvy audience curators fill galleries with computer-based interactive kiosks offering games and quizzes which yield media hidden underneath touchscreen buttons. Others build crowd-pleasing Omni Theaters to draw visitors back to the museum. To compete with entertainment venues some museums bring in blockbuster exhibitions featuring pop culture icons such as the "Bond, James Bond" exhibition at the Science Museum in London, or well-loved children's book characters such as the Richard Scarry traveling exhibit

[1] Stephen E. Weil, *A Cabinet of Curiosities: Inquiries in Museums and Their Prospects* (Washington D.C: Smithsonian Institution Press, 1995) 15.
[2] George Hein, *Learning in the Museum* (London: Routledge, 1998)
[3] John Falk, Lynn Dierking, *Learning form Museums: Vistor Experiences and the Making of Meaning* (London: Altamira Press, 2000) 135-204.

at the Carnegie Science Center.[4] These moves to blend education with entertainment are attempts to make the museum experience a hybrid one of 'edutainment'.[5]

It is in the creation of scientific 'edutainment' that my personal story begins. As a producer of scientific documentaries for public television and multimedia museum exhibits, I was constantly trying to balance the twin goals of education and entertainment. It often seemed to me the two were inversely related; the more educational content in a piece—the less entertainment value it had and vice versa. The curators on one hand wanted to increase factual information in keeping with educational goals while the production team wanted to simplify and reduce the information content to fit the general audience's presumed interest level and attention span. I found myself in the classic dilemma of serving two masters and pleasing neither. Moreover, I would hazard a guess that most of the media I produced rarely created those singular memories of delight in nature nor will they stand the test of time like great exhibits do. So what goes awry in the exhibit design process? Why do so many exhibits fail to inspire and delight museum visitors?

My experience would point to a creative process that emphasizes production over design, fact over meaning and amusement over delight. The audience is often a remote, generalized concern; the selection of subject matter arbitrary; the union of form and content not fully understood; and the totality of the experience not crafted in a unified vision. The design goal is often to produce exhibits that educate and entertain, and the resulting design process becomes an effort to balance these two seemingly competing forces. The edutainment dilemma weighs down the creative effort, freighting it with a clumsy design goal and a poor set of criteria by which to judge exhibits. An educator's goal is to teach. An entertainer's aim is to shock, titillate and amuse in spectacle. I would like to argue that an exhibit designer's intent should be to delight the mind, eye and senses—a pursuit that subsumes the conflicting goals of entertainment and education in its aesthetic shadow. It is in the pursuit of delight that an exhibit designer creates those memorable experiences we carry on with us, and which we use to build connections of beauty and meaning about the natural order in the world around us. It is my intent in this thesis to explore how the aesthetics of delight can inform the design of exhibits about nature and draw audiences back into the museum with memorable, meaningful experiences.

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[4]Exhibition website <http://www.jamesbondexhibition.com> (London: Science Museum Exhibition, Feb– June 2003)
[5] C. G. Screven, "Information Design in Informal Settings: Museums and Other Public Spaces," in *Information Design*, ed. Robert Jacobson (Cambridge: MIT Press, 1999) 165.

Part Two: Introduction

2.1 The Delights of Knowledge

"All men by nature desire to know. An indication of this is the delight we take in our senses; for even apart from their usefulness they are loved for themselves and above all others the sense of sight. For not only with a view to action, but even when we are not going to do anything, we prefer seeing to everything else. The reason is that this, most of all the senses, makes us know and brings to light many differences between things."[6]

These opening words to Aristotle's *Metaphysics* clearly link knowledge to delight and emphasize the senses, especially sight, which bring the light of knowing to us. Delight is the fleeting emotional response that arises when the desire for knowledge is fulfilled through the senses. In speaking of the human passions in the first part of *Leviathan*, Hobbes puts it this way: "*Desire to know why and how, 'curiosity' such as in no living creature but 'man,' so that man is distinguished not only by his reason but also by this singular passion from other 'animals', in whom the appetite of food and other pleasures of sense, by predominance take away the care of knowing causes, which is a lust of the mind, that by a perseverance of delight in the continual and indefatigable generation of knowledge exceedeth the short vehemence of any carnal pleasure.*"[7] It is delight, the lust of the mind and the ceaseless pleasure in coming to know, that I want explore before beginning a discussion about exhibitions of science, nature and natural phenomena in museums.

Section 1 will briefly describe four ideas of nature and the related forms of knowledge that each produces. Associated with each form of knowledge, is an aesthetic pleasure that comes from perceiving nature. I will call this psychosomatic, phenomenological response delight and describe the different aesthetic forms it takes in each view of nature. In the second section, I will relate the aesthetics of delight to explanation and to the master tropes and I will show how these rhetorical devices manifest themselves in the poetics of thought.

By the end of Section 2, I hope to have shown that the delights of knowledge and the delights of explanation meet in wonder, discovery, invention and ingenuity and can be characterized by the master tropes. We will then have a framework to explore how delight

[6] Aristotle, *Metaphysics*, trans. R. W. Ross (New York: Random House, 1947) 1.980.1a, 243
[7] Thomas Hobbes,"Of the Interior Beginning of Voluntary Motions, Commonly Called the Passions and the Speeches by Which They Are Expressed," *Leviathan* (Cambridge: The Harvard Classics) Chap. VI.

functions in thought and explanation, and we will also have a set of rhetorical tools by which to uncover the role of delight in museum exhibitions devoted to nature. Part 3 applies this rhetorical framework to contemporary exhibition strategies in a range of museums that all, in one way or another, deal with light as a topic. Let us first begin by tackling Nature as a subject matter and looking at the knowledge its study produces.

What is Nature?

"…As if Nature could support but one order of understandings."

Thoreau, *Walden*

The very idea of nature changes depending on the causality one seeks to attribute to natural phenomena. I would like to briefly draw out four conceptions of nature that hearken back to Aristotle's division of the four causes — material, efficient, formal, and final.[8] A shorthand to remember the modes of causation lies in the analogy of house building. Material causes are found in the building blocks—the brick and mortar—needed to fabricate a house. Efficient causes lie in the actions of the builders and their efforts to erect a house. Formal causes are captured in the architect's design which lays out the master plans for the home. Final causes arise from the purpose or reason why the house was built—to shelter and protect its inhabitants. Substitute nature for house in the above analogy and we splinter the idea of nature and its relationship to us into four distinct branches of thought.

By looking to Aristotle's four modes of causation, we can locate four very different kinds of knowledge. My claim is that different kinds of knowledge build distinct realities that produce different kinds of delight in nature. In the next section I would like to examine four very different conceptions of nature and the associated delights of coming to know in each conception.

Nature as an Intelligent Being

The idea of nature as a final cause has its roots in antiquity. The Greeks conceived of Nature (with a capital "N") as an intelligent, living being to explain the regularity and order

[8] Aristotle. *Physics*, trans. R. P. Hardy and R. K. Gaye (New York: Random House, 1947) 194.b16-195b30, 122.

of natural phenomena observed in the world.[9] The inevitability of the sun's rising, the moon's waxing and waning, and the seasons' passing all bear witness to the rational structure of the cosmos. Bodies in motion move according to universal laws of nature positing an unknowable, but visible, causation. Axiomatic in principle, and ultimately inexplicable, this view of Nature borders on the metaphysical and requires faith in a creator or a firm belief in the knowing order of the universe to explain the natural world. Natural philosophers were the first practitioners to formally study nature, to ponder its existence and causality, and to define its rational purpose and truth.

This conception of Nature incites in us sheer wonder at the beauty of nature and its natural order. In the beginning of *Metaphysics* Aristotle linked delight to knowing. In a later passage he grounds delight in wonder: "*For it is owing to their wonder that men both now begin and at first began to philosophize; they wondered originally at the obvious difficulties, then advanced little by little and stated the difficulties about the greater matters, e.g. about the phenomena of the moon and those of the sun and of the stars, and about the genesis of the universe. And the man who is puzzled and wonders thinks himself ignorant; therefore since they philosophize in order to escape from ignorance, evidently they were pursuing science in order to know not for any utilitarian end."*[10] Wonder is the first delight. It outlines the boundaries of our knowledge by highlighting our ignorance, and it is the passion that drives our desire to know. Inured to the surrounding sea of everyday sights, sounds and sensations, wonder is what pulls something into focus from the backdrop of ordinary experience. Wonder goes on to attract our attention to the 'obvious difficulties,' the puzzling moments, and inexplicable little phenomena we encounter on a daily basis and which cause us to question. Wonder grows with the rare marvels, prodigies, extraordinary experiences and counterintuitive phenomena that defy explanation. These induce a sublime state of wonder, rendering us ignorant of cause and left to acknowledge the unfathomable purpose of Nature.[11] We delight in the elusive vision of an all-knowing One that confounds our power to completely explain ourselves and the world which we inhabit. As we build knowledge about the world, wonder continues to mark a fluid boundary between what is known and what is unknown. A sense of wonder is the delightful response to realizing and expanding the bounds of our knowledge.

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[9] R. G. Collingwood, *The Idea of Nature* (London: Oxford University Press, 1945) 83.
[10] Aristotle, *Metaphysics*, trans. R. W. Ross (New York: Random House, 1947) 1.982.13b, 247.
[11] Lorraine Daston and Katherine Park, *Wonder and the Natural Order 1150-1750* (Boston: Zone Books, 1998) 121.

Nature as a Living Organism

Nature can also be seen as a process of change spiraling forward through time.[12] Things are as they are because of the interaction between entities and the environment over time. Macrocosmic in focus, this conception of nature finds the logical connections between form and matter, cause and natural phenomena. It produces a grand design of nature captured in scientific theories that rest on formal principles and mathematical truths. Purposeless, meaningless matter in motion is united in holistic systems that reveal meaning and purpose. Great unifying theories such as evolution, quantum theory and the Gaia hypothesis are the typical kinds of knowledge produced by this view of Nature. Moreover these unifying theories emphasize the interrelationship between humans and the natural world and reveal the consequences of human action through our deep connections with nature.[13] Disciplines such as ecology, architecture and design that draw connections between humans and their environment also venture into the world of formal causation.

Associated with this view of nature is the delight of discovery. Discovery is the thrill that comes with uncovering new relationships that were hidden from view. Discovery can be sighting new lands for the first time, or connecting the dots to find our place in the world. Alternatively, it can be the discovery of linkages in nature that broaden our horizons and reveal a more complete picture of the natural world. There is a distinct pleasure— an *aha* or eureka moment— that comes from shining a light into the unknown and finding something recognizable. We discover new objects, see patterns, find equivalences, and begin to understand the parts in relation to the whole and thus realize the essential relationships between things. There is an intense feeling of satisfaction that comes from making the world seem a little more intelligible, and this is the delight of discovery.

Nature as a Social Construct

Another view of nature is derived from the study of efficient causes; the external motivations that drive the production of knowledge. Things are as they are because we choose to see them that way. Our shared knowledge of nature is viewed as a social construct—the historically bound product of a collective social endeavor. Scientific knowledge emerges from a messy, highly rhetorical process which privileges ascendant claims

[12] R. G. Collingwood, *The Idea of Nature*, 14.
[13] Fritjof Capra, *The Web of Life: A New Scientific Understanding of Living Systems* (New York: Anchor Books, 1996) 27-31.

of certain facts over others. Knowledge is contingent on negotiated social processes, power relationships, political influence and individual psychologies which form an idea of nature that is ultimately one of human invention. Cultural anthropologist Thomas Gieryn in the *Cultural Boundaries of Science* epistemologically locates science in this realm by examining "*how its borders and territories are flexibly and discursively mapped out in pursuit of some observed or inferred ambition—and with what consequences, and for whom*?[14] Science studies within disciplines such as history, sociology and psychology develop rich cultural theories and produce voluminous historical and biographical accounts of scientists' lives. These accounts emphasize the particular emotional, psychological and social factors that lead to inventions and discoveries about nature. Despite their varied disciplinary objectives, the reality of nature remains firmly seated in the human mind disconnected from nature itself.

The aesthetic delight associated with this view of nature is related to invention. Taken in the extreme, nature as we know it is a fiction that finds its source in human imagination. Accounts of nature unfold like a story, chapter-by-chapter, structured around credibility disputes, academic reputation building, patronage, politics and research territory grabs. Scientific theories are merely the prevailing network of various commitments to an idea and are subject to change or complete revision in the face of new facts. Thomas Kuhn's classic account of the scientific process in "The Structure of Scientific Revolutions" labeled a radical overturning of the prevailing wisdom as paradigm shifts.[15] One paradigm can overwrite the next as if it were a mere script change to accommodate a new character. The personalities, circumstances and events in the lives of famous scientists like Galileo, Einstein, Turing and Darwin fascinate us in their intellectual triumphs over mysterious nature and offer us a reminder of the power of the human mind to comprehend nature and her creations. Delight stems from the creative process of invention and witnessing a story about nature with humans as the main protagonists around which the drama unfolds.

Nature as a Machine

The study of material causes—the atoms, genes, cells and substrates of life—is central to our modern conception of Nature and bound up in a scientific worldview. The study of nature with a little "n" avoids the conundrum of establishing first principles. Things are as

[14] Thomas F. Gieryn, *Cultural Boundaries of Science: Credibility on the Line* (Chicago: University of Chicago Press, 1999) 23.
[15] Thomas S. Kuhn, *The Structure of Scientific Revolutions,* 3rd ed. (Chicago: The University of Chicago Press, 1996) 11.

they are because of what they are made. In this view, nature is bounded and hierarchical: "*the world is seen as literally compounded in the style of a nest of Chinese boxes. Thus physical particles constitute the organization called chemicals. Chemicals constitute each physiological. Society is the structure of physiologicals."*[16] Nature is treated as a machine that can be understood by pulling apart its works and examining the pieces. To dissect nature's building blocks we have devised clever scientific instruments, from telescopes to microscopes to linear accelerators, that help us to look inward and peer outward into the unknown. These tools extend our senses and allow us to partition and probe the inner workings of nature in controlled, repeatable experiments. Cartesian in outlook, nature is assumed knowable through experimental empiricism and the rigorous objectivity of scientific methods applied to physical matter. Science and nature become interchangeable terms when nature is reduced to matter. The materialist approach to nature is prevalent in university science and engineering departments and informs the practice and methodology of many social sciences.

The delight of knowing that comes with a material view of nature is one of ingenuity. If nature is found in the study of matter, nature becomes a great scientific puzzle that skillful practitioners set out to solve using empirical methods. Little by little through observation, experiment and clever induction, the mysteries of nature begin to reveal their causal mechanisms. Like a hunter tracking down clues, or a player solving a puzzle, the emotional pleasure associated with this intellectual activity is one of delight in one's own ingenuity; the flush of accomplishment that comes with resourceful problem-solving, clever model building, realistic simulations and elegant solutions that tease nature out from her materials. The word ingenuity comes from *ingenium* and *ingeniators* were engineers who devised nifty contraptions, powerful war machines and useful mechanical devices. Ingenious thought focuses on technical mastery with little concern for foundational theories and first principles that underlie a successful outcome. As a culture we delight in our ingenious ability to 'control' nature, to have her serve human needs through the means of science and technology.

To summarize, in this first section I have tried to show that delight is the aesthetic response to Aristotle's light of knowing. Put another way, delight is the pleasure of learning or coming to understand the world a little more clearly, fulfilling our desire to know. Different

[16] Joseph J. Schwab, "What Scientist's Do?" *Science, Curriculum and Liberal Education: Selected Essays* (Chicago: The University of Chicago Press, 1978) 187.

kinds of knowledge and their associated realities evoke different kinds of emotional delight in the beholder. The forms of delight I have identified as being aesthetic responses to different views of nature are wonder, discovery, invention and ingenuity. Delight begins in wonder and then unfolds in discovered, invented and ingenious thought—each describes an aesthetic response to 'seeing' nature and understanding the natural world.

We have all at some point in our lives experienced the thrill of discovery, felt the flush of accomplishment that comes with ingenious thought and activity and enjoyed the inventions of ours' and others' imaginations. We all have had moments of wonder in Nature's grandeur, her awesome strength, her strange creatures and marvelous diversity. The next section describes a rhetorical approach to understanding how museums can becomes sites in which we can experience the delights of these fused cognitive, emotional and aesthetic pleasures.

2.2 The Delights of Explanation

Museum exhibitions that attempt to communicate ideas about nature are, by design, places in which we experience the delights of knowledge. Exhibits succeed in varying degrees to capture our attention, and cause us to wonder, discover, invent, and be ingenious in thought and activity. If we agree that delight is an umbrella term for these four aesthetic responses to knowledge, how can we begin to identify whether these forms of delight are present in museum exhibits? And more importantly, how do museums go about explaining nature so as to delight? Delightful, revelatory speech has always been the purview of rhetoric. Can a theory of persuasive argumentation offer insights into the design and evaluation of museum exhibits which communicate not only in verbal, but also visual and sensory languages?

Museum exhibits are rhetorical artifacts. They are demonstrations of ideas, explanations communicated in optical, visceral and linguistic forms. Exhibit designers create arguments conveyed in multi-modal multimedia environments. If we accept that exhibits have a persuasive function, we can look to rhetoric for insight into argumentative forms of communication. Rhetoric has a long established tradition in honing the tools of demonstration, informal logic and explanation and so rhetoric offers a sturdy scaffolding upon which to evaluate exhibition strategies in museums. Rhetorical tools can help map verbal and visual symbolic terrain and chart the ways in which linguistic superstructures operate to demonstrate ideas about nature.

For guidance on rhetoric, I have looked to the writings of Cicero, Ernesto Grassi and Kenneth Burke and have found a powerful set of rhetorical tropes that reveal the poetics of thought and which help locate aesthetic sources of delight in museum exhibits. In contrast to the neo-Aristotelian proponents of the new rhetoric movement, Kenneth Burke and Ernesto Grassi are the 'tropists' of modern rhetorical theory who see the power of language residing more in image and metaphor than argument *per se*.[17] This view of rhetoric lends itself to communication media that rely on the visual as well as the verbal arguments and leaves room to address the irrational visceral and poetic components inherent in art and communication. Barbara Stafford in *Visual Analogy* attempts to recuperate 'embodied analogy' by suggesting "*we only become aware of thinking in those kinesthetic moments when we*

[2317] Ernesto Grassi, *Rhetoric as Philosophy: The Humanist Tradition*, trans. J. M. Krois and A. Azodie, 2nd ed. (Carbondale: Southern Illinois University Press, 2001) xvii.

actively bind the sights, savors, sounds, tastes and textures swirling around us to our inmost, feeling flesh."[18] The master tropes point the way to these participatory modes of perception in the experience of museum exhibitions.

The Master Tropes and the Poetics of Thought

Tropes are rhetorical commonplaces and commonly refer to figures of speech. Tropes identify the variety of ways we have for saying 'this is (like) that' and by drawing out similarities and differences they help us to communicate meaning. The appendix to Kenneth Burke's *A Grammar of Motives* contains a short chapter entitled "The Four Master Tropes," in which he identifies the master tropes as metaphor, metonymy, synecdoche, and irony. He pairs each of these tropes with their 'literal' or realistic counterpart in the following manner:

> "For metaphor we could substitute perspective;
> For metonymy we could substitute reduction;
> For synecdoche we could substitute representation;
> For irony we could substitute dialectic."[19]

By this coupling of meaning, Burke frees these rhetorical terms from mere figures of speech or commonplaces fulfilling a linguistic function and elevates them to essential figures of thought under the honorary title of master tropes. In doing so Burke has given us a set of tools with which we can recognize patterns of thought that depart from traditional logical reasoning and focus instead on uncovering meaning, relationships, significance and ultimately truth. Analogical reasoning, which finds likeness in the difference between things, is essential to human cognition. The master tropes identify not only linguistic relationships, but point to the mental images and processes we use to create meaning. Cognition proceeds by finding similarities, seeing connections, making comparisons and conveying differences that resolve into the master tropes.

Relying heavily on imagistic language, the master tropes are four different rhetorical methods for relating an object, idea, state or sensory experience to another for communication purposes. The more incomplete or tentative our understanding the more we resort to rhetorical devices to aid explanation and the demonstration of ideas. In that they are "*prior to*

[18] Barbara Stafford, *Visual Analog: Consciousness as the Art of Connecting, "*Figures of Reconciliation*"* (Cambridge: MIT University Press, 1999) 58.
[19] Kenneth Burke, *A Grammar of Motives* (Berkeley: University of California Press, 1969) 503.

logical deduction" and rational thinking, the tropes of metonymy, metaphor, synecdoche and irony reflect the poetics of thought.[20] If the master tropes connect to thought, it follows that they should connect to delight. Cicero gives some hints as to how to locate delight in the tropes. Let us first explore the most familiar and perhaps primary of imagistic tropes, metaphor, and trace its link to delight in the fulfillment of the desire to know.

The Master Tropes and Delight

In Cicero we have a clear elaboration of the emotional appeal of metaphor and how it produces delight in the listener. In the following passage, Grassi neatly summarizes Cicero's discussion of metaphor in *De oratore III* and its power to delight, "*First it is a sign of intelligence to disregard that which is immediately obvious. Second, a listener enjoys learning while being led by metaphors. Third, it is pleasant to bear witness to a similarity on the basis of such a transfer of meaning. Fourth, because sight is the most active and sharpest sense, metaphor leads us to 'see' something.*"[21] Notice the emotive terms linked to the use of metaphor, one "enjoys learning" and it is "pleasant to bear witness." Figurative language helps us to synthesize sensed feeling and information and build connections between experiences and the external world. In the last line Cicero emphasizes the importance of metaphor in letting us 'see' something." Metaphor acts as a light because it illuminates relationships and allows us to perceive knowledge. The aesthetic pleasure of 'seeing' in the mind's eye— forming mental images—directly relates to the delight of knowledge that Aristotle first described in *Metaphysics*. In *On Rhetoric* he calls it a "bringing-before-the eyes," and claims "metaphor most brings about learning."[22]

My claim is that all the master tropes are used to demonstrate ideas. They all lead us to "see something," satisfying our taste for knowledge and thereby delighting us. Each trope identifies a different method of seeing relationships, finding significance and building meaning and therefore each trope produces a different form of delight. The master tropes locate the aesthetic features of delight within explanation. They are the poetics of thought which shed light upon the unknown. What I hope to show is that the delights of knowledge we found in the study of nature meet in the poetics of thought that the master tropes illuminate.

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[20] Ernesto Grassi, *Rhetoric as Philosophy: The Humanist Tradition*, xvii.
[21] Grassi, 95.
[22] Aristotle, *On Rhetoric,* trans. George Kennedy (London: Oxford University Press, 1991) 245.

In the next section we will delve into the master tropes of irony, synecdoche, metaphor and metonymy to examine how each delights in explanation. My goal is to pin down the master tropes in terms of the "figure of thought" they illustrate and the kind of delight produced by "seeing" new relationships and illuminating thought. To do this we must stretch the meaning of the tropes to include not only verbal, but also the visual and sensory forms of communication. We can then begin our discussion on museum exhibits armed with a rich idea of nature, demonstration and delight.

Irony and Wonder

Buchanan, following Burke's interpretation, describes irony "as a device for expressing an idea by the means of its opposite—in the highest forms with a subtle kinship of both."[23] Burke links irony to dialectic in its pluralistic meaning of a "perspective of perspectives" and, in dramatic terms, he locates it in the "the strategic moment of reversal." Burke advocates an ironic stance that recognizes a multiplicity of conflicting views, each right and each wrong in part, but when merged forming a new perspective closer to the truth. Thoreau's statement, *"…as if Nature could support but one view*" reveals a deeply ironic view of nature that hints to its superiority over fragmentary human knowledge. Irony marks a dynamic boundary between opposites; it establishes a reflexive relationship between the explicable and inexplicable. Irony shows what is comprehensible in the face of the incomprehensible and seeks reconciliation in knowledge.

Wonder links to irony and dialectic in powerful ways. *"Wonder is a boundary line between the obvious, the ordinary and the everyday on the one hand and the unknowable, the inexpressible and the unformulated on the other.*"[24] Wonder arises in the clash between opposites—the known and the unknown—and marks off the boundaries of our knowledge. Wonder occurs when we are confronted by something beyond our understanding and can manifest itself in fear, horror, awe and delight. A moment of dramatic irony and great delight occurs when, in the shadow of sublime Nature, we feel our indebtedness to rather than our power over nature. Ironic wonder can lead to a dialectical transcendence if it causes us to reconcile opposites and gain a perspective on perspectives that is closer to the truth.[25] At the margins of the known, wonder will surface and seek explanations, which can be discovered, invented, and

[23] Richard Buchanan, *Four Master Tropes or Figures of Thought* (Carnegie Mellon University, 2001) class handout
[24] Philip Fisher, *Wonder, the Rainbow, & the Aesthetics of Rare Experiences* (Cambridge: Harvard University Press, 1998) 120.
[25] Burke, *A Grammar of Motives,* 512.

ingeniously synthesized to formulate a more enlightened perspective on the unknown. In this way wonder is the necessary first step in the poetics of thought.

Creating wonderful exhibits which trigger a rich sense of delight in the audience are perhaps the most difficult and the most rewarding to find. Exhibits with an ironic stance challenge a single, authoritative account of nature. Nevertheless, without the intent to help the audience synthesize those competing views into a single voice of greater truth for themselves, ironically-styled exhibits will fall short of Burke's goal of dialectical transcendence. We will look for examples of exhibits that demonstrate an ironic or dialectical approach to Nature in the visual, visceral and information content they offer and look to see if wonder functions as a form of delight.

Synecdoche and Discovery

Synecdoche is a figure of thought that finds the inherent relationships, equivalences and felt connections between things and experiences. Synecdochic relationships reveal and clarify meaning by a clever and often surprising series of mental substitutions that link together seemingly unrelated phenomena and sensory information. For Burke synecdoche is synonymous with representation and he defines synecdoche as "*a device for representing one thing by another which implies an integral relationship or convertibility*."[26] In physical terms speed and momentum, or volume and surface area, are relationships linked by an equal sign. Synecdoche points out the rhetorical equivalent in images, words and sensory experiences. Representation indicates a two-way relationship between the things being represented, be they parts for a whole, genus for a species, matter for material or vice versa. This trope relies on substitutions of equivalence where one thing stands interchangeable for another.

The discovery of surprising connections through the substitution of one expression, thing or experience for another is the source of synecdochic delight. The aesthetic pleasure synecdoche brings is one of novel discovery which uncovers new relationships and finds non-obvious connections of significance. Delight ensues from seeing how formal causes and master plans emerge from a complex chain of connections. We delight in finding deep links between the external world and ourselves. Synecdoche lights up our minds with the discovery of meaningful relationships in an organic whole.

[26] Burke, 508.

Philip Fisher describes the poetic aspects of synecdochic thought in *Wonder, the Rainbow and the Aesthetics of Rare Experience* when he traces out the historical series of explanations that unraveled the mystery of the rainbow: "*The physical substitution of one drop for the rainbow, or of a glass sphere for the raindrop, merges into the substitution of geometrical models, ideal and simplified shapes, angles and their relations*." Fisher describes the visualized series of connections that linked the rainbow to a raindrop and finally to refraction as: "*the acts of substitution that we can see in passing along the history of the part played by the individual drop and the paths of a ray of light within it make clear the part played by substitution—synecdoche in rhetorical terms—within explanation*."[27] From Aristotle to Newton the physics of the rainbow was uncovered through series of metal images in which one representation was substituted for another. Imagistic thinking related sensed visual experience in profound substitutions that led to a formal abstract, geometrical demonstration of the rainbow phenomena and each step along the way was accompanied by a delightful sense of discovery in explanation.

In the museum we will look for exhibits that promote the discovery of knowledge by revealing surprising chains of connections that link phenomena to experience and, when fully discovered, reveal our place within nature. This will be one of the delights of discovery.

Metonymy and Ingenuity

Metonymy is the figure of thought used to reduce higher order concepts to lower order ones, and to substitute matter for spirit to aid in the explanation of the unknown. Like synecdoche, it is a trope of substitution. Burke gives this succinct definition of metonymy, "*A device for conveying some incorporeal or insubstantial state in terms of the corporeal or tangible*."[28] The power of metonymy lies in its ability to take grand notions, elusive indescribable states or intangibles, and reduce them to a concrete reality we can understand. The first inevitable reduction is the non-verbal to the verbal, the explanation of the world in terms of words. In this sense all exhibitions involve a reduction of sorts. Another form of reduction takes place when an attribute or feature is substituted for the thing itself. Science can be thought of as a form a metonymy, taking Nature in the largest sense of the word and reducing it to tangible objects and material

[27] Philip Fisher, *Wonder, the Rainbow, & the Aesthetics of Rare Experiences*,109.
[28] Burke, *A Grammar of Motives*, 506.

matter that can be observed, described and experimented upon. Metonymy reduces qualities to quantities, comparison to contrast and creates a denatured reality in science.

Metonymic thought narrows the circumference of nature to make explanation possible in material terms. Burke clearly describes the language of metonymic reduction: "*Variants of reduction in this sense are the atomistic vocabularies that would account for entities in terms of the particles of which they are thought to be composed, as one might account for a building in terms of the materials used for its construction*. He goes on to add, *"Such atomistic search for the 'building blocks' of the universe stresses the material cause to the exclusion of final causes*."[29] Burke in this passage reminds us of the way in which different ideas of nature are captured in rhetorical terms. Science and technology, which concentrate on material rather than formal causes, point to where the aesthetics of delight can be found.

Metonymic thought is the engineer's delight. It is the genius associated with ingenious creation. The search for Occam's razor and the pleasure of overcoming challenges is a powerful motivating passion. A sense of ingenious delight comes from solving puzzles, uncovering clues, constructing machines that operate according to the laws of nature and building models that simulate aspects of the world. Ingenuity is the aesthetic pleasure that comes from reducing nature to manageable working parts that can be experimented upon and combined in acts of ingenious creation to form new processes and clever new machines.

Metonymic reduction illuminates nature's mechanisms that we ingeniously co-opt and cobble together to do our bidding. In the museum we will look for exhibits that emphasize doing and putting things together. These telltale interactive and hands-on exhibits support ingenious creation, illustrate cause and effect and help to illuminate the rules of science and operations in nature.

Metaphor and Invention

Metaphor comes from the Greek word *metapherin* which originally meant the "carrying over" of one idea to another. Burke enlarges the traditional definition of metaphor to "*a device for seeing something in terms of something else*" and he emphasizes the associated perspective shifts they produce.[30] In contrast to the explicit and implicit

[29] Burke, 97.
[30] Burke, 504.

relationships of metonymy and synecdoche, metaphors rest on the imagined relationships and rely on intuition from sensed experience rather than logical connections. Metaphoric thought opens up a whole realm of inventive possibility that defies plain logic in the transference of meaning.

Metaphor is an *a priori* form of invention. In linguistic terms it creates relationships between unlike things by a simple conjunctive "and" or stated more clearly with 'like.' Metaphor "*captures the similarity of things different in appearance and remote from each other in ordinary associations*"[31] The intellectual source of metaphor is intuition, fantasy and imagination and when used in communication brings with it the attendant pleasure of 'being led' down a new pathway of relationships. The path brings us to a new point of view, and delights us with the enjoyment of seeing something from a fresh perspective.

In the beginning of this section we discussed the emotional pleasures associated with metaphor. The delights of witnessing the unexpected and seeing connections in the unrelated are the pleasures of invented metaphors. The delight of invention comes forth in moments of bold intuition. Epiphanies, bolts of lightening, flashes of insight, and the presence of a so-called sixth sense create unique connections between the unlike and the seemingly illogical. There is a deep pleasure that flows within each of us in those moments when, sparked by our imagination, we invent, make or see novel connections about the world around us.

Museums could be storehouses of inventive connections, imaginative associations and fantastical leaps of logic that delight our minds with new perspectives. But when overused, metaphors quickly decay into tired clichés drained of delight. In Part 3 we look for museum exhibits that use metaphor to enliven rational scientific thought with metaphoric connections to human reality and everyday sensed experience.

To help readers keep track of ideas presented, I have included a schema (Fig. 1) to illustrate the relationship of the master tropes to the aesthetics of delight.

[31] Fisher, *Wonder, the Rainbow, & the Aesthetics of Rare Experiences*, 9, 97.

Metaphor and synecdoche on the horizontal axis are the tropes of analogy. Metaphor finds sameness-in-difference, or the overlap/intersection/correspondences between two things in invented relationships. Synecdoche identifies real relationships of equivalence between reciprocal pairs of attributes where one feature can be meaningfully be substituted for another. Paired along the vertical axis are irony and metonymy, the tropes of disanalogy, or difference. Irony suggests what something *is* by what it *is not*. Metonymy reduces wholes to parts for comparison and contrast and as a means to reflect back on the whole. Additionally, for mnemonic purposes, I have created a graphical representation of the cognitive function each trope illustrates and suggested a pairing with a mathematical term from formal logic.

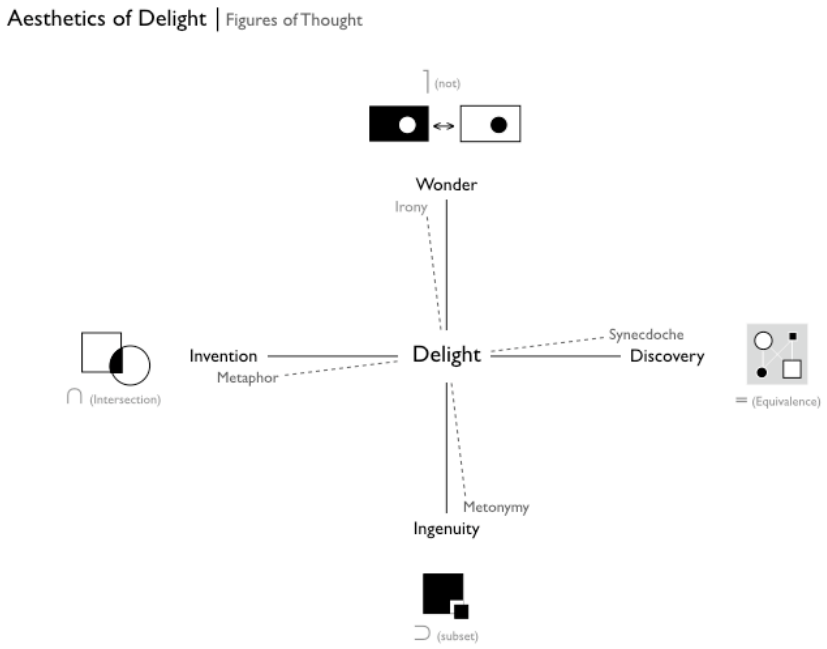

Figure 1 – Delight Schema and the Master Tropes

Now armed with an understanding of the master tropes, we can begin to look for these figures of thought in museum exhibits.

Part Three: Discussion & Analysis

In Part 2, I have tried to build a schema by which to identify the aesthetic forms of delight that fulfill the emotional desire to know. The master tropes of metaphor, metonymy, synecdoche and irony offer a compass by which to locate different ideas of nature and the means by which these ideas can be communicated in rich multimodal (visual, aural, kinesthetic, spatial, textual) media of exhibits.

Over the past year I have visited a number of museums: The Carnegie Natural History Museum, the Carnegie Science Center, the Carnegie Museum of Art, the Children's Museum and the Mattress Factory in Pittsburgh, the National Air and Space Museum in Washington D.C. and the Natural History Museum and Science Museum in London. I approached each institution with the intention of finding out how the aesthetics of delight functioned to reveal ideas of nature. My methods for picking the exhibits discussed in the next section relied more on intuition and observation than on a rigorous user study plan. The exhibits chosen for analysis were based first on my own personal response to the exhibit installations and secondly from informal observations of visitors' behavior in the galleries. Exhibits that seemed popular with audiences, encouraged sustained interactions, and promoted conversations among patrons and enthusiastic responses in children I took to be suggestive of meaningful engagement with the exhibit. Engagement is an essential precursor to a delightful experience and successful communication.

In the following discussion of exhibition techniques I intend to show how the aesthetics of delight can be found operating alone and in combination with one another. To limit the scope of the analysis I am going to focus the discussion on three key questions:

- What essential idea or view of nature does the exhibit attempt to communicate?
- Which figures of thought or master tropes (irony, synecdoche, metaphor and metonym) does the exhibit employ to demonstrate these ideas?

- Has the desire to know been fulfilled through the aesthetic delights of wonder, discovery, invention and/or ingenuity?

Let us begin with metonymy, the most prevalent trope in museum exhibits that deal with science and nature and look for exhibits that encourage the delight of ingenuity.

3.1 Metonymic Exhibits and the Delights of Ingenuity

At one level, all exhibit displays are metonymic by sheer virtue of the fact that they must be on display—extracted from their original environment, isolated in vitrine cases or placed on stands in a manufactured relationship to neighboring objects and surrounded by an artificial and invented context of words, sounds, lights and interpretation. Most museums organize their exhibitions within galleries under the heading of a major disciplinary field, historical era, material or process. Within a gallery exhibits are grouped around themes which reveal themselves in a spatial arrangement usually following the dictates of a chronological, taxonomic or hierarchical organizing principle. This reductive order is highly metonymic—it conveys the meaning of something greater through something lesser in a nested series of relationships. In this display method an armillary model comes to stand for the universe.

The Smithsonian's National Air and Space Museum (NASM) in Washington D.C. is a museum that is metonymic both in concept and in many of its exhibition approaches. Institutionally the NASM is devoted to celebrating the triumphs of humankind in aviation and space exploration. Its galleries house the Wright Brother's original 1903 flyer, Charles Lindbergh's gleaming *Spirit of St. Louis* aircraft and the Apollo 11 command module, all milestones in the history of human flight and our exploration of the skies. NASM's newest permanent gallery is called "Exploring the Universe." Excerpted from the Smithsonian's Visitor Guide is a description of the gallery and its highlighted features:

> "Explore the Universe (Gallery 111) - The museum's newest gallery has five major sections that trace **400 years of evolution** in the instruments humankind has used to view the heavens and probe their secrets. Begin your tour at "Exploring the Universe with the Naked Eye" and see the measuring tools scientists used before people had telescopes. The next section shows how telescopes transformed our view of the universe and features the **original 20-foot tube and mirror** from William Herschel's favorite telescope. Then you'll see how photographs recorded the images astronomers saw though their telescopes, enabling Edwin Hubble to measure how fast **galaxies are moving away from each other.** In the next section on spectroscopy, you'll learn how the different **colors within starlight** reveal what the stars are made of. Finally,

> "Exploring the Universe in the Digital Age" brings you to the present day. You'll see electronic instruments like those in a video camera that enable astronomers to peer back in time to the origins of the universe!"[32]

The entrance to *Exploring the Universe* appears as a darkened portal bathed in a soft purple light. A large introductory wall panel prefaces the exhibit with four questions: "*What is the Universe? How big is it? How old is it? How did it begin?"* These questions are intended to orient the visitor's intellectual journey through the gallery. Captured in these four questions is a mode of inquiry and view of nature that relies on scientific reduction and metonymic thought. In doing so the Smithsonian sidesteps all theological questions and cosmological debates. The underlying assumption is that the universe can be known through science and technology. The universe is conceived of as a 'what' that can be measured by physical attributes such as size, age and origins in space, time and matter. Much like the verbal trope of metonymy which names an intangible by its attributes, the universe in this exhibit is understood in terms of material quantities and qualities. The various exhibits progress through the history of astronomy featuring artifacts, models, dioramas, diagrams and interactive screens to impart information. The connecting thread throughout is how, through ingenious devices, man has been able to capture, measure, and record the vagaries of visible and invisible light to yield increasingly more detailed and precise explanations about the nature of the universe in terms of structure, age and matter.

One exhibit in particular stands out as a singular example of a delightful demonstration that engages visitors with metonymic explanation. Entitled *Different Ways of Focusing Light,* the exhibit's rather mundane title belies the clever presentation of a topic that would be easy to ignore—mirror and lens arrangements in telescopes. This exhibit consists of a rotating platform on which four different lens-mirror arrangements are placed corresponding to the configurations Kepler, Galileo, Cassegrani and Newton used in their telescopes to focus and collect increasing amounts of starlight. A "To Do" text panel instructs users to "Press the button to turn on light," and "Turn the wheel and notice the light path." With each crank of the hand wheel, the platform rotates a quarter turn forcing a red laser beam though a different set of lens-mirror configurations.

[32] Smithsonian Institution, *My Smithsonian*, v.2 (Washington D.C.: Fall/Winter 2002-2003) Free Visitors Guide

Figure 2 – "Different Ways of Focusing Light" Exhibit Display

The exhibit is a visually self-explanatory demonstration of how light can be refracted, reflected, and focused. Stars become starlight, which is metonymically reduced to rays of light that can be captured in the barrel of telescopes and magnified to gather a clearer view of the stars in the night sky. One need not read a line of wall text or remember the great astronomers' names to take pleasure in the delights of this interactive display.

The metonymic delight of ingenuity comes from reducing intangibles to tangibles, parts that can be experimented on to reveal the whole. The ingenious delight featured in this exhibit operates at several levels. One pleasure comes from visually "getting it," seeing how a telescope works by breaking down the instrument into its constituent parts so that one can appreciate the ingenuity in its design. Secondly, the exhibit invites one to control light and manipulate its path by focusing a beam of light through different kinds of lens-mirror arrangements. The hands-on interaction with the exhibit shifts the visitor's role from a spectator to a participant who conducts the first step in a controlled experiment of comparison and contrast. Not only satisfying the taste for experiment, the exhibit is a clear demonstration of cause and effect placed in the visitor's hands. Thirdly, exhibits that feature mediating instruments, whether astrolabes, spectrometers or telescopes, offer us a chance to appreciate the ingenuity of the technological tools we use to probe the nature of our universe more deeply. Exhibits like this, and the rockets, jet engines and airplanes that grace the floors of the NASM delight us in human ingenuity and its inventions.

The idea of invention brings us to metaphor. Telescopes may be appreciated as ingenious objects, but one can also see them as novel inventions of the human mind. Burke cautions that the master tropes "shade into" one another so it is not surprising to see that

invention and ingenuity have aspects in common. Webster's Dictionary helps clarify the blurred use of metonymic and metaphoric invention by defining *to invent* as "to produce for the first time though the use of imagination *or* ingenious thinking and experiment."[33] The *or* here distinguishes two kinds of invention: one produced by ingenious thinking and experiment—metonymic thought, and one produced by imagination—metaphoric thought. Most inventions require both kinds of thought.

In the next section we explore the use of metaphor as a trope in exhibit design and look for the delights of imaginative invention.

3.2 Metaphoric Exhibits and the Delights of Invention

As scientific explanations become increasingly more complex and abstract, the need for metaphoric language increases. Scientific language itself is riddled with metaphoric references: DNA fingerprints, RNA zippers, the tree of life, neural nets and motherboards to name a few in common parlance. Metaphors help to elucidate something more complex by something less complex, and to see something in terms of something else often referencing common or sensed experiences. Metaphoric thought finds apparent intersections, or overlaps of similarity between unlike things. As Burke points out, there is always "*an incongruity involved as A is not B*" and metaphor requires an imaginative act to create a fictional relationship between the two things. The stronger the overlap between A and B, the stronger the explanatory power of the metaphor. Science museums tend to be filled with metaphors ranging from weak clichés to illuminating analogies that delight the imagination. The final gallery in the *Exploring the Universe* introduces new digital technologies that utilize x-ray and gamma radiation to image the universe. The exhibit designers wanted to show that visible light is just one part of the broader spectrum of electromagnetic radiation. To explain this difficult concept, the exhibitors turned to metaphor in an exhibit entitled "If the Electromagnetic Spectrum were a Keyboard." This verbal metaphor is visualized by portraying the electromagnetic spectrum as a larger-than-life sized piano keyboard.

[33] *Webster's New College Dictionary,* 9th ed., s.v. "invention."

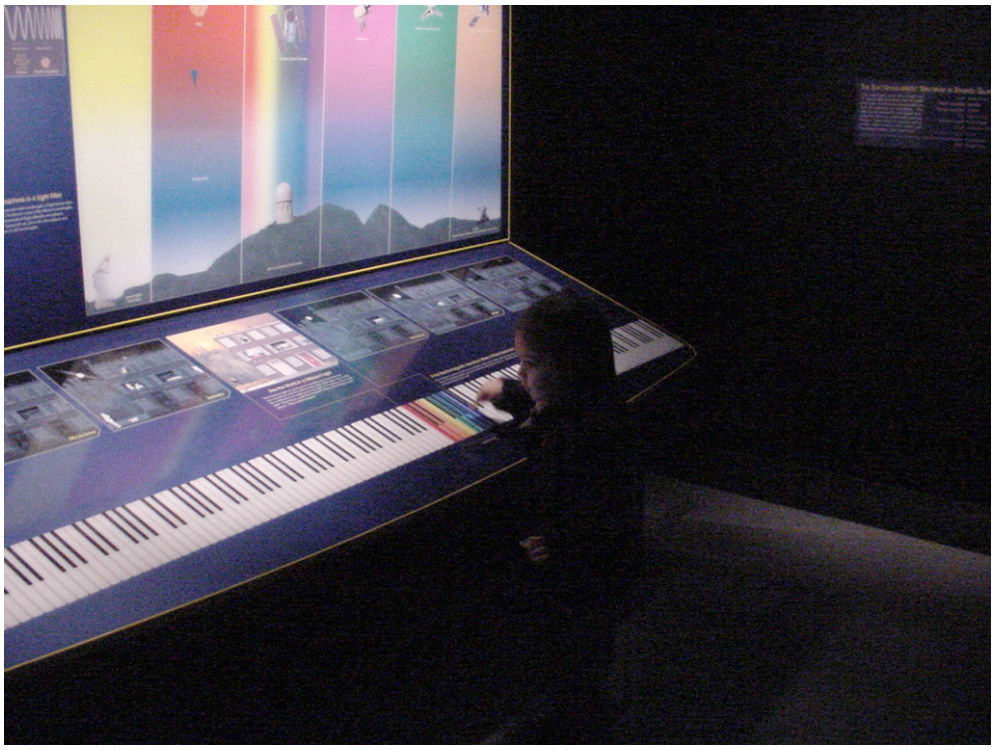

Figure 3 – "If the Electromagnetic Spectrum Were a Keyboard" Exhibit Display

Eight colored keys in the center of the keyboard represent visible light in the colors of the rainbow, ROYGBIV. Each of the colored keys play a musical note when pressed while the remaining white keys on the keyboard are silent. Above the keyboard are some large text panels that attempt to clarify the metaphoric relationship likening sound to light and spectrum to keyboard with the following explanation: "If the rainbow of colors our eyes see spanned a single octave the detectable range of the electromagnetic spectrum would span more than 65 octaves—about nine piano keyboards placed end to end."

This exhibit is an example of a weak metaphor that obscures more than it enlightens. The similarity between light and sound is a conceptually hard barrier for children to bridge. Both parents and children I observed interacting and discussing the exhibit seemed oblivious to or unsure of the connection between light and sound frequencies. The piano metaphor does nothing to shed light on the similarities between the wavelengths of invisible radiation and musical frequencies. While the visible portion of the spectrum is color-coded, the longer and shorter wavelengths of radiation remain an undifferentiated series of black and white keys. Indeed the black minor keys serve only to confuse the metaphor further. The

attention this exhibit receives is mostly from small children who play it like a musical toy. This exhibit may amuse, but it does not succeed in fulfilling the desire to know with inventive explanation that delights the imagination. The idea of gamma and x-ray radiation remains an opaque concept despite the exhibit's attempts at explanation. However, some exhibits do stimulate the imagination in explanation, and in these cases metaphor is often the primary trope in operation.

The *Benedum Hall of Geology* at the Carnegie Museum of Natural History has one exhibit that brings metaphor to life in a delightful, imaginative journey towards the center of the earth. The *Stratavator* is a simulated elevator ride 16,000 feet down below the museum. Upon entering the imaginary elevator cab Rocky, the onscreen operator and tour guide, appears on the monitor before you as the doors close behind, encapsulating you in the experience. The familiar experience of riding an elevator with stops at different floors is likened to an imaginary platform descent down a mineshaft with stop off points at different strata layers. With the suspension of disbelief the metaphor launches the visitor into the realm of pure fantasy. The elevator cab starts descending, an effect simulated by the relative motion of layers of earth rushing behind Rocky, who remains stationary in the same frame of reference as the viewer. The video runs 9-minutes, a long time by today's exhibition standards. A surprising amount of visitors stay through the whole experience despite the somewhat outdated look and feel of the media and the campy narration. The metaphoric leap from an elevator to a mineshaft lift is an easy jump, but the resulting perspective shift opens up a deeper reality.

The power of metaphor works in the *Stratavator* exhibit to illuminate the relatively dry subject of Pennsylvania's geological formations in imaginative explanation. One descends through the museum's basement to the basement of the continental shelf in a journey that is only possible in the mind. The cab stops at five locations of interest along the way and through the 'magic' of the *Stratavator* you can see microscopic views of fossils embedded in coal seams and the sparkling crystal formations of an ancient cave. Even if the limestone formations of a prehistoric lake or the coal beds from ancient tropical forest that once graced the surface of this region do not interest you, the idea of descending deep down into the earth delights the imagination of most visitors. As visitors exit the *Stratavator* the earth beneath them will literally seem richer and deeper through the delights of invention

produced by metaphoric thought. This new perspective or change in viewpoint suggests the real power of metaphor.

Enlightening metaphors composed of a rich 'samenesses in difference' are as hard to find in museums as is true synecdochic thought and the pleasure of discovery it inspires.

3.3 Synecdochic Exhibits and the Delights of Discovery

Perhaps most difficult trope for exhibitions to capture is synecdochic relationships which represents one thing in terms of another in substitutions of equivalence to build meaning and uncover the poetic pleasures of discovered connections.

Former curator of the Glasgow Museums and museum critic Julian Spaulding in *The Poetic Museum: Reviving Historic Collections* laments the loss of traditional artifact-based collections and makes an impassioned plea to bring synecdoche back to the museum.[34] Without calling for synecdochic representation directly, Spaulding envisions display strategies that avoid traditional categorical, didactic techniques and rely instead on interconnected, multidisciplinary approaches and narrative devices to communicate the elusive and profound meanings hidden in artifacts. In his poetic museum of the future exhibits are "*arranged as constellations of stories, some small, some large, some linked, many separate.*"[35] As the visitor explores the museum in a self-directed fashion, accompanying headset audio uncovers surprising links between objects and exposes dense network relationships between things all supporting a higher order theme. Spaulding's vision of the poetic museum rests on a database-driven technology able to connect stories into a rich narrative. The dream essentially wishes for a technological version of a witty and erudite tour guide who brings out synecdochic connections between objects and relates them to a larger narrative in response to your personal interests. A current curatorial vogue seems to be addressing a portion of this vision. A number of recent exhibitions display eclectic collections of artifacts in themes that crosscut traditional disciplinary boundaries.[36] While

[34] Julian Spaulding. *The Poetic Museum: Reviving Historic Collections* (London: Prestel, 2002) 54.
[35] Spaulding. *The Poetic Museum: Reviving Historic Collections* 158.
[36] *Devices of Wonder: From the World in a Box to Images on Screen*, (Los Angeles: J. Paul Getty Museum Exhibition, November 2001 – February 2002). Exhibition website <http://www.getty.edu/art/exhibitions/devices/flash/>
Metamorphing: Transformation in Science, Art and Mythology (London: Science Museum Exhibition, October 2002 - February 2003). Exhibition website < http://www.wellcome.ac.uk/en/metamorphing/>

this approach opens up new thematic possibilities it does not necessarily fulfill the potential of synecdochic delight. These exhibitions harness the linguistic power of the trope in their narratives but miss its potential for creating delightful visual and sensory experiences that illuminate thought in the discovery of meaningful relationships. Burke has a richer view of synecdoche and its potential for delight.

For Burke, the "noblest synecdoche" comes when the "microcosm is related to the macrocosm as part to whole, and either the whole can represent the part or the part can represent the whole."[37] This ideal synecdoche brings a poetic rather than scientific realism to the museum by connecting human experience to a large context – be it the past to the present, the individual to the collective, the internal to the external, the particular to the universal - always in an interdependent relationship. He enlarges synecdochic connections to include sensory, synaesthetic forms of experience that "represent the quality of an experience." In museums we find synecdoche operating narrowly as a verbal trope in thematic connections or a visual trope of linking objects and symbols, but we rarely see its sensory form employed. The sensory representation of synecdochic relationships is a powerful but little used tool in the exhibit designer's kit. This form of the trope is a subtle and challenging one to create in exhibits because it requires synecdochic connections to be perceived through an embodied sensation. I have only been able to find one exhibition that comes close to including all three forms of synecdoche—verbal, visual and synaesthetic—to communicate ideas and suggest universal relationships.

In the Spring of 2001, the Carnegie Museum of Art opened *Light! The Industrial Age 1750 – 1900, Art & Science, Technology & Society,* an intriguing exhibition that beautifully illustrates the potential for synecdochic representation in exhibitions. Science and technology are not usually subjects art museums deal with explicitly. If they do, it is usually a marriage of discord or a harsh critique of a society drifting into technological psychosis. *Light!* takes a different tack, and instead reveals the reciprocating influences of science on art and art on science. Divided into five distinct sections: *Rays of Light, The Light of Nature, Makers of Light, Personal and Public Light*, the curators draw on a heterogeneous assortment of artifacts to build the story of science influencing art, and art and science influencing life. The core of the exhibit rests on material typically found in art museums—paintings, prints, photographs and

[37] Burke, *A Grammar of Motives*, 508.

decorative objects. Woven into these displays are light sources of various kinds (candelabra, filament bulbs, gas lamps), antique books and scientific journals from the period, cameras, magic lanterns, optical troughs and prisms. The resulting hodge-podge of objects stays coherent through the logic of synecdochic relationships that uncover surprising links and build an interconnected web of meaning that illuminates the past and our relationship to artificial light.

The curators struggled with the question of how best to present the historical experience of light. The following passage in the exhibition catalogue provides insight into their selection process, "*Can the experience of light be visualized best through the emotionally-charged scene in Degas's* Interior*, or Charles Dickens's description of a cozy evening gathering, or a household manual with instructions for cleaning and filling oil lamps, or by lighting a real antique lamp in a museum laboratory? Our response is an emphatic 'all of the above*."[38] Their inclusive choices reflect the rich variety of visual and verbal analogies with which the curators can communicate a vision of the past to present-day audiences now familiar with the flood of artificial light. *Light!* uses a multifaceted exhibition approach that depends on metonymic comparison, metaphoric juxtaposition and synecdochic equivalences that delight visitors in the light of understanding and an enriched view of the past. In isolation these artifacts would be inert for most viewers in terms of their ability to evoke a delightful response. But placed into holistic relationships, visitors can discover deep connections between objects, ideas and human experience.

One particular exhibit embodies the trope of discovered connections in a sensory representation. To illustrate the qualities of different kinds of light on a painting, the curators illuminated *Gauguin's Chair* by Van Gogh under different lighting conditions to suggest how Van Gogh saw it, how he portrayed it and how we see it today (Fig. 4). Every 30 seconds the lighting changed to alternately simulate the qualities of candlelight, gas lamp and fluorescent light.

[38] Anderas Blühm and Louise Lippincott, *Light!: The Industrial Age 1750 – 1900 Art & Science, Technology & Society* (London: Thames & Hudson, 2000) 14.

Figure 4 – *Gauguin's Chair* by Van Gogh

Through this demonstration we experience the different qualities of light Van Gogh was so intent on visually representing in this still life. The soft glow of the candle placed on Gauguin's chair is dwarfed by the fierce glare of a gas lamp in the background. This second light source, newly invented in his time, fascinated Van Gogh with the novel quality of its light that dispelled the darkness of night. This exhibit rises above a purely metonymic comparison of paint color reflected under different sources of light, or the metaphoric transference of the past to the present, because it brings a remote sensory experience forward in time connecting us to the past though the experience of seeing. This exhibit illustrates the sensory form of synecdochic representation. The idea of light is transmitted not just by words and visual images but also in a sensed ocular experience. The visitor then carries the embodied feeling of light on to discover new connections and experiences in conjunction with other works in the exhibition. Van Gogh's fascination with light becomes our own through the allure of a sensory impression connected to a larger idea. We begin to understand the delight late nineteenth century artists took in new forms of lighting that allowed them paint a night and capture the emerging night life in the gaslight of street lamps. It is a delightful feeling to discover verbal, visual and sensory logic in the world and place it in a larger, interconnected context of meaning.

Despite *Light!'s* lovely presentation of beautiful objects placed in rich synecdochic connection to one another, this exhibit still required an inherent sophistication on the part of the audience to uncover its delights. One essential feature is missing that keeps this type of exhibition from being accessible to a universal audience: the motivation to be interested and to participate in the experience. Spaulding hints at what this absence might be in the poetic museum he imagines. He closes his book with a metaphor, "*Museums today are like trees in winter: their collections, like closed buds, all holding tight their secrets. They need to become more like trees in summer, their collections flowering in the minds of each visitor. The poetic museum will then not be just a repository for past thoughts and fading memories, but will become a place of wonder and discovery—a home, once again, for the Muses, those magnificent, spirited and inspiring daughters of Memory.*"[39] Wishing a spring to coax museums back into bloom, Spaulding identifies the last and perhaps most essential delight I want to explore—wonder.

3.4 Ironic Exhibits and the Delights of Wonder

It is perhaps a mistake to treat wonder last in the discussion, as it is the first and most essential delight. Descartes called wonder the first passion[40]; for Plato, philosophy began in wonder.[41] Wonder is the emotion that ignites the desire to know, to seek explanation, to read, to listen and immerse oneself in an experience. Without wonder as a motivating force the delights of knowledge cease to function. Museums would love to divine the secrets of wonder and find its elusive source. Irony in its highest form may be a divining rod by which to locate the origins of wonder. I have found two examples of exhibits in which irony functions to stimulate wonder by locating boundaries and finding opposites. One employs a subversive irony, the other poetic; but both motivate the desire to know, to question truth and synthesize a more holistic view of nature.

In an extended piece of reportage Lawrence Weschler takes readers on a virtual tour of the Museum of Jurassic Technology (MJT) in his book "Mr. Wilson's Cabinet of Wonder."[42] Despite its placement in the non-fiction section, this book keeps readers guessing as to whether this is a real museum or a parody of natural history museums. MJT is run by the

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[39] Spaulding, *The Poetic Museum: Reviving Historic Collections*, 167
[40] René Descartes, *Passions of the Soul*, trans. Elizabeth S. Haldan, G. R. T. Ross (Cambridge: Cambridge University Press, 1986) 41 Plato, *Theaetetus*, trans. Harold N. Fowler (Cambridge: Harvard University Press, 1952) 155c, 55.
[42] Lawrence Weschler, *Mr. Wilson's Cabinet of Wonder: Pronged Ants, Horned Humans, Mice on Toast and Other Marvels of Jurassic Technology* (New York: Random House, 1996) 35.

self-effacing curator David Wilson who claims to have inherited a collection of strange objects from the Thum family estate.[43]

The museum is an eclectic assortment of odd artifacts and obscure exhibits, many bordering on the ludicrous: an African stink ant with a horn spouting from its tiny head, a microminiature sculpture of Pope John Paul II etched in a human hair and mounted inside the eye of a needle visible only though a magnifying glass; a series of fruit stone carvings; and a rare specimen of bat *Myotis lucifugas* embedded in a mass of solid lead. The museum recalls the display methods of *wunderkammern* or 'cabinets of curiosity' in the pastiche of *naturalia* and *artificialia* coexisting side-by-side. The exhibits are unsettling and cause people to question what they believe and do not believe. The book traces Weschler's attempt to peel away the layers of 'ironylessness' that hide the museum's deeply ironic stance.

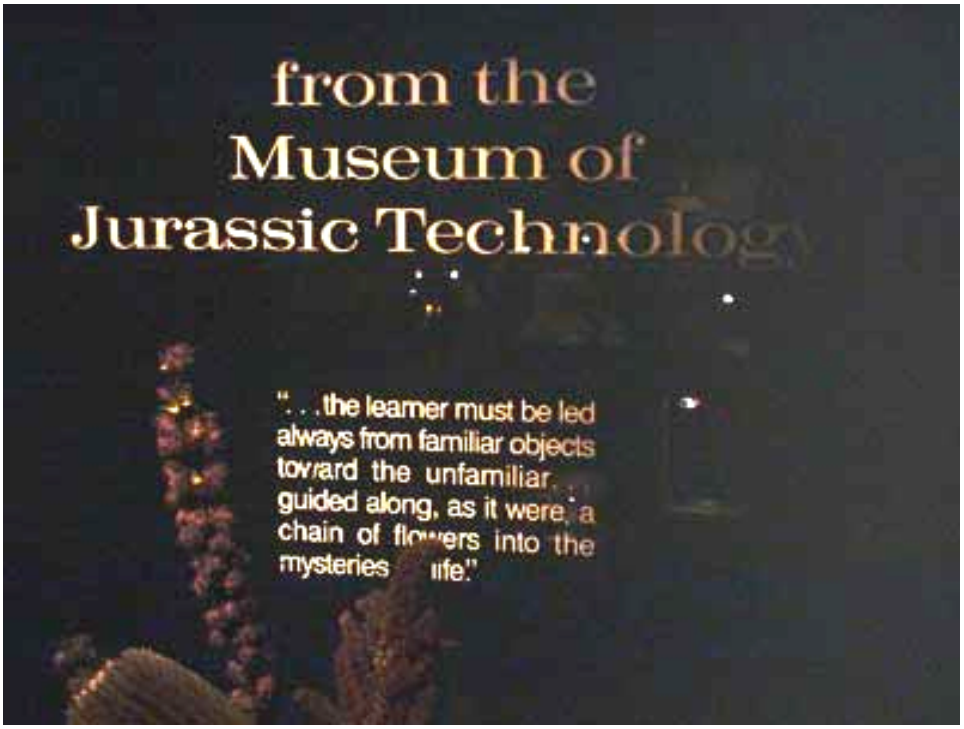

Figure 5 – Introductory wall panel at the Museum of Jurassic Technology

43 The Museum of Jurassic Technology, Museum website <http://www.mjt.org/>;
Also find an NPR profile on *Sound Portraits* by Lawrence Weschler
<http://www.soundportraits.org/on-air/museum_of_jurassic_technology/>

The subversive brilliance of the exhibits in MJT is that they cause visitors to question—to question their trust in the cultural authority of museums, academic scholarship and historical claims. Some have suggested that MJT is Wilson's performance art, a permanent installation poking fun at the authority of museum exhibitions; but that would be selling MJT short. One museum director called it "*a museum, a critique of museums and a celebration of museums—all rolled into one.*"[44] I bring up this example of exhibition display because it illustrates one form of irony—satire—a gentle satire of natural history museums that causes us to see what museums are through what they are not and thereby to wonder about them. The subtle use of irony is intended to make us see the trust we place in museums to acquire and represent our collective history and ideas of nature. In an oversaturated, post-postmodern culture, carefully used irony can cut through deadened layers of apathy to encourage people to wonder, challenge assumptions and seek new explanations. In this way irony can stimulate the delight of wonder.

Burke in his chapter on the master tropes cryptically describes irony as "*that which goes forth as A returns as non-A.*"[45] He seems to be referring to a kind intellectual metamorphosis in which one crosses a boundary exposed by irony and comes back somehow transformed, preferably enlightened. Can museums offer this kind of transforming, transcendental experience with nature? The closest thing I have found to an exhibit that aspires to sublime irony and poetic wonder is in the works of the artist James Turrell.

The Mattress Factory (MF) on Pittsburgh's North Side features an exhibition of his light installations in *James Turrell: Into the Light*. Turrell has created site-specific works of art that bring out the 'thingness' of light in luminous creations that play with our senses. By creating light installations that push the limits of our visual perception, we become cognizant of the act of seeing as the eye strains to make sense of what is in front of it. Turrell's light pieces are located on the second and third floors of an old converted warehouse. Exiting from the elevator one comes into a darkened hallway, a liminal, otherworldly kind of space that leads to rooms containing the works. Upon entering a room, it takes a long moment for the eyes to adjust to the light. *Danæ* first appears as a glowing blue panel hung at the far end of the room (See Fig. 6).

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[44] Lawrence Weschler, *Mr. Wilson's Cabinet of Wonder: Pronged Ants, Horned Humans, Mice on Toast and Other Marvels of Jurassic Technology*, 40.
[45] Burke, *A Grammar of Motives*, 517

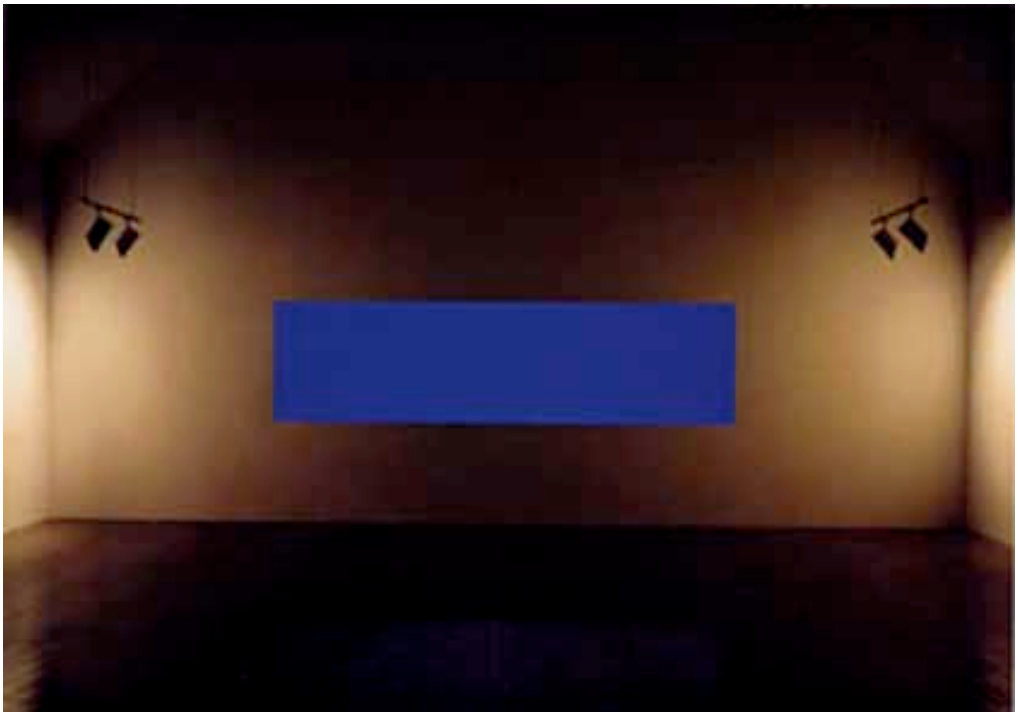

Figure 6 – "Atlan" from *Danæ* Space Division Series

The air looks but does not feel dusty and the dim light in the room has a strange foggy quality to it. The eyes struggle to make sense of the light and space. One can almost feel the eye trying to see. Approaching the far wall the glowing light of the flat panel suddenly gives way to an empty three-dimensional space beyond the wall. This experience is marked by a sublime moment of wonder, when you realize what you see and think are at odds. It is also a slightly unnerving to become aware that your eyes have misinformed you. No longer trusting one's sense of depth perception, there is an instinctive desire to stick your hand into the inner blue space, to feel if what you think you see is really what you see.

In the MF Family Guide the artist gives visitors the following advice on how to view his work: "*it is very important to me that you see it in one way at first and then it reveals itself as something else. Then you go back and see that initial way again.*"[46] In the return to the initial viewing state, one comes back as non-A. One can experience *Danæ* again from the initial perspective, but never in exactly the same, naïvely trusting way. One realizes the fallibility of sight, and the need for patience before judgment. This light installation provides a sensory version of Burke's dialectical process for gaining a "perspective of perspectives." The viewer

[46] *Family Guide–James Turrell: Into the Light* (Pittsburgh: Mattress Factory, June 2002 – April 2003) 1.

has seen *Danæ* exist both as a flat panel of light and as a window into a lit space. How does one see *Danæ* a third time? For some, the sensory experience of *Danæ* provides simply an aesthetic pleasure with no consciousness-raising effect. For others, Turrell's installation might encourage silent contemplation and a wonderful awareness of things beyond our grasp in a transcendental kind of experience. For still others, the experience might function as a moving reminder of the perceptual nature of light and the limitations of our sensory apparatus.

The Mattress Factory is not a place one normally thinks of going to find exhibits that speak to the idea of nature, but Turrell's work encourages us to wonder about light and perception and by extension nature. This sense of wonder triggers a search for explanations, scientific and otherwise. On the third floor of the museum there is a reading room filled with books, articles, posters and a computer with bookmarked websites about astronomy, perception, color, light and cognitive psychology. Strewn about are well-worn texts about how the eyes work. For some people the experience has made the difference between incandescent, fluorescent and neon a subject of interest. For the others, wonder has stimulated a broader quest for knowledge. Science educators and exhibit designers alike would do well to remember the motivating power of wonder and its relationship to the aesthetics of delight.

Part Four: Conclusion

In the preceding examples, I have tried to identify the idea of nature that different exhibits attempt to communicate and examine the aesthetics of delight that each employ in that communication. The master tropes are instrumental in providing a framework by which to analyze and evaluate the communication strategies used in museum exhibit displays and demonstrations. Moreover, the tropes identify the poetics of thought in operation and reflect back on the aesthetics of delight. These rhetorical tropes are a vital tool not only in a hermeneutic sense but also in a productive one. Designers, cognizant of the tropes, who employ their power to communicate in delightful verbal, visual and sensory ways would certainly enrich the museum experience with the design of more compelling and meaningful exhibits.

A gallery full of narrowly focused metonymic exhibits runs the risk of being irrelevant to most audiences. Used sparingly with the intention of revealing ingenious thought and involving the visitor in experiments of cause and effect, comparison and contrast with clever devices, metonymy has the power to delight in the details of concrete, material experiences. Nevertheless, metonymy alone does not the capture the hearts and minds of most people. With metaphor exhibits have the potential to stimulate imaginative thought, to help us see complex phenomena through something more simple or familiar in a shift of perspective. Used in excess metaphoric exhibits cloud galleries with too many explanations of things similar only in invented relationships; A is not B. In synecdochic representations, A has real two-way equivalence with B, so the relationship holds. In an increasingly estranged and fragmented world, synecdoche can fill our museums with rich interconnected stories that place our experiences in relation to a greater world of meaning. These exhibits require a great amount of time and effort on the part of the designers to research, synthesize and creatively translate ideas into moving exhibits that stimulate all our senses in a vision of the whole. It is thus harder to find and often more expensive to produce exhibits that promote a true sense of discovery in synecdochic thought. Finally, without envisioning museums as places of wonder, we run the risk of driving them into irrelevance for the non-specialist. Used sparingly lesser forms of irony have the power to grasp people's attention in the conflict of opposites. Noble irony finds wonder by marking out the boundaries of our knowledge and our experience. Above all museums can and

should be places for delight. They must rise above the self-imposed limits of plain education and pure spectacle and harness the potential of delightful, sensory-based education. When curators and exhibit designers take this to heart, we have the opportunity to create poetic museums that delight visitors.

Lastly, I hope to have given the word delight some weight by suggesting it means more that just a purely sensual response to beautiful things. Delight is the emotional fulfillment of the desire to know, satisfying the Hobbesian "lust of the mind." It is the ephemeral pleasure that comes with completed thought. If delight motivates the desire for real knowledge then it is no idle word. Knowledge empowers people to make better decisions for themselves. Knowledge enriches our view of ourselves and our environment. Knowledge brings together a colorful, interconnected view of the world that makes everyday experiences more delightful as we are able to see analogies, make comparisons, build connections and find the irony in our existence. In delightful thought the individual realities we live become more pleasurable. With this enlarged notion of delight, we can push exhibits beyond the four walls of the museum and bring demonstration into everyday life. Experiences at the park, post office, bus stop or mall present exhibit design opportunities to delight the public into creating deeper meanings, stronger connections and richer realities for themselves.

Finally, I close with this etching depicting a sixteenth century display of natural wonders and the inscription "*Viewer, insert your eyes. Contemplate the wonders of Calzolari's museum and pleasurably serve your mind.*"

Figure 7 – Ferrante Imperato, *Dell' historia naturale* (Naples: Costantino Vitale,1599)

The animated gestures and delighted expressions of the face of the patrons suggest this is a captivating experience. As exhibit designers we must find a twenty-first century way of attracting visitors to 'insert their eyes' and delight their senses. We have new interaction technologies, rich communication media and a sophisticated understanding of human cognition at our disposal. All that remains is creative design thinking to delight the public in captivating experiences of wonder that motivate learning and the search for meaning.