



# Rationally Entertained: Non-Museological Foundations of the Contemporary Science Center

by Jason Jay Stevens

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## Is a science center a museum?

The answer is incontestable, and yet the question is provocative. Yes, a science center is a museum; the rationales are myriad. Most significantly, categorically, the science center shares an inextricable institutional history with the greater museum domain. In this historical weave, an intensifying focus on public education, the insatiable mass popularity of science, and the lingering afterglow of the World's Fairs converged on the collecting museum of the early twentieth century and provided for the emergence of today's science center (Friedman, 2010).

However, this proof, reinforced by a stubborn trend in common lexical usage, does not resolve the familial tension. In part, this schism may be a side effect of observing history as a family tree of institutions; there is an implicit sense of evolutionary imperative and generational replacement: in with the new growth, out with the old. In this case, the situation is exacerbated by the traditional role of the museum as the great cultural bulwark, preserving, enshrining, and defending the past from the present; that is, what late Louvre curator, Germain Bazin (1967) called, "a temple in which Time seems suspended." Also problematic is the rhizomatic behavior of the denotations of "museum," coming to describe odder cousins with increasingly different defining characteristics. If we could establish a restoration of specificity to the way we refer to traditional museums, call them "collection halls," or "cabinets," let collecting, preserving and ordering be understood, and use "museum" only to reference the wider kingdom, much of the tension could disperse. Alas.

We can also try some models other than a strict genealogy. Human social history—to which museums belong—is after all much too chaotic a system to expect too many tidy chains of cause and effect; patterns regularly hold true only to the generalizations we can afford. Innumerable vectors, interrelated trends, irreducible complexity—we might be more accurate to consider human social history as a spuming froth of interdependent activity. Our institutions in this sense are crystallizations, where organization and structure emerges from the foam of shared activity. As our modern day sports leagues are crystallizations of the broader phenomenon of sport, our museums are the crystallizations of the age-old art of exhibition. In one instance, exhibition is a natural or cultural object preserved; in another, a demonstration, or a simulation; in another, a spontaneous collaborative process; and in another a garden. Exhibition is an art concerned with the presentation of knowledge and experience, and it takes myriad forms, in and outside of the museum.

In this essay, we'll make several all-too-brief traverses through the sprawling history of exhibition—as much as possible from the point of view of the exhibits themselves. This story is constructed not by the hand of a historian, but by a practitioner of the art of exhibit design and realization. We are looking to see how forms other than cabinet display may have contributed to what has become today's science center. A more interesting study might have taken us into how these particular tendencies have influenced the collection halls, but that will have to be the focus some other time.

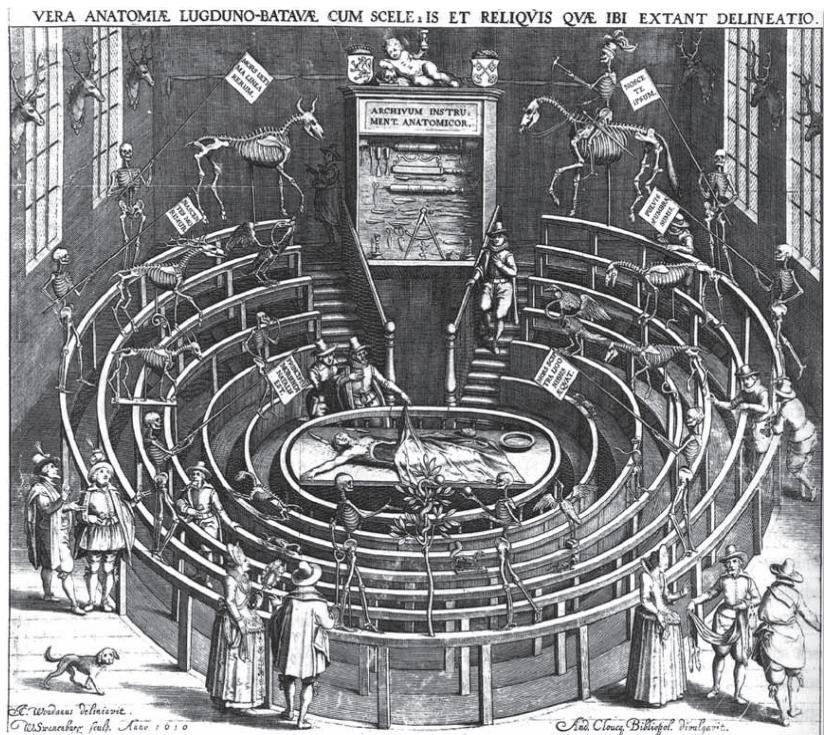
## The Demonstrators and Lecturers

Imagination, as well as reason, is necessary to perfection in the philosophic mind. A rapidity of combination, a power of perceiving analogies, and of comparing them by facts, is the creative source of discovery. Discrimination and delicacy of sensation, so important in physical research, are other words for taste; and love of nature is the same passion, as the love of the magnificent, the sublime, and the beautiful. Sir Humphrey Davy (Holmes, 2008, p. 276)

## Anatomical Theater, New and Old

Here's something I would only expect to see in a science center:

It was the first time I saw video conferencing technology being used in a public education environment that was both a) working properly (until more recently, the technology has been notoriously difficult to wrangle) and thus invisibly, and b) enabling an otherwise impossible, profound adventure for a diverse group of people, young and old. It's a case of new technology increasing accessibility—as opposed to getting in the way, rather creating new ways—and unfolding exemplary new learning situations. It was in 2004, in an amphitheater at the Liberty Science Center in Jersey City, where they were co-hosting a live, two-way video connection between about one hundred LSC visitors and a cardiac surgical team in a distant hospital operating room. The audience was watching a complete heart operation, as it was taking place—as the LSC website says, "from the first incision to the last suture." More incredibly, everyone was free to communicate directly with the



An anonymous 17th century engraving of the anatomical theatre of the University of Leiden. It was fairly common for such rooms to include a range of anatomical exhibits, sometimes with a dose of college humor. Courtesy of [http://www.art-bin.com/bilder/theatre\\_leyden.jpg](http://www.art-bin.com/bilder/theatre_leyden.jpg)

surgeons, nurses, and technicians as they worked, asking questions, just like being there, but also protected—in a way—by the mediation of the video screen.

"Live From Cardiac" began in 1998, a child of earlier electronic field trip programs, and it continues to this day, networked to an expanded suite of operating rooms, supported by a passionate set of physicians, the Liberty Science Center staff, and an enthusiastic public.

Communication technology aside, this particular form of science demonstration goes back at least to 1594, when what is generally accepted to be the first anatomical theater—for the live academic demonstration of medical procedures and autopsies—was built at the Università degli Studi di Padova in Italy. It remains there to this day, in preservation (*Università degli Studi di Padova—Palazzo Bo, n.d.*). Like many similar theaters that followed, it was in-the-round, coliseum-style, with steep, tiered seating from which observers would look down upon a demonstration performed at the center. Anesthetics and surgical techniques were cruder, but then, the intended audience was restricted to medical students and researchers.



"An Experiment on a Bird in an Air Pump" by Joseph Wright of Derby, 1768, oil on canvas, Courtesy of Tate Gallery, London.

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It is called an anatomical "theater" because of its architecture; unlike most theaters, it has never been used as a stage for plays or music. More accurately, it is an exhibition space for scientific demonstrations, generally without illusion, and in a class of its own. Demonstrations like these configure an exhibition form that emerged independently of the human tendency to collect and preserve. Demonstration is closely related to the lecture, sometimes indistinguishable: in both cases one person, or a small group of experts, present a program of knowledge for a larger audience, illustrated with words, pictures, apparatuses and/or actions. This form of exhibition is, of course, a very important part of the contemporary science center.

#### **The Public Science Lecture**

Aside from several notorious episodes, involving enterprising showmen like P. T. Barnum and Gunther von Hagens, anatomical theater has not generally been openly accessible. Public scientific demonstration as we know it formally begins at the latest with the 1660 founding of the Royal Society ("for the Improvement of Natural Knowledge"), assembling in London to this day. Informally, the tradition can be traced back further, through generations of

itinerant science demonstrators, depending on where a particular researcher chooses to draw the line between science and the proto—or pseudo-science of ancient traveling fortune tellers and magicians. Certainly, by the 18th century, the tour routes were full of itinerant natural philosophers, commonly moonlighting as instrument makers or close allies thereof, traveling with their own portable cabinets of curiosities (Turner, 2001). They "entertained their benefactors, were responsible for the demonstration of experiments at universities and highly regarded as popularizers of science" (Teichmann, 2007).

The Royal Society was, in part, an institutionalization of the itinerant tradition. Endowments throughout its history have provided for many long-running and prestigious invitational lecture series, bringing demonstrators in from the cold, so to speak. The ongoing Bakerian Lectures, for example, were endowed by Henry Baker, a naturalist with a microscope and penchant for poetry, in 1775. Another scientist and published poet, a close friend of Samuel Taylor Coleridge, the celebrity Sir Humphrey Davy (1778 - 1829), gave the first of his seven Bakerian Lectures in 1806, titled, "On some Chemical Agencies of Electricity." This presentation and its sequels were incredibly popular, followed by what some scholars identify as the first true big mass media phenomenon. Davy toured his lectures to diverse crowds throughout Europe, becoming one of the great Romantic Era popularizers of science (Holmes, 2008).

We are, of course, talking about the demonstration of electricity in the early 19th Century; to this day, it's a topic that enlivens the imagination without much resistance.

## Exhibition is an art concerned with the presentation of knowledge and experience, and it takes myriad forms, in and outside of the museum.

Beginning in the century prior and throughout the 1800s, interest in electricity grew in pace with the news of discoveries and inventions, giving rise to a thriving industry of itinerant electrical demonstrators, including well-known personalities like Giacomo Bianchi and John Leonard Riddell. Riddell (1807 - 1865) sold subscriptions to his traveling lecture series by promoting them thus:

I am convinced that I can render a course amusing and instructive. To those who have no taste for science, but merely are fond of show, very many experiments in chemistry are highly gratifying. Those who can admire the varied and wonderful powers of nature would, I trust, be rationally entertained. This science is extensively useful and might be rendered much more so to all classes of people.  
(Dexter, 1988)

### **Demonstration Moves Into the Science Museum**

Martinus van Marum (1750 - 1837) was a Dutch scientist, teacher, and polymath. He was renowned in his day as a researcher of medicine, plant breeding, air pollution, the ventilation of factory buildings, the handling of cholera. He was best known for his public demonstrations of electrical energy while serving as the first Director, from 1784 to 1837, of what was then known as Teylers Physiche en Naturalien Kabinet en Bibliotheek, open to the public even today as Teylers Museum, in Haarlem, the Netherlands.

Teylers Museum houses an encyclopedic collection of well-preserved natural samples and scientific equipment; "emphasis was placed on the construction of large, accurate equipment, beyond the reach of private individuals,"

(Turner, 2001), and a huge collection of old masters' prints and drawings. It was here that von Marum built his famous *electriseermachine*, an immense electrostatic generator, comprising two spinning glass discs, each 65 in. in diameter, with the potential of producing a two foot long, 2000 Joule bolt of lightning, "the thickness of a quill pen" (Curry, 2003). Van Marum would perform experiments and public demonstrations with the machine, requiring four people to turn the crank, generating massive arcs, melting metal wire, magnetising needles, and allegedly electrocuting small animals. "Persons within 10 feet of the plates experienced a sort of



*The Oval Room at Teylers Museum, with Martinus van Marum's electrostatic generator in the foreground, as painted about 1800 by Wybrand Hendriks. Courtesy of <http://en.wikipedia.org/wiki/File:Oval-room.JPG>*

Demonstration is closely related to the lecture... in both cases one person, or a small group of experts, present a program of knowledge for a larger audience, illustrated with words, pictures, apparatuses and/or actions.

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creeping sensation over them, as if surrounded by a spider's web" (Curry, 2003). These arcs produced ozone, astounding people with what van Marum called the "strange odour of electrical matter." The machine was wired to a battery consisting of one hundred Leyden jars so that Van Marum and his assistants could store enough electrical power to create big, beautiful calcination patterns in metal ore, or to blaze a hole through a 192-page book (Curry, 2003). The *electriseermachine* is still maintained and on view at Teyler's Museum.

Electricity fervency peaked in 1893, when Nikola Tesla and George Westinghouse lit up the century's ultimate exhibition showcase, The World's Columbian Exposition, in Chicago, with electric light. Until this time, the demonstration of the day's scientific discoveries was to be found in lecture halls and theaters. Today, the science center is the venue for this variety of exhibition.

#### **Simulations and Cinema**

The Museum of Science and Industry in Chicago opened in 1933 in The Palace of Fine Arts building, constructed for the 1893 World's Columbian Exposition. One of the first exhibitions was *The Coal Mine*, taking visitors into a simulation coal mine—a tour complete with cage elevator, railcars, underground mine shaft and mining machinery made to appear to be working the face of a coal seam. It continues operating to this day. As the great grandson of Scots who immigrated to mine coal in nearby Indiana, my visit to *The Coal Mine* exhibition was a profound experience.

#### **Cinema**

In many aspects, a simulation like *The Coal Mine* is theater, an immersive theater in which illusion is expected and disbelief willfully suspended. From the perspective of exhibition history, the immersive simulation has close ties to cinema. By cinema is meant the movies as well as their abounding history of forebears—many of which movies directly displaced—and a diverse set of alternative contemporary cousins, from virtual reality to motion/video simulators, from video art installation to the new media art of VJing. Cinema is perhaps best understood as a form of mediated theater; it is usually experienced collectively, commonly appeals to multiple senses, often simulates and is always in a sense immersive.

Like demonstration, the cinema institutionalizes an itinerant tradition: the magic lantern storyteller, a charmed if unavailing specialty of 17th and 18th centuries. (We must note the Wayang Kulit shadow puppet theater of Indonesia, perhaps the true first cinema, with an ongoing tradition going back millennia—but we'll save its story for another day.) Granted permission to use a room in a meeting place, a magic lanternist would set up a collapsible screen and portable projector, and sometimes arrange musicians. The lanterns used argand lamps or limelight to illuminate and project images painted on glass slides. The magic lantern shows disseminated news and included plenty of humor, history, fantasy, general knowledge, and tours of foreign architecture. Special slides were enabled with mechanical animations, some for storytelling, but also for visual jokes, and even occasional motion-enabled op art.



Robert Barker's panorama, "Edinburgh From The Crown Of St. Giles." It is preserved by the Edinburgh Virtual Environment Centre, at the University of Edinburgh. Courtesy of City Art Centre, Edinburgh Museums and Galleries.

In the century and a half leading up to the development of the motion picture film, cinema blossomed into myriad forms, with many personal variations. Following observation and detailed studies of the 1767 eruption of Mount Vesuvius, Sir William Hamilton (1731–1803), a Scottish diplomat and collector of antiquities, devised an illuminated painting with a hidden clockwork mechanism to animate an eruption and lava flow, complete with sound effects (Sørensen, 2004). American museum pioneer and painter, Charles Wilson Peale (1741–1827) exhibited his own moving pictures in his home museum for a period (Alexander, 1979). Louis Jacques Mandé Daguerre (1787–1851), famous for developing the daguerreotype photographic process, first ran a popular and profitable enterprise based on a further development on these ideas with his diorama, debuting 1822, named separately from the natural history diorama. Daguerre's oiled calico canvases measured 72ft wide and 45ft tall, and utilized various lighting effects with distinctive subtlety, animating topics including religious architecture and depictions of Hell. Viewers sat in a unique 350-seat theater that could be rotated from one diorama to another by the power of one atlas-shouldered fellow (Comment, 1999). Sadly, none of these moving pictures survive (Stafford, 2001).

The cinematic exhibition spectacle has persevered not only in the simulations and re-enactments found in science centers, but in the ornate, immersive designs of many contemporary touring exhibitions. And we can't mention touring exhibitions in the context of the 19th century without remembering the panorama.

### Panorama

Of all the early cinematic exhibition forms, none is grander than the panorama, founded quite definitely in London in 1793 and spreading into a worldwide network of hundreds, likely thousands, by 1890, almost all but vanishing 20 years later. Stephan Oettermann has counted 38 existing panoramas, the world over (1997). The International Panorama Council adds another ten contemporary interpretations.

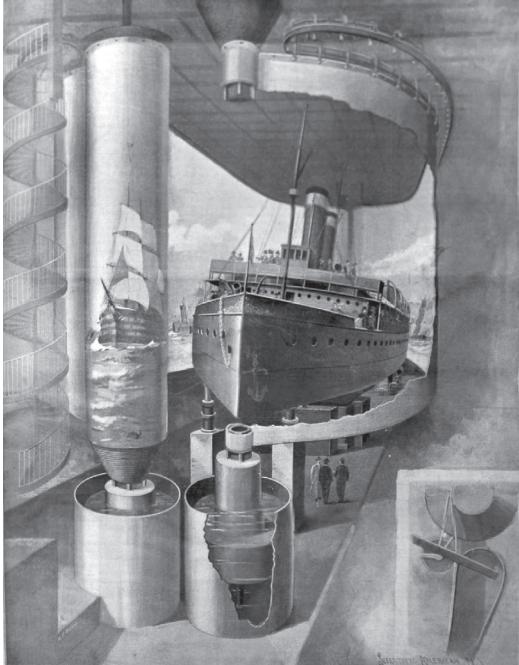
Traditionally, a panorama consisted of a gigantic canvas, 20 to 60ft in height, upon which was painted a realistic, 360° view of a landscape and scene, installed in a specially-constructed rotunda hall, 30 to 130 ft in diameter. By far the most common depictions were urban vistas, battle scenes, natural landmarks and the Crucifixion. This limited range of subject matter is indicative of the large cost, heavy risk, and constant commercial pressure that each project demanded, even when relying on tried and true themes.

Panoramas were thought of as educational entertainment. Accuracy and quality were held in high esteem even in cheaper productions; in fact the battle scene genre was dominated by well-researched recent skirmishes, in a kind of nationalistic news-telling, and a panorama visit by a returning soldier could often become what we today call a media draw. This soldier's comments regarding the authenticity of the depiction could make or break a very expensive undertaking. Frequently, visitors were offered guided tours or narratives, enhanced by sound effects or music. The simulation was persuasive and for some overwhelming. "The dizziness experienced by IMAX viewers was frequently

Panoramas were thought of as educational entertainment.

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- An illustration of the Mareorama at the 1900 Paris Exposition, as depicted on the cover of Scientific American, September 29, 1900.
- reported by panorama viewers" (Stafford, 2001).
- Panoramas had considerable appeal from inception, especially with the strolling boulevard culture of Europe during the Romantic and Victorian Eras, but eventually extending to all continents. A 1889 *La Nature* article describes the panorama visitor profile as "peasants and laborers who have never seen the sea, the bourgeoisie and tradespeople who have been raised in their small communities or over the shop, diplomats who dream of representing France abroad, nature lovers who hunker for virgin forests" (Comment, 1999).
- The widely-accepted originator and patent holder, Robert Barker (1739-1806), had a good career with the panorama; he eventually employed a large team of carpenters, painters, sculptors and other artisans. They worked in a round studio in London, making two new panorama canvases a year (Comment, 1999). Within a few decades, production studios had popped up across the continent. All panorama production and installation work became specialized. Painting crews included up to a half a dozen master painters, each with assistants,
- and who each worked on only one aspect of a painting, such as perspective, or architecture, vegetation, costumes, and so on. Skilled portrait painters were in demand because of the concern for biographical accuracy. Sculptors were employed to create wax figures, taxidermy, and objects for the foreground. Carpenters built replications of boats, and towers, and bridges. There were scaffolding and dolly technicians, lighting gurus, and publicity agents. The industry supported rotunda architects and designers, a level of management workers, businesspeople, and financiers.
- By mid-century, limited liability companies had formed and developed international tour networks. Importantly, this enabled the standardization of canvas sizes, solving a long-standing problem. The standard rotunda became 50ft high and 120ft in diameter—over 11,000sf of exhibition space, surrounded by a canvas with about 19,000sf of painted surface. By comparison, a typical IMAX screen is 3,744sf (Brain, 2001), and the Hayden Planetarium in New York City has something on the order of 10,000sf of projection surface. In terms of the total volume of painted canvas, a single panorama is equivalent to at least a dozen touring exhibitions of large-scale mid-twentieth century American avant-garde painters.
- Even by today's standards, with our paved highways, air ride trailers, and comprehensive insurance policies, the panorama traveling exhibition business seems an awesome undertaking. The canvases weighed several tons (Comment, 1999), crossing borders by horse cart and ocean liner. The paintings understandably wore out over several years. Robert Barker and many other painters recycled their canvases, painting new panoramas over

the top of old pictures. When the canvas was finally beyond repair, it was destroyed; thus today, few remain

### **Moving Panorama**

One of the exhibits at the Paris Exposition of 1900 was the Mareorama, a model of a 230ft transatlantic ship that pitched and rolled, with an acting crew, and kelp-scented air. This model was surrounded by two scrolling canvases on either side, each 50ft high, displaying the coastal and island scenery from Marseilles to Yokohama.

The Mareorama was an orotund version of smaller and simpler moving panoramas which had become popular touring exhibitions in mid-19th century North America, exhibiting in Odd Fellow's Hall and small theaters. Some were comprised of one canvas, scrolled between two spools, operated from behind stage legs or drapes. Others were more immersive, with two scrolls on either side of a stationary vehicle, such as a train or a boat, that acted as the viewing platform. The most common and popular theme was a simulated ride along an American river or coastline. Many included lighting, sound, and climatological special effects.

John Banvard's "Mississippi from the Mouth of the Missouri to New Orleans" was described as a three mile long painting, and its presentation included a speaker at a podium, with live musical accompaniment. They toured North America and Europe for six years. Banvard, both inspired by

Barnum, and convinced he could do the master one better by presenting actual scientific truth in exhibition form, opened his own museum in the late 1860's, prominently featuring his famous moving Mississippi panorama; but he was out-marketed by P. T. Barnum and forced to close shortly after opening. The canvas was eventually cut into hundreds of smaller pieces, none of which are known to exist today.

### **Conclusion**

Maybe not all the paths we traverse through the history of exhibition land us directly in the field of the contemporary science center; none of the stories told here should be understood as leading exclusively to this destination. The exhibition forms and the social and educational tendencies they express can be found in collection halls, theme parks, historical sites, zoos, art centers and elsewhere, revealing the pervasiveness of their influences.

Inspiration and creative endeavor as widely dispersed as that of exhibition provides no easy, distinct history. The researcher identifying form and vectors of movement is a pattern seeker, subject to whim and some arbitrary restraint. We descend a ladder of giants, each standing on another's shoulders. Where we stop is a choice; it's giant shoulders all the way down. Even so, what we seek is a connection to universal experience—reflections of the individual in the greater whole—and fortunately these are profuse in the history of exhibition. \*

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