

## Goosebumps! The Science of Fear

by Brenda Cowan, Paul Orsell, and Martin Weiss

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**We asked three seasoned professionals with varied expertise to write critiques using the following guideline:**  
**A critique is an individual viewpoint, shaped by expertise and experience. Its audience is the profession. It involves your analysis of the exhibition, and your assessment of its strengths and weaknesses from your personal and professional viewpoint – as a designer, an educator, an exhibit developer, or whatever your area of expertise. The Editor**

### **So What Are You So Afraid of? A Critique of Goose Bumps! The Science of Fear at the Liberty Science Center by Brenda Cowan**

The great achievement of an exhibition is “epiphany,” the amazing situation where someone experiences a connection with an object, concept or event, seemingly great or maybe mundane, that changes their relationship with it from then on. Within the environments themselves and also as extensions of the visit, exhibitions have prompted great civic debates as well as small private giggles, all of great value. I’ve made it my work to make spaces that accomplish as much and to learn from looking at those made by others.

#### **Facing the Fear**

Sadly, I see myself as positively ruined when it comes to taking in an exhibition free of my professional baggage. When invited to explore **Goose Bumps!** as a visitor with a trained eye, I did what any sensible person would do and exploited my ten-year-old daughter and husband who are not quite as ruined as me. Together we went on a weekday and were able to join camp groups and families with children of various ages. One of the families had a child in a wheelchair, and I was able to observe a fairly varied audience. Helpful too, was the fact that my daughter has been talking with me quite a bit lately about being afraid of the dark. The opportunity to visit **Goose Bumps!** gave me the chance to mitigate a difficult situation while indulging in the work that I love best. Before our visit, I took a moment to ask my daughter for a kid’s point of view on the topic. When asked what kids are most commonly afraid of

she responded:

*Heights, death from knowing someone who’s died, the dark because you can’t see and something can jump out and grab you and eat you.*

I asked her why people are afraid of things: *People know about bad things that have happened to others and they get a weird feeling that it can happen to them.*

I asked her what she hoped to see in the exhibition:

*I hope there’s interactive stuff like going into a dark room or a tube or something. I want to see what the things are that people are the most afraid of and want to know some ways that people can get over them. I like to know things that others are feeling so I can go ‘Oh, you know, Anne has the same fear! I should go and talk with her.*

So with hopes, fears, and family in tow, the journey began.

**Goose Bumps!** is a 6,000 square-foot traveling exhibition created by the California Science Center targeting middle school-aged children and their families. The exhibition’s content covers the physiology of fear, its causes and effects, psychological disorders and normalcy, stress, anxiety, fear in popular culture, its emotional attributes and coping mechanisms. The exhibition is comprised of the key concepts of Fear & the Brain, Fear in the Wild, Fear & the Media, and Dealing with Fear. Content is intended to be conveyed in a manner that is exciting, playful and complex, and a great deal of attention is paid to making the exhibits multisensory, incorporating sight, sound and touch elements. **Goose Bumps!** houses a

tremendous amount of information and clearly intends to enable its audience to connect their own experiences with high level, authoritative and objective theories and data. It's a tall order and one that was met in many ways.

The subject of fear is brilliant as it is integral to all human beings on an intimate and deeply personal level. It is truly universal, cross-cultural, recognizable and multigenerational. Yet however natural a topic it may be, high level scientific content presented within interactive devices for a young and lay audience to understand and personalize is a great challenge. The different types of interactive exhibits and layering of content are a strength, and the exhibition's intention to involve visitors physically, emotionally, and intellectually is achieved within the range of components

### Scared Stiff

A great example of one of the exhibition's successful interactives is a media-based game called *Freeze* where visitors experience the fear of being prey. Visitors follow an enclosed path where their shadow is projected onto a screen, becoming part of a scene that includes shadows of a fruit tree and a jaguar. The challenge is to move along the path and collect fruit from the tree without arousing the attention of the jaguar. Despite a spartan use of imagery the exhibit is riveting and onlookers were strangely silent. The design is elegant as it requires little to no instruction, integrates physical, emotional, and intellectual properties seamlessly, and conveys information in a powerful way. Biological and psychological fear responses in predator and prey situations are also described in adjoining graphics that add depth to the experience.



*An installation of books, toys, news clips and other items about fear in popular media prompts nostalgia and excited multigenerational sharing. Photo courtesy of Brenda Cowan.*

### Don't Leave Me Alone

One of the exhibition's weaknesses is the inconsistent grouping of exhibits according to its key concepts: Fear & the Brain, Fear in the Wild, Fear & the Media, and Dealing with Fear. For example, Fear in the Wild is comprised of related exhibits including a computer game about survival rates in predator and prey dynamics; a video-based exhibit illustrating animal predator and prey moments; and the wonderful exhibit *Freeze*. The exhibits are situated closely together, have interrelated content, and the overarching concept is made very clear. The multiple exhibits work in concert to encourage visitors to become deeply engrossed in seeing, feeling and learning what Fear in the Wild means.

Unfortunately key concepts in other areas aren't similarly constructed and thus lack the impact that Fear in the Wild has. *Fear Theater* is an exhibit that illustrates Fear & the Brain. It's a delightful demonstration space where visitors are connected to a heart rate meter and experience fear conditioning and how fear responses are measured. Adjacent to the theater is an equally engaging installation with news clips, books, toys and movie references depicting the concept Fear & the Media. Each of the exhibits is multilayered and rich with content, but conceptually unrelated. Were *Fear Theater* located next to a companion exhibit such as

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A brave visitor is strapped into *Fear of Falling*, an interactive that records visitors' facial responses while taking a plunge backwards. Photo courtesy of Brenda Cowan.

the formation of deeper understandings of the meaning of Fear & the Brain.

### **Fear of Fear Itself**

Probably the most interesting part of my visit to the exhibition came at the end of my stay. I began to notice that there were a few small children clutching and tugging at their caregivers, distressed and crying. I looked around at the darkly lit environment and noticed that the loud noises, use of the word fear everywhere, images of scared people, even the silly ones, appeared to be making some young people frightened. If any adults were shaken it wasn't obvious to me, and the upset kids seemed to be ignored, brought to another exhibit, or simply shushed. Although there are exhibits about universal coping mechanisms in the concept area *Dealing With Fear*, they are allocated to a subdued corner; being static graphics and videos, they are out of character with the rest of the exhibition. The suggestion in these exhibits is that the coping mechanisms provided are post visit considerations, as opposed to tools for active use during the visitation. The exhibition doesn't communicate with visitors in mid-engagement who become frightened about simply being in the space, or suggest dialogue for visitors to employ during their exhibition experience.



The animated "Mr. Goose Bumps" in *Fear Theater* has visitors riveted while he shakes his knees, sweats and wets his pants in fear. Photo courtesy of Brenda Cowan.

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*The Fear Lab*, a hilarious animated exhibit about bodily responses to fear, *Fear & the Brain* would become as powerful a conceptual area as *Fear in the Wild*. Instead, *The Fear Lab* is located half an exhibition away. This lack of interconnectedness lessens the opportunity for a more immersive visitor experience and

Often, exhibitions include "tips" or "touch stones" that are teachable moments located throughout their spaces. Would designing *Dealing With Fear* as teachable moments make the best possible use of its content and jibe with the overarching intentions of the exhibition? Would the challenges of frightened visitors within the space actually be addressed in any kind of meaningful way? I don't know but would love to find out.

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### I'm Not Afraid

**Goose Bumps!** is an exhibition well worth visiting. The topic, the layers and complexity of information, the deft use of humor and its mannerism as an exhibition designed for science center venues are excellent qualities. The tremendous amount of research, collaboration, technical acumen and play that obviously went into creating it makes me wish I had been a part of the project team. To inspire people to laugh at their fears and demystify some of the most intimate parts of themselves is quite an achievement and one that should be experienced by all. My family and I found ourselves laughing and chiding each other about being too scared to put our fingers into a live electrical socket. After years of childproofing my home it took a great deal of courage to face this particular fear. It required me to put complete trust in the Liberty Science Center and the exhibition's creators. I did and I survived. It was an epiphany.

### **Goose Bumps! or Exhibition Schizophrenia? by Paul Orsell**

I went to visit the **Goose Bumps!** exhibition while it was at the Liberty Science Center. I had my family (my wife and four children ages 13, 10, 8, and 4) in tow to be able to gather their reactions as well. We visited the exhibition on a busy weekday when LSC was filled with camp groups of various ages.

The **Goose Bumps! The Science of Fear** exhibition was developed by the California Science Center with partial funding by the National Science Foundation. The Science Museum of Minnesota was responsible for exhibit design and fabrication.

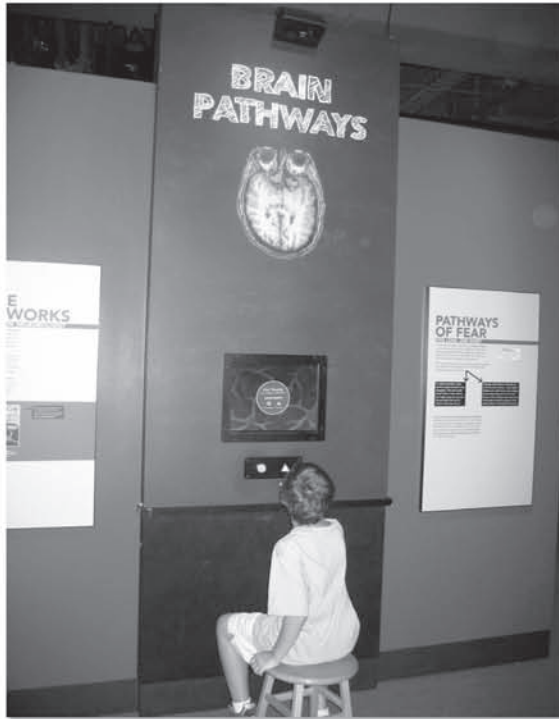


Visitors encounter a "wall of text" near the entrance to **GooseBumps!** Photo by Paul Orsell.



Getting a lift to observe animal brain cross-sections. Photo by Paul Orsell.

As I was first entering the **Goose Bumps!** exhibition, I thought about the things that often frightened me. Of course, being an exhibit designer, and being inside a museum made me naturally think about things like excessive label text and vaguely framed exhibit interactives. Unfortunately, many parts of **Goose Bumps!** exacerbated my designerly fears. In many ways, **Goose Bumps!** seemed to be a schizophrenic exhibition. Parts seemed to engage visitors while compellingly encouraging them to examine their fears, while other areas of the exhibition seemed determined to squash



Very BIG text panels highlight one of the design decisions in the exhibition. Photo by Paul Orsell.

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any interesting topics under an avalanche of technical label text.

### Fear of Being Alone

Immediately upon entering *Goose Bumps!* you encounter the Coping With Fear area, a literal “wall of text” that details the types of fears one may encounter throughout the different stages of life and ways to cope with those fears. As you might expect, the day camp crowd didn’t spend much time reading the wall here (and honestly, neither did I).

Several exhibit stations near the entrance of *Goose Bumps!* deal with the relationship of the brain, and its structures, to the mechanisms of fear. This section could have easily been entitled, “More Than You Ever Wanted To Know About The Amygdala.” I’m not sure how many times the word “amygdala” was featured in the title and text of the labels and graphic panels (I lost track!) but if there was one piece of information I left *Goose Bumps!* with it was that the amygdala equals fear. There were also various sections of animal brains that you could examine to see the (you guessed it) amygdala! After a while, I began to realize that none of the two or three camp groups inside the *Goose Bumps!* installation was spending much time

with the brains and amygdalas either. Where was everyone?

The central area of the exhibition, the *Fear Lab* consists of large, blocky forms strongly colored with dark black and deep red colors. Each of these monoliths was covered with text-laden graphic panels and inset video screens also displaying a lot of text. The graphics usually contained the photograph of a researcher who studied some fear-related topic alongside a description of the researcher’s focus and the science behind it. While these large pieces of exhibit furniture may have deliberately been designed to create a foreboding atmosphere, they also had the unintended consequence of giving me completely unimpeded access to read and photograph the labels and graphics. Visitors seemed completely uninterested in these text-heavy component areas.



Young visitor tests his “resistance” to the fear of electrical shock. Photo by Paul Orsell.

This tension between intellectual and emotional responses to fearful situations was nicely done, and one of the most compelling aspects of *Goose Bumps!*

This may have just been a result of the particular group dynamics going on when I visited the exhibition, but I also think the content presented in several sections of *Goose Bumps!* was fairly self-evident. It may be that visitors didn't need to spend a great deal of time with message sets like "your heart beats faster when you are scared" or "your facial expression changes to indicate you are feeling fear." Even reliable "kid magnets" like computer stations and touch screens didn't seem to have their normal holding power in the *Fear Lab*. Their on-screen content seemed unable to find the visitors' "sweet spot" (either too simplistic or bogged down with scientific jargon) but, as noted above, the bulk of the material presented was textual, despite being screen-based. It was interesting, if not downright frightening, how many times I heard young campers telling each other, "let's go see something fun" as they scampered out of the more didactically science-based exhibit areas.

### Fear of Crowds

So where were all the people in the *Goose Bumps!* exhibition? It was clear from just standing back and watching the crowds, that two areas were the most popular places in the entire exhibition.

The first was the *Fear Challenge Course*. This part of *Goose Bumps!* consisted of four smallish rooms placed right next to each other. Each of the rooms had an entrance/exit doorway and a viewing window opposite, so that other visitors could watch the action from the outside. Four strong human fears were represented inside each respective room: Falling, Electric Shock, Loud Noises, and Creepy Creatures. As you entered a *Fear Challenge* room you encountered a large, attractive set piece that you could interact with

in some way. For instance, the Creepy Crawly room had big tanks filled with snakes and spiders. Attached to the front of these tanks were large tubes that terminated inside open-front boxes that you could stick your hands into. Even though everyone, at some level, must have realized that the exhibit developers wouldn't really deliver a lethal shock or have



Trying to carefully gather virtual fruit without getting eaten by an electronic jaguar. Photo by Paul Orselli.

us come in contact with snakes or spiders, there was still hesitation and lots of interaction between strangers in the *Fear Challenge* rooms. This tension between intellectual and emotional responses to fearful situations was nicely done, and one of the most compelling aspects of *Goose Bumps!*

The other very popular area in *Goose Bumps!* was a computer-driven immersive environment by artist Scott Snibbe called *Freeze Game*. As you entered the space, a projected version of your silhouette was seen on a screen in a jungle type environment. Your challenge was to move

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I kept wishing that the creative team had been able to better integrate the “fun” parts of the exhibition with the “scientific” parts.

carefully and gather electronic “fruit” but to also know when to “freeze” if a predatory jaguar came near. If you successfully reached the other side of the screen/jungle, your avatar won. If not, your electronic silhouette was eaten! The novel immersive interface, as well as the intellectual/emotional tension inherent in the primary activity greatly contributed to the success of this component.

#### **Fear of Integrating Science and Fun**

As I walked away from the *Goose Bumps!* exhibition, I kept wishing that the creative team had been able to better integrate the “fun” parts of the exhibition with the “scientific” parts. Unfortunately, it seems that *Goose Bumps!* shares this same schizophrenic way of exhibiting scientific topics with most North American science centers. That is, science exhibit components are framed in ways that are either as dry as dust or as frenetic as an amusement park ride. There seem to be fewer and fewer examples of exhibits that let visitors discover the elegance inherent in scientific phenomena without either slathering it in neon-colored touch screens or burying it under a ton of didactic label text. And that may be the scariest thing of all.

### **Goose Bumps! A Critique by Martin Weiss, PhD**

#### **Four Fears**

My overall impression of the exhibition is favorable. *Goose Bumps!* is a science-rich exhibition that attempts to incorporate whole body experiences with standard science museum experiences to convey science information. Upon entering the exhibition there are at least four signs, ahead and to the sides telling visitors that the exhibition is about fear. Unfortunately

the advance organizer for the exhibition is on the obverse of the central sign so it is viewable only when leaving the exhibition.

To the right of the entrance are four rooms, the *Fear Challenge Course*, containing exhibit experiences of four fears: falling, loud noises, shock, and creepy crawly things in dark spaces. These are about your fears: if you are afraid of these you do not engage with them. However, most visitors, I think, engage and deal with the anticipation; therefore the squeals or screams. For the falling experience, visitors are strapped on a gurney-like device, lowered backwards to about 45 degrees, and then allowed to freefall. A video camera records their facial expression, but it was not working the morning that I visited. Young day campers lined up and watched their friends while waiting their turn. A number I spoke to expressed no interest in doing it. I am not certain how much the science of the fear of falling is impressed upon those who participate in the exhibit. Visitors who are truly afraid of falling in an uncontrolled manner may recall their fear, but I am not sure about the campers who participated. Certainly emotions play a large role in what and how we remember experiences.

The other three rooms in this area contain exhibits on the fear of shocks, loud noises, and creepy crawlies in dark spaces. These rooms were filled with campers. I found the fear of loud noises effective. Though I am not fearful of loud noises I certainly was startled when the unexpected noise occurred. A computer recorded my reaction, and I was able to play it back in slow motion. I did not learn much about my fears, as I was not put off from engaging with the exhibit. However, as I don't like shocks I did not try the exhibit in the Fear

## *Goose Bumps!* is a science-rich exhibition that attempts to incorporate whole body experiences with standard science museum experiences...

of Shocks room. A camper told me it was not so bad. What did I miss by not participating? Well, I was not shocked and maybe my fear was reinforced. A learning experience? Perhaps. A problem I have with using rooms like this to contain exhibits is that when there are a number of visitors in them other visitors tend to walk away while they might stand back a bit from an exhibit in a more open space and wait for a turn.

### **The Fear Lab**

A major portion of the 6,000 sq ft exhibition is devoted to a section called the *The Fear Lab*. This a larger area with lots of room between exhibits, in contrast to the rooms containing the four fears. It contains three videos, one a scientist talking head, and a larger than life body, Mr. Goose Bumps, with interactive exhibits and videos showing different parts of the body, e.g. the brain systems interacting with the heart, the bladder, etc. reacting under stress. Information is contained on a railing. The videos are very engaging; I noted no campers reading the railing, though a parent was helping a child with the text by pointing and reading. There were few family groups so I cannot say that this was typical behavior, but it is the type of activity that we look for in museums and try to encourage. The videos in this room are designed to convey information about how we perceive dangers and threats and react to them. I think they were well done, and I wished more campers were using them.

They are subtitled in English and Spanish and had both language audios. I did not find an easy way the change the language unless the video was at the very beginning. There was not a language choice button. Ambient noise was a difficulty. The laboratory also contained two

computer stations that were collecting data for scientists' use. Though interesting, it is not clear to me how useful this would be as there were no apparent controls for randomly entered data (i.e. garbage). One computer that was to collect my image was not working. I think it is important to bring scientists into exhibitions like this, and I think the developers made a good effort. I was disappointed that I could not contribute due to a malfunction but maybe others were not. I did not notice any other visitors using these stations. Adjacent to this area were other exhibits that I tried and observed visitors using. An especially engaging one was a tabletop activity which simulated the pathways signals travel when a fear/reaction occurs. It featured a series of clear Plexiglas domino shaped objects standing on end. When a signal, represented by a mechanical device, was initiated the dominos fell down in a domino effect. It was fascinating to the visitors I observed painstakingly setting it up. This was successful as a collaborative activity, but it was not apparent that there was much awareness of what it represented. There is information on a colorful wall panel, but it was not clear that anyone I saw noticed it. The sign was attractive but not as attractive as the activity. This might have been an opportunity for a short audio guide.

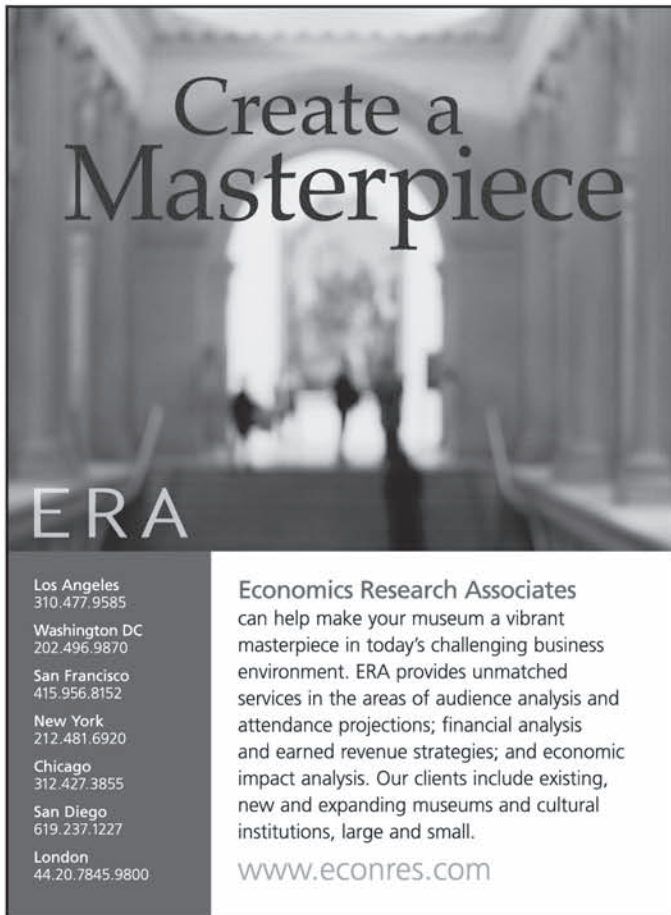
### **Freeze**

Another major portion of *Goose Bumps!* is Fear in the Wild, an exhibit in which you have to avoid being eaten by a virtual jaguar while trying to collect fruit. The passage is 10 -15 feet long and was often packed with children. They either did not see or ignored the sign advising that there be only 3-4 users at a time and all going in one direction. The labels providing information are not in a position where visitors can easily encounter them either before or after



The areas with which I have most difficulty are the over-engaging activities that do not seem to lead to any learning because the interactives are so stimulating.

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using the exhibit. Children clearly enjoyed either being eaten, watching friends dissolving into a red mass of virtual flesh, or avoiding the animal. Learning? Awareness of what this had to do with their fear reaction or any other neurological function? Not much, I suspect.

There are several other areas of the exhibition but they are not as interactive. Brain slices indicate that the amygdala is in other animals, suggesting that the fear reaction in humans has evolved from other animals. This is an important point that I would have liked to see elaborated, given the majority understanding in the population that we have not evolved from other animals. Several panels, Coping with Fear, offer advice to parents on how to deal with children's fears. I found them less interesting than the other portions of the exhibition.

### **The Challenge of Embedding Science in Activities**

All in all I found the exhibition to be graphically well designed, though some sections seemed to have different design criteria (notably the section on children's fears). The science is good and suffuses the exhibition. The areas with which I have most difficulty are the over-engaging activities that do not seem to lead to any learning because the interactives are so stimulating. The information panels have no chance to engage the visitor. I guess the difficulty is that there seems to be little information from the interactive themselves. Perhaps a summative evaluation will enlighten us on this point. ✨