

Choice and Chance: Engaging the Public

Room: 206A 2:00 - 3:30 PM

Chair(s): Joseph Andrade

14:00 Choice and Chance at The Leonardo--the visitor as participant.

Andrade, Joseph

Utah Science Center @ The Leonardo

jandrade@utahsciencecenter.org

14:30 From Research to Public Awareness and Education.

Slovic P*, Walter C;

University of Oregon

pslovic@pop.uoregon.edu

15:00 Risk, humor, and the SRA.

Thompson KM

Harvard School of Public Health

kimt@hsph.harvard.edu

15:30 Your turn!

W3-F.1 14:00 Choice and Chance at The Leonardo--
The Visitor as Participant
jandrade@utahsciencecenter.org

There is a great need in improving the awareness and education of the general public in Risk, Choice, Chance, Decision-making and allied areas.

Risk 'communication' must go far beyond traditional communication tools and strategies to motivate, empower and facilitate effective public awareness, education, and understanding.

Decision Place and the Center for the Big Picture are major components of The Leonardo and the Utah Science Center--opening 2011 in Salt Lake City.

Novel plans and developments for The Leonardo include:

- Miracles Happen! (1 in a Million)

- Unknown or Unknowable?

- From Simple games to Chess—and Beyond

- Numbing of Large Numbers

- Story, Narrative, Emotions, and Individuals

SRA members are encouraged to contribute their ideas and perspectives.



erLeonardo

W3-F.2 14:30 From Research to Public Awareness and Education. Slovic
P*, Walter C; University of
Oregon pslovic@pop.uoregon.edu

This discussion will focus on public awareness and involvement via a modern,
interactive science exhibit--Risk!

Risk! is an interactive, multi-dimensional traveling exhibit developed by the Fort
Worth Museum of Science and History that examines risk and risk assessment:
how risk affects our lives,
how we view risk and why, and
how we can better understand and deal with risk using science,
mathematics, and critical thinking skills.

The research foundation for Risk! and the process of developing and testing the
exhibit will be discussed.

SRA members will be encouraged to provide input.

W3-F.3 15:00 Risk, humor, and the SRA
Thompson KM; Harvard School of Public Health
kimt@hsph.harvard.edu

Popularity of risk analysis as a profession continues to grow.

Understanding risk represents an essential skill given an increasing number of mainstream media dedicating space to covering risk. Most students do not study risk as a subject as part of their pre-college education. Many people would benefit from more basic training related to dealing with risk.

This talk will discuss the use of humor and games as powerful tools for engaging people to think about risk and risk-related concepts.

The talk will also explore opportunities for the SRA and its members to get more involved in risk education, potentially through supporting efforts to develop curricula and exhibits.

Most of this session will involve responding to questions from session attendees and interactive dialogue.

W3-F.1 14:00 Choice and Chance at The Leonardo--
The Visitor as Participant
jandrade@utahsciencecenter.org

There is a great need in improving the awareness and education of the general public in Risk, Choice, Chance, Decision-making and allied areas.

Risk 'communication' must go far beyond traditional communication tools and strategies to motivate, empower and facilitate effective public awareness, education, and understanding.

Decision Place and the Center for the Big Picture are major components of The Leonardo and the Utah Science Center--opening 2011 in Salt Lake City.

Novel plans and developments for The Leonardo include:

- Miracles Happen! (1 in a Million)

- Unknown or Unknowable?

- From Simple games to Chess—and Beyond

- Numbing of Large Numbers

- Story, Narrative, Emotions, and Individuals

SRA members are encouraged to contribute their ideas and perspectives.

generally used for some public function, like education or museums. But, if all the money put into lottery tickets was put directly into education or into museums, it would be a lot more. But it's fun to take your chances in Wendover or Idaho—maybe you'll be lucky, just this once. But the odds are, you won't.

You don't see stories in the papers about the millions of people who lost their money in lottery tickets; Figure 37-3 is made up! You do see stories about the one in a million who won, but each of the one million who lost is not news. The one who won is news. That's just the way the media operates, because that's what you want to hear or read. You identify with that one person who won, and not with the million who lost. You're not alone, most of us are that way. That's why the media are completely unrepresentative, in a sense completely dishonest, because the whole story is rarely presented.

Debt

Another, less direct, aspect of statistics, is borrowing money. Credit requires interest. A rural philosopher once described interest: "Thems that understands it, earns it; them that don't, pays it."

When you borrow, you're betting that you will be able to pay the loan back, on schedule. You have to pay a rental fee, called interest, for the use of that money until you pay it back. The major difference in renting money, as opposed to renting goods, is that you normally rent money in order to spend it, to purchase other things and to pay other bills. The money is gone, there is no money to pay back. It's very unlike renting a car. When you're finished with your rental car, it's still there, so it's easy to give it back. It's often not easy to give back borrowed money. You have to earn more money in order to pay it back. So you're gambling that you'll be able to earn the money needed to pay back what you



Figure 37-3 Stories which ought to appear in the papers.

companies don't only make their money from the small percentage on each transaction paid by the merchant. In the fine print of every credit card is, of course, the interest rate. If you don't pay your monthly bill on time, you have to pay what is among the highest interest rate in the nation for borrowed money, about 18%. The average American household has four credit cards with a total debt of nearly \$5,000—at a rental fee of about 18%! And we have



It's Not Just Your Genes

Did you know that your genes don't determine your health? They only determine what you're capable of. The choices you make about your diet, exercise, and stress levels are what really determine your health.

It's not just your genes that determine your health. It's also your choices. Making good choices can help you live a longer, healthier life.




Take a Break from Stress

Being a kid isn't always easy. Dealing with school, too much homework, or fighting with a friend can all cause stress.

There is professional help, but it can also help your physical health. It can give you headaches or stomachaches or make it hard for you to fall or sleep.

There are many ways to relax when life gets too stressful. Spending time alone, doing an activity you enjoy, or even talking to a friend can help you take a stress break.



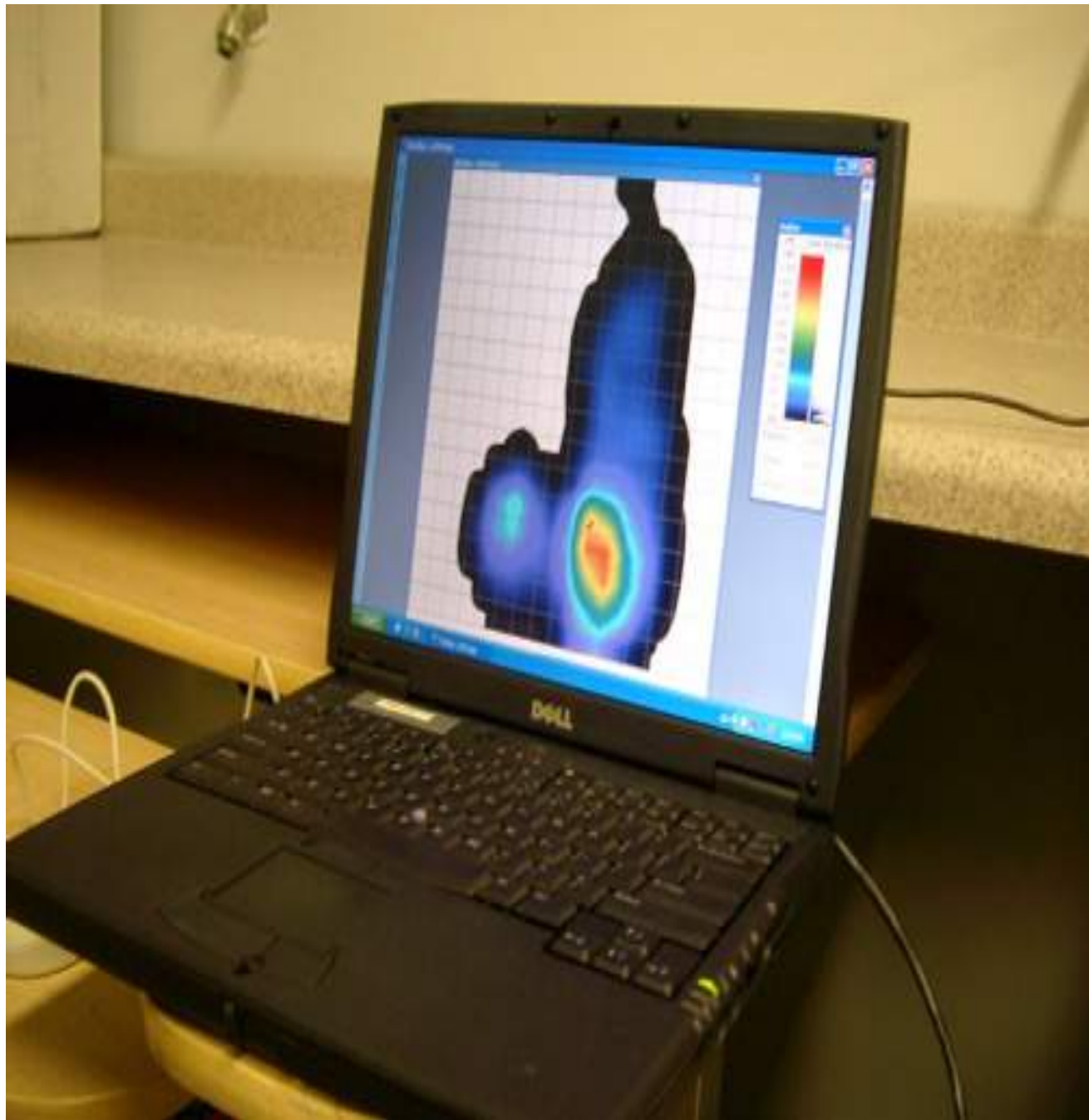
A large interactive exhibit with a microscope, a globe, and a control panel. The control panel has several buttons and a display. The exhibit is mounted on a metal frame with wooden tables and chairs.

The exhibit features a central control panel with a grid of buttons and a display. To the left is a microscope on a wooden table. To the right is a globe on a stand. In the foreground, there is a wooden table with a purple panel that has a hand icon and some text. A pair of headphones is connected to the panel.



EMG





This is your teen's custom attitudinal report

Your key to determining which driving choices your teen could make that may cause them to crash, be injured or even be killed.



How to Read this Report

The **TeenBASE**™ four main categories of attitudes are Risk Taking, Responsibility, Authority and Anger.

The subcales are an in-depth look at which attitudes are prevalent in your child's personality and beliefs.

Blue bars in the chart represent the median percent of teens nationwide.

Orange bars represent your child's specific scores on each of the attitudes the survey measures.

Youth who score above the median would tend to be less safe than half of the teens in the U.S. Youth who score lower than the median would tend to be safer as drivers than half of the teens in the U.S.



Do Attitudes Really Matter?

Risk Taking

Research shows that teens react differently in high risk situations. Some teens get nervous but others enjoy risky situations.

These subcales measure:

Thrill Seeking

To what extent is your teenager willing to do things that are frightening? Thrill seekers tend to take more risks and are more likely to crash than non thrill seekers.

Distraction

How is your teen's desire to engage in new, exciting, perhaps unconventional or even illegal experiences and sensations? Teens that score a high score on this scale are more likely to crash.

Boredom

How easily does your teen get bored? A teen that gets bored easily is more likely to engage in risky behavior and is more likely to crash.

Responsibility (Technical name: Locus of Control)

Research shows that teenagers who believe that they are in control of their own actions are more likely to drive safely.

Authority

Some teens respect and others rebel against rules and authority.

'Respectful'

Does your teen understand the reasons for rules and authority figures?

'Rebels'

Does your teen not like to follow the rules? Do they think that there is no need for rules and tend not to respect authority figures?

Anger or Hostility

Teens who have an attitude of anger, tend to express their anger to ensure that the "whole world" knows how they feel.

These subcales measure:

Anger Frequency

How often does your teen tend to be angry?

A high score suggests that he is angry often, perhaps almost every day or for no specific reason.

Hostile Outlook

Is your teen unsympathetic, intolerant and aggressive towards others?

This is your teen's custom driving behavior report

TeenDASH has identified your teen's specific driving behaviors based on the attitudes they displayed in the online survey.



How to Read this Report

The first column identifies general behaviors. The second column defines specific driving behaviors that could result in a crash. If your teen scored higher than the median in any of the key categories of attitudes, you will see the symbol in the relevant attitude, and your child could be at risk.

BEHAVIORAL CATEGORIES	Specific Behaviors	ATTITUDINAL CATEGORIES			
		Risk Taking (The more, the greater the risk)	Responsibility	Authority (Only when appropriate)	Anger (Anger is a major thought)
Aggressive Driving	Speeding	●			
	Reckless Driving	●			●
	Racing	●			
	Unsafe Passing	●		●	
	Tailgating	●			●
Dangerous Intersection Behavior	Crossing Solid Lines			●	
	Run Red Light	●		●	
	Not Stopping	●	●	●	
Disobedient	Not Stopping	●	●	●	
	Not Yielding	●	●	●	
	Weak Stop Solution				●
	Wrong Lane Change	●			●
Driver Inattention	Getting Driver Off	●			●
	Straddling Lanes	●			●
	Head Down	●			●
	Improper Lane Change	●	●		
	Distraction	●	●		●
	Failing Aids	●	●		



Your Teen's Attitudes & TeenDASH Teaching Methodologies to Help Them Be Safer

You are now ready to consider specific teaching methodologies to help your child become aware of their attitude, make better choices and be a safer driver. The TeenDASH Methodologies may help your child better manage the effects of their attitude while behind the wheel. The best time to discuss your child's results is they are driving the vehicle and you are the passenger. Be sure that your child has a driver's permit or driver's license before you attempt these exercises. It is suggested that you focus on one behavior in each 30 minute session so that they have time to comprehend the message that you are teaching.

NOTE: It is important to recognize that there may be other reasons why your child may exhibit these driving behaviors based on the attitudes defined. For example, physical related issues including lack of vision may affect driving behavior. Children with ADHD may demonstrate poor or unsafe driving choices.



Aggressive Driving

This hazardous category of driving behavior includes speeding, reckless driving, racing, unsafe passing, tailgating and crossing solid lines to get ahead. Any of these behaviors may be related to a teen's propensity for risk taking, anger, and lack of respect for rules and authority. Unfortunately, many teens choose to drive aggressively and end up being involved in serious types of crashes, most notably in the number one crash type for young drivers: rear end collisions.



Teaching Method

- First, calmly ask your child to pull over where you can talk safely.
- Ask if they recognize that they were driving aggressively and whether it was a conscious decision.
- Ask in what ways such driving might be dangerous.
- Confirm the unsafe driving behavior you observed.

fire, climate, insurance: **CHOICES**

free public dialogue

Thursday, November 8th, 7-9 pm

Auditorium, The City Library, 210 E 400 S, Salt Lake City

Fires continue to be a significant risk and are becoming even more difficult to control due to weather and climate change. What can residents do to minimize fire risk and to aid fire control professionals in their difficult jobs? Please join a prestigious panel of experts in a free dialogue that will explore how you can influence the choices made in facing the West's fires.

Panelists:

Aileen Donahue
Moreton
Insurance

Dan Andrus
Salt Lake City
Fire Department

Tom Cova
Geography
Department,
University of Utah

Brian McInerney
National Weather
Service

Chairs:

Joe Andrade
Utah Science Center

Frank Drews
Psychology
Department,
University of Utah

Science in Society

A Utah Science Center Public Dialog Series
Sponsored by The Leonard, The City Library and KCPW



Utah Science
CENTER

er Leonardo

The City Library
210 E 400 S, Salt Lake City, UT 84143

KCPW
www.kcpw.com

Science in Society Public Dialog Series: 07-08 Choice

- Sept. 13, 2007: Coal, Clean Air, Climate Change: Choices
- Nov. 8, 2007: Fire, Climate, and Insurance: Choices
- Jan. 24, 2008: Sports, Brains, and Cold: Choices
- March 6, 2008: Teens, Brains, Risk: Choices
- May 1, 2008: Lotteries, Luck, Risk: Choices

www.utahsciencecenter.org/uscprograms.php

What's Worth Worrying About in Life?

by DR. MICHAEL P. KENNA
Director, USGA Green Section Research

IN RECENT YEARS, the public has become increasingly overwhelmed by the growing number of news reports announcing health hazards that seem to threaten our lives daily. We know all too well that the game of golf has been dragged into this environmental debate. Until now, citizens, legislators, and even the media had no simple way of sorting out the relative importance of new risks and putting them into perspective with other environmental and public health hazards. This article offers a brief summary of an effective communications tool that can help people make sense out of all their environmental worries.

Dr. John Paling and his son, Sean, have developed an objective, comparative scale that reflects the relative levels of risk from different hazards. The *Paling Perspective Scale*SM presents these relative risks in a manner that can be readily understood, yet is based on sound risk assessment practices. If someone has done a risk assessment calculation and claims to have estimates of the

UP TO YOUR ARMPITS IN ALLIGATORS?

How to sort out what risks are worth worrying about!

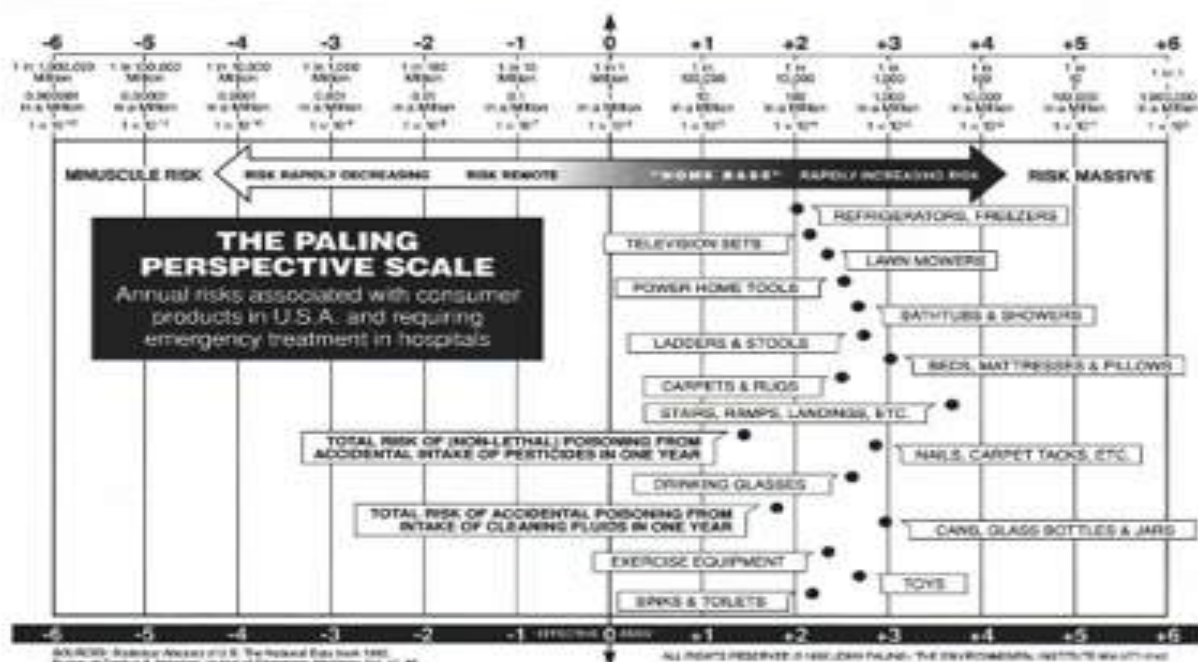


BY JOHN & SEAN PALING

level of risk for a particular hazard under certain circumstances, then this scale can easily show how it stacks up to other risks we face each day. It answers the public's wish to cut through all the technical stuff and get a simple answer to the question, "What's the bottom line?"

The "bottom line" of the scale displays simple numbers for all the levels of risk that could ever be important to the life of any individual on the planet earth (see figures). The scale ranges from a "-6" through "zero" to "+6," and every single risk that we know of can be effectively positioned on this one scale!

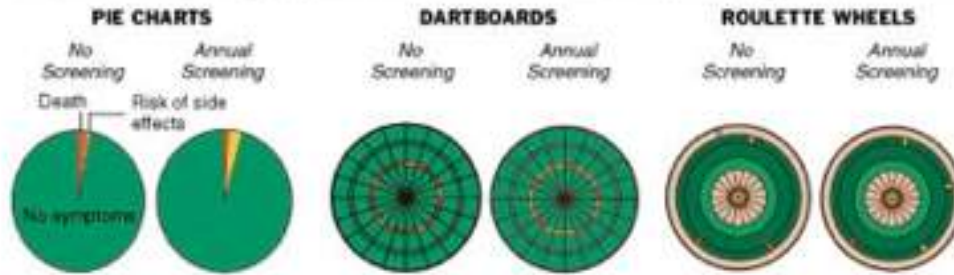
When you follow each of these numbers upwards to the top of the chart, the same risk level is expressed in three different ways. In other words, a "+6" on the scale is the same as a risk of 1 in 1, which is the same as a risk of 1,000,000 in a million, and is the same as what mathematicians call a risk of 1×10^6 . Similarly, the bottom line risk level of a "-2" is the same as an estimated risk of 1 in



Wheels of Misfortune: Visualizing Risk

University of California scientists say that dartboards or roulette wheels may more accurately convey risk than conventional charts. One problem with these models, scientists say, is that patients may feel they have some power over the outcome.

Relative risks for an average 65-year-old man, whether or not he chooses screening for prostate cancer:



Source: PLoS Medicine

The New York Times

Close Window

Copyright 2006 The New York Times Company

Kodak

http://edoctoring.ncl.ac.uk/System_Check/psa_detect_html

Risk Rings: Leading Causes of Death

Diseases and injuries cost the lives of hundreds of thousands of Americans each year. Here, we present the 15 leading causes of death - both diseases and injuries are represented.

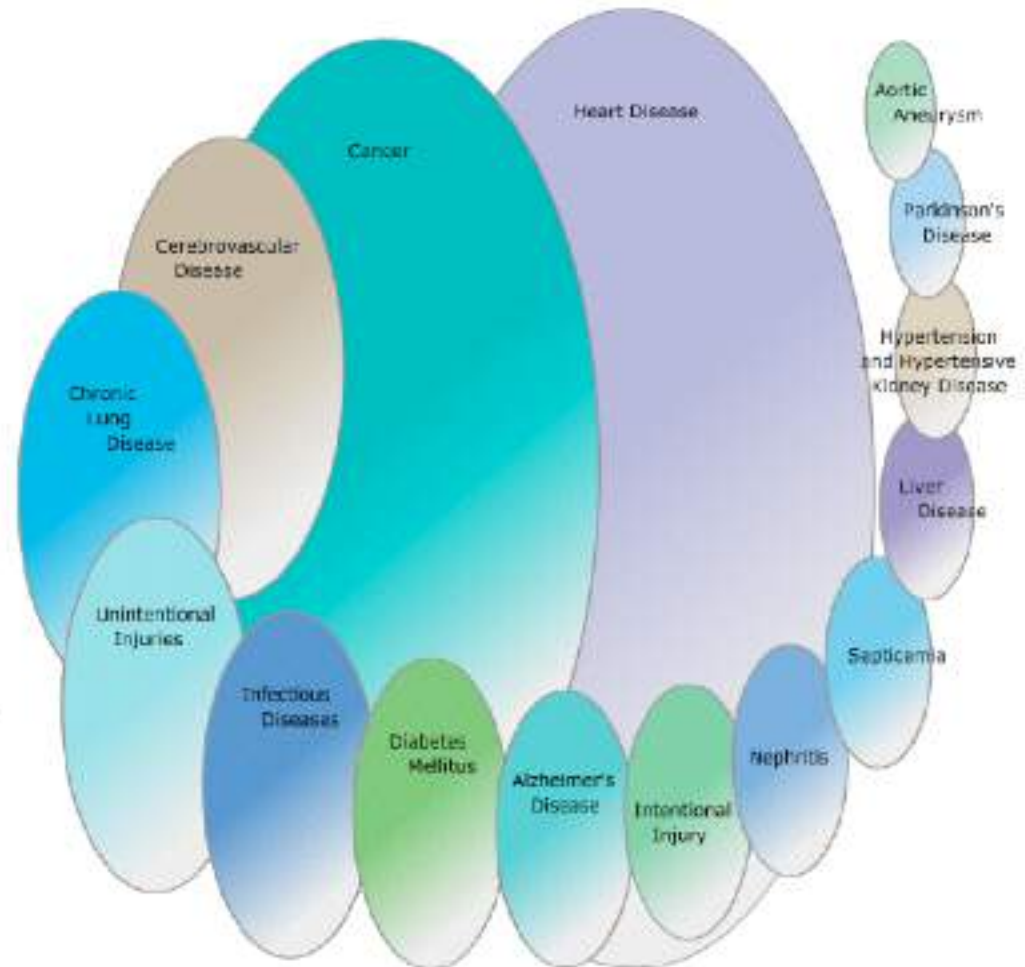
Use your mouse and click the rings. See the "odds of dying" from any of the diseases or injuries presented. The 'odds of dying' is reported here as the number of people expected to produce one death from a particular cause. This number is calculated by dividing the United States population, approximately 300 million people, by the number of deaths from each cause during 2002. Using this method, 771 people would be expected to yield one death from active smoking. In contrast, 5,882,353 Americans would yield one death from exposure to the dry cleaning chemical, perchloroethylene.

Explore the other Risk Ring page, Exposures, by pressing the menu button at top. Or visit the Riskometer, and the Data pages.

If you have questions, [contact us](#).

**American Council
on Science and Health**
New York

Year 2002 statistics were the most recent complete statistics available. Total USA deaths in 2002 were 2,443,387.



Risk Rings: Exposures

Exposures to behaviors and our environment offer all sorts of risks. Here we present a full spectrum of exposures that caused American deaths - the size of each ring is proportional to the number of deaths from the specified cause.

Use your mouse and click the rings. See the "odds of dying" from any of the exposures presented. The 'odds of dying' is reported here as the number of people expected to produce one death from a particular cause. This number is calculated by dividing the United States population, approximately 300 million people, by the number of deaths from each cause during 2002. Using this method, 771 people would be expected to yield one death from active smoking. In contrast, 5,882,353 Americans would yield one death from exposure to the dry cleaning chemical, perchloroethylene.

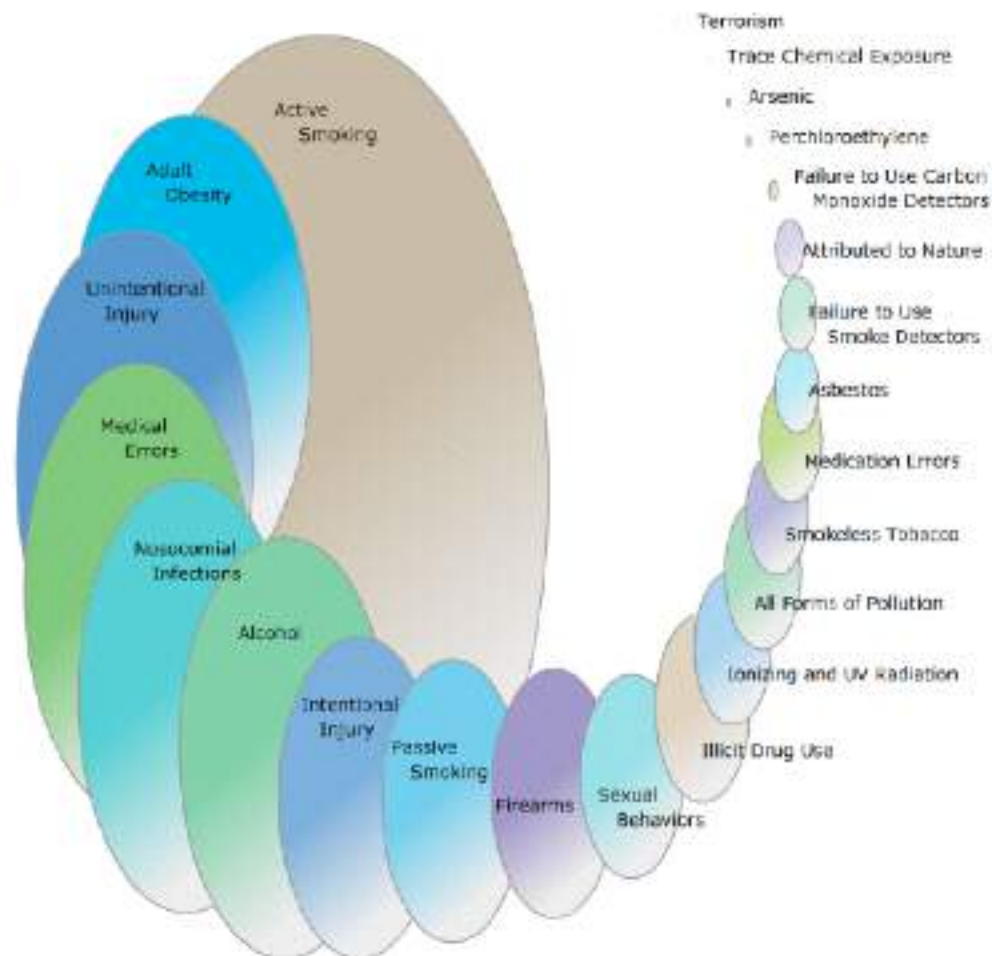
Active Smoking was the leading cause of exposure death. In contrast, exposure to the dry-cleaning fluid, Perchloroethylene and to numerous environmental chemicals resulted in virtually no deaths at all.

Explore the other Risk Ring page, "Leading Causes of Death", by pressing the menu button at top. Or visit the Riskometer, and the Data pages.

If you have questions, [contact us](#).

**American Council
on Science and Health**
New York

Year 2002 statistics were the most recent complete statistics available. Total USA deaths in 2002 were 2,443,387.



Enhancing Data Visualization and Simulation

- <http://services.alphaworks.ibm.com/manyeyes/>
- www.visualcomplexity.com
- <http://www.turbulence.org/spotlight/thinking/chess.html>
- www.kinacity.com

Risk Attitude and Profile via DOSPERT or similar system

On a scale from 1 (extremely unlikely) to 7 (extremely likely) in these domains:

- Ethics
- Finance
- Health/safety
- Recreation
- Social

And a multi-axis data visualization

Exhibits to Rent



EXHIBIT INFORMATION - FACT SHEET

Risk! is an interactive, multi-dimensional traveling exhibit developed by the Fort Worth Museum of Science and History that examines risk and risk assessment: how risk affects our lives, how we view risk and why, and how we can better understand and deal with risk using science, mathematics, and critical thinking skills.

- The central idea of *Risk!* is that life is all about taking risks and the decisions we make about risk can affect the quality and nature of our lives.
- Major components of the exhibit include:
 - Beam Walk
 - Bed of Nails
 - You Bet Your Life
 - Car Crash
 - How Old Are You Really?
 - Switches
 - Extreme Gallery
 - *Risk!* Cinema
- The exhibit was developed by the Fort Worth Museum of Science and History as its third-round contribution to the Science Museum Exhibit Collaborative (SMEC), a collaborative of seven museums across the country created to ensure the production and sharing of high quality, world-class science exhibits.
- The exhibit was designed in cooperation with Hands On, Inc., an exhibition design company based in St. Petersburg, Florida.
- Principal advisor on the project was Dr. Paul Slovic, president of Decision Research, Eugene, Oregon, and a professor of psychology at the University of Oregon. Slovic studies human judgment, decision making, and risk analysis, and is the author of *The Perception of Risk* and *Risk Analysis*.
- *Risk!* is targeted to children ages 12 and up and adults and is also appropriate for elementary school-age audiences.
- The *Risk!* exhibit encompasses 5,000 square feet of space.
- The *Risk!* exhibit is expected to draw an estimated 2.5 million guests in its first three years of travel.
- Planning for *Risk!* began in 1998.



© Exhibition design by Hands On! Inc. Photograph by Frank Baphe.



WILL I or WON'T I?



EXHIBIT VENUES

March 2 – September 2, 2002	Fort Worth Museum of Science and History
October 11, 2002 – March 2, 2003	The Franklin Institute, Philadelphia
March - September 2003	Fort Worth Museum of Science and History
October 2003 – March 2004	California Science Center, Los Angeles
April –September 2004	Museum of Science, Boston
June – August 2005	Pacific Science Center
October 2005– January 2006	COSI, Columbus
February – September 2006	Fort Worth Museum of Science and History
October – December 2006	Carnegie Science Center
February – April 2007	Carnegie Science Center
November 2007 – May 2008	Long Island Museum of Science and Technology, Garden City
May – September 2008	Contract pending

goose bumps!

the  science of fear

FEAR

THE EMOTION THAT CAN SAVE YOUR LIFE

We often cast fear in a negative light – as a weakness we must overcome. In reality, the fear response is often the very thing that keeps us safe from harm.

Enter the exhibit, and explore the many sides of fear.

- ▶ Experience fear.
- ▶ Measure and observe the fear response.
- ▶ Understand the science of fear.
- ▶ Reflect on the role fear plays in society and your own life.

COME ON IN! WHAT ARE YOU AFRAID OF?

www.fearexhibit.com

Choice and Chance: Engaging the Public

Room: 206A 2:00 - 3:30 PM

Chair(s): Joseph Andrade

14:00 Choice and Chance at The Leonardo--the visitor as participant.

Andrade, Joseph

Utah Science Center @ The Leonardo

jandrade@utahsciencecenter.org

14:30 From Research to Public Awareness and Education.

Slovic P*, Walter C;

University of Oregon

pslovic@pop.uoregon.edu

15:00 Risk, humor, and the SRA.

Thompson KM

Harvard School of Public Health

kimt@hsph.harvard.edu

15:30 Your turn!



Luck and Risk: Personal and Private Statistics

The luck of the draw, breaking your leg, a gun in your house, and your chance of getting cancer—they are all due, in part, to randomness, statistics, and luck.

QUESTIONS

- 1 How is borrowing money like gambling?
- 2 Are most of the risks I worry about really significant?
- 3 What is insignificant?
- 4 *Want* versus *need*? What do you mean?
- 5 Why do some people voluntarily take great risks?
- 6 Why is one of the riskiest occupations “no occupation at all?”
- 7 How is interest an exponential function?
- 8 What is the Bell or normal distribution curve?

throws don't give you five and five. The result is a typical normal or bell curve. Almost everything you measure in nature gives a similar curve. If we were to do this with the height of typical university students, it ranges from under five feet to over six feet. There are no eight-footers, or three-footers. The majority of us are average, about 5.5 feet.

Now, obviously I could change the statistics. Because any set of statistics depends on the population, the group from which the data were gathered. If I were to look at the distribution function for the height of professional NBA basketball players, you know that it's not going to peak or average around 5.5 feet. It peaks at about 207 cm, about 81 inches, nearly 7 feet! But this is not a normal bell curve. It is skewed towards the taller end of the curve; it's a non-symmetrical distribution.

When you read the polls in the paper—when you read anything in the paper, don't ever take it literally. You always have to go beyond the headlines, or even the first paragraph, and ask yourself what is really going on. Has this data or this population been *selected*?

Risk and Perception

Another very important subject is risk—and this one is closely tied to perception. Perception is not only related to what we do with the physical and chemical information provided by our senses, perception is also involved in dealing with a wide range of socio-political and psychological issues. Risk perception is particularly interesting and important. We all want to avoid risk. We do not intentionally fall down stairs, slip on the ice, or otherwise cause harm or injury to ourselves, and yet those risks are all around us. We make hundreds, perhaps thousands, of decisions everyday which relate to risk avoidance or risk acceptance. But almost no one objectively assesses their personal risks.

There is a science of risk assessment which has developed in the last 20 years. It says that you and I have a strategy for assessing risk (Figure 37-12), al-

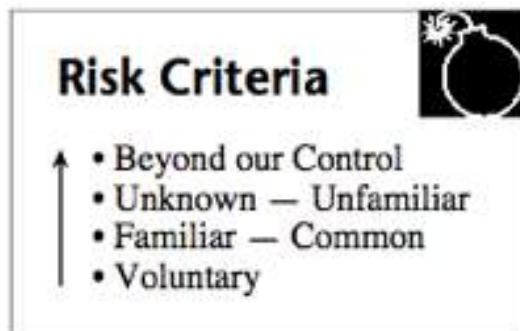


Figure 37-12 Risk perception factors. Things which are voluntary are perceived as far less risky (a thousand times less!) than unfamiliar risks or risks completely beyond your control.

- Is it beyond our control? Examples include global, catastrophic events, such as a major, devastating earthquake;
- Is it relatively unknown or unfamiliar? Is there little experience or data, such as the genetic engineering of new organisms;
- Is it common, familiar? Is it readily observable and interpretable? A good example is auto accidents;
- Is it voluntary or largely self-controllable? Examples are smoking, skiing, sky diving, driving.

Even if we have data and are told that risks are approximately the same, we perceive risks very differently, based on these four criteria. Stuff which is uncontrollable or unknown is considered to be the greatest risk—the ones for which we demand protection by society. Those risks which are more common, more well known, are accepted because of their commonness, especially if we have some voluntary choice over them. Risks that seem fairly shared are seen as more acceptable than those that are not. We perceive natural risks as less threatening than man-made ones, and risks from exotic or new technologies are more feared than those involving

being over a thousand times safer than those things which you might normally chose to do.

So, just as you perceive the world, non-objectively (Chapter 2), based on your experience, your attitude, your mood, and a variety of other factors, you also perceive statistics, probability, and risk the same way, non-objectively. Your risk perception is largely conditioned and controlled by what you have already learned or think you have learned by familiarity or lack of familiarity.

Let's look at some risk numbers. Flying in the space shuttle is a very risky job—Utah's Senator Garm knew that (Figure 37-13). All the astronauts know that, even if the press is surprised. Mountain climbing can be very risky, but it's a voluntary risk (Figure 37-14). You choose to take it or you don't.

The greatest daily risk most of us face is being involved in an auto accident (Figure 37-13). One in 5,000 per year! That's pretty risky. If you're a pedestrian, that decreases by a factor of five. It's much safer being a pedestrian. You also have about a 1 in 10,000 annual risk of having a significant accident in your own home. But in many parts of the country your risk of getting shot is now approaching the #1 risk, auto accidents (Figure 37-15).

One of the riskiest occupations in society is no occupation at all. The riskiest occupation is to be unemployed. Being unemployed rates as the equivalent of smoking about 10 packs of cigarettes a day. Being very poor is just as risky. It's been reported that living in poverty reduces your life expectancy nearly 10 years. Severe emotional or psychological stress is generally far riskier than the physical risks we routinely face.



Risk

Space Shuttle Explosion . . .	- 1 in 130 flights
Auto Accident Death	- 1 in 5,000 per year
Pedestrian Death	- 1 in 26,000 per year
Death by Lightning	- 1 in 1,000,000/year
Home Accident	- 1 in 10,000 per year

Figure 37-13 Some risk numbers .

Climbers seek summits in the shadow of death

Mount Everest victims knew risks of their journey to the top of the world.

Associated Press

NEW YORK — The eight men and women who died in a blizzard on Mount Everest knew before they started that even if they reached the world's highest peak, it could all end in disaster.

So why did they spend \$60,000

Blizzard rescue

Nepalese army helicopters evacuated two people from Mount Everest on Wednesday after one of the deadliest blizzards ever on the peak.

The helicopters carried Charlotte Fox of Aspen, Colo., and Michael Groom of Australia to Katmandu's airport. They left with represen-

Figure 37-14 Mountain climbers know the risks. Adventure is generally tied to risk; if it wasn't risky, it wouldn't be an adventure! (From *Deseret News*, Salt Lake City, May 15-16, 1996.)

Keep Guns in Sight

Here's a prediction to chill you: The U.S. Centers for Disease Control and Prevention says that by the year 2001, there will be more U.S. deaths annually from guns than from car accidents.

No, it's not because we're using our cars less. We do use them more safely now, however, thanks largely to educational campaigns that, over time, have

That's regrettable. The CDCP has been a beacon of enlightenment as the efforts of gun-related violence on society.

CDCP research, for instance, has found that a gun in the home almost triples the risk of homicide and family violence. The CDCP also reports that 75 percent of the risk of suicide.

The National Rifle Association's news-

Figure 37-15 Guns are risky. More guns mean more risk. Enough said. (From *Salt Lake Tribune*, 1996.)

predictions can be made about the behavior of collections of molecules using their normal distribution averaging methods, but we cannot predict the behavior of that individual electron, atom, or molecule. Remember Heisenberg (Chapter 16)? His uncertainty principle always wins. The intrinsic uncertainty makes individual predictions impossible. Those same statistical problems or principles apply at the level of our individual risk. Insurance companies cannot predict whether you will be killed or injured in an accident, although they can accurately estimate the annual number of car accident-related deaths in the U.S. When that statistical event happens to you it can be the cause of great sorrow or great celebration. If it's winning the lottery or a jackpot at Wendover, then presumably it's cause for celebration. But if it's a senseless statistical event that results in great loss, then it seems so senseless (Figure 37-16).

There is a lot we can do to minimize risk—putting on our seat belts, driving carefully, alertly, defensively; walking carefully on the ice; wearing safety glasses. But we also have to understand, appreciate, and even accept that rare, random, senseless events *do* happen. And when they do happen, if they were truly random, then it simply is no one's fault.

Our legal system today, both the judges and the lawyers, simply do not understand that fact. This lack of education and un-

derstanding is a continuing to be of great concern. But that's another story.

Question everything you see and read. Ask yourself: Is this representative? Is this general? Is this reasonable? Or is this an isolated event, blown out of proportion? And remember that there is no such thing as zero risk of anything. Random events happen. Senseless, horrible events happen—and so do senseless, wonderful events.

Good luck!

Family Has Extra Burden Of Death's Randomness

By Dan Harrie

THE SALT LAKE TRIBUNE

Aside from the usual shock and desolation that accompany the sudden death of a loved one, Utah family members of U.S. Army Maj. Stephen Mark Badger must cope with the maddening randomness of his staying by a sniper's bullet.

"You think about them going to war — and then to be shot like that for no good reason — I don't know what word to use," 69-year-old Maurine Badger said Saturday of her 37-year-old son's death.

"It seems so senseless," she said in a voice hoarse from talking to family, friends and reporters in the aftermath of the tragedy.

Badger was killed in a sniper attack Friday at Fort Bragg, N.C.

Badger's Utah family members Saturday said they believed the suspect was unknown to the victim.

"It was totally random," said nephew Robert J. Badger, 22.

Badger made countless parachute jumps and just last August injured his leg during a demonstration jump — marred by heavy winds — at a veterans' convention in West Jordan.

Even in his spare time he pursued risky, edge-pushing sports — hang gliding, mountain climbing and skiing.

Ironic then, relatives suggested, that he had been cut down during routine exercises.

"In the news media you often hear of different families who have been affected by random violence, and I never in my wildest dreams ever imagined we would find out what it was like," said nephew Robert Badger Jr. "I dearly wish I was not finding that out at this point."

The first hint Maurine Badger had of her son's death was a radio report at mid-day Friday as she was returning home from a trip to the Church of Jesus Christ of Latter-day Saints Jordan River Temple. The broadcast said only that a

Figure 37-16 Unfortunately, guns are used and senseless gun-related deaths are becoming more common. (from the Salt Lake Tribune, Feb. 5, 1996).