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THE STATE UNIVERSITY OF NEW JERSEY

**Effectively Communicating about Science
in an Era of Virally Disseminated
Nonsense**

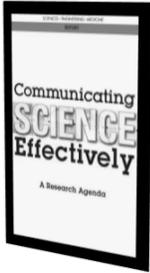
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University of Pennsylvania



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“Communicating about science effectively with public audiences, . . . turns out to be more difficult than it might at first appear.”



<https://www.nap.edu/catalog/23674/communicating-science-effectively-a-research-agenda>

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“People communicate about science for diverse reasons, there is no single audience for scientific information, and the societal contexts surrounding different scientific issues can vary considerably. Communication approaches need to be adapted to reflect the circumstances that prevail.”





Five Goals for Communicating Science

- *Share the findings and excitement* of science.
- *Increase appreciation* for science as a useful way of understanding and navigating the modern world.
- *Increase knowledge* and understanding of the science related to a specific issue.
- *Influence* people's opinions, behavior, and policy preferences.
- *Engage* with diverse groups so that their perspectives about science related to important social issues can be considered in seeking solutions to societal problems that affect everyone.





Key Assumptions:

- For each goal, the assumed roles of the communicator and audience differ
 - Who has information worth sharing?
 - Who should be part of the process of deciding?
- Trouble comes when the answers to these questions are not shared between the communicator and audience





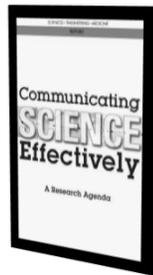
Why are you communicating?

- Simply to share the findings and excitement of science.
- To increase appreciation for science as a useful way of understanding and navigating the modern world.
- **To increase knowledge and understanding of the science related to a specific issue.**
- **To influence people's opinions, behavior, and policy preferences.**
- To engage with diverse groups so that their perspectives about science related to important social issues can be considered in seeking solutions to societal problems that affect everyone.

Education ≠ Persuasion

THE SIMPLE—AND FALSE—MODEL OF SCIENCE COMMUNICATION

“...the “deficit model” is widely held, simple on the surface, and appealing, but frequently does not hold. This model depicts nonscientists simply as not yet informed about what science has to say on a topic. In this model, “the science” of an important question is settled, and stands immutable and clear to the experts; the task of communication is simply to explain the facts to the public. However, real-life science communication rarely if ever operates in this way.”



Why Education Alone Doesn't Work

- Simply providing facts rarely meet an individual's needs, wants, or expectations.
 - Distance between knowledge, beliefs, attitudes, intentions, behaviors
 - Stage models of behaviors
- Educational efforts often assume a base level of knowledge that doesn't exist.
 - Much of the public does not understand the context that would allow them to incorporate the information presented.
- They also often assume a base level of interest in the details that doesn't exist.
- People don't know what they don't know – so are unlikely to seek education.

Perception

- Perception is reality
 - We act or fail to act based on our perceptions



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Motivated Reasoning

- We look for and readily incorporate new information that is consistent with our beliefs



Motivated Reasoning

- We tend to reject new information that is inconsistent with our beliefs
- We resent those who try to "correct" us



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Motivated Reasoning and Social Media

- Algorithms used to deliver targeted information
 - based on our demographics, previous searches, likes, and sharing behaviors
- Social media filters information through our friends
 - highlighting views and opinions that we agree with
- Most users of social media are connected to a small number of like-minded others.



 Share on Facebook  Share on Twitter

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The Public is Predictably Irrational

- People's perceptions are often inaccurate
- People's actions may be inconsistent, and they ultimately may not be in their own best interests.

However,

- Perception and behavior are predictable
 - And manageable



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Can The Public Reach The Right Decision?

- Yes
 - But it depends on what your definition of "right"
 - Public perceptions are unlikely to match expert perceptions



Can The Public Reach The Right Decision?

- We tend to believe that:
 - others share our values
 - know many of the same things we do
 - are naturally interested in the same things we are
- We generally overestimate how representative our own knowledge and opinions are





Can The Public Reach The Right Decision?

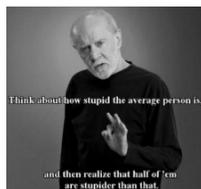
- We also believe that given the same set of facts, others would come to the same set of conclusions
 - This belief is strongly held by scientists
 - It's the basis for the scientific method
 - This belief is also socially reinforced
 - We choose friends with similar values and interests who do think much the same way we do
 - In part, this is why we enjoy our associations with them





Can The Public Reach The Right Decision?

- We tend to think that everyone does (or should) think the same way we do
- We question the competency or motives of those who do not agree with us
- As a result, it is easy for experts to conclude that the public is inconsistent, "irrational", or just plain "stupid."



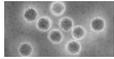
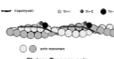


Danger in Dismissing the Public

- Concluding that efforts to provide information and education are a waste of time and money.
 - ensures that the public will not have the tools needed to make informed decisions.
- Concluding that the public cannot make "good" decisions.
 - As such, those who are rational (the experts) should make decisions that are "good for the public."
 - the public often becomes angry that decisions about the acceptability of a perceived risk are being made for them.



Most of the Public Health Risks We Worry About Are Invisible

Bacteria	Viruses	Chemicals	Allergens
 E. coli	 Norovirus	 Melamine	 Plant Allergen
 Salmonella	 Hepatitis A	 Malachite Green	 Shrimp Toponoxin



Central Thesis:

- Many important technologies and systems, especially those at the genetic, cellular, or nano-scale are both literally and figuratively invisible to people.
- They operate on a scale that makes their mechanisms difficult to explain or to comprehend without reference to scientific principles that are unfamiliar to most.
- However, formal efforts designed to educate the public about these technologies and systems have been largely unsuccessful.



Mental Models

- Important to know what people *know* about an issue.
- Important to know what people *want* to know about an issue.
- More important to know how people *think* about an issue.

- Important to understand what they see as "the big picture" and how they construct that view



Views of Complex Systems

- Only 20% of Americans rate their understanding of science as poor
 - Most have a poor grasp of basic scientific facts
- In fact, they often exhibit a kind of 'false fluency'
 - They may have the right vocabulary, but not the right constructs
 - Knowledge is 'a mile wide and an inch deep'
 - They 'fill in' gaps in facts to complete their version of 'the big picture'
 - They will use whatever information is available to do so
 - This can create problems



Mental Models

- Mental modeling efforts have often focused exclusively on the science or technology
- 'How things work'
 - This can be useful in understanding how people are likely to interact with a technology



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The Immune System

How the immune system works





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Victory of the white blood cells

Victory





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How Does Vaccination Work?



How Does Vaccination Work?

- Consistent with the military metaphor:
 - It adds extra troops to your 'germ fighters'
 - It's like the cavalry riding in

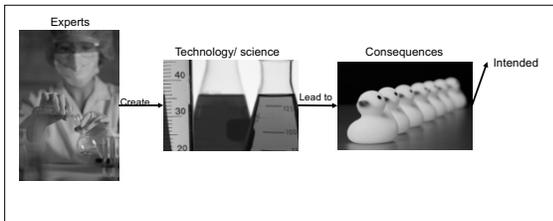


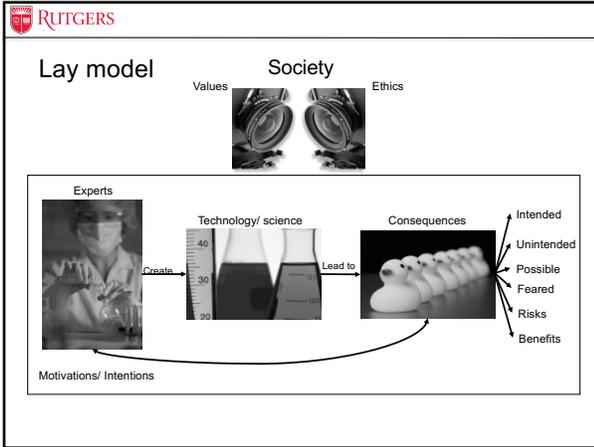
How Does Vaccination Work?

- Vaccines help your germ fighters recognize the enemy and respond to them more quickly



Expert model





Values Matter

Connecting with shared values is often a more effective communications strategy than using "facts" to convince people that they are wrong

Sarah Pope, the Healthy Home Economist, and infectious-disease advocate.

"You can line up the doctors from here to down the block refuting me, but I'm not going to change my mind."
"My data is different."

COMEDY CENTRAL

Cognition and Affect

- Many psychologists (and especially economists) who incorporate affect into their theories of risk and decisions believe that affect is the byproduct of cognition.
 - People evaluate the information they are given, which leads to an overall affective reaction (i.e. fear, anger, dread, outrage).



Cognition and Affect

- However, research suggests that people have a remarkably poor understanding of what influences their perceptions and behaviors.
 - They can't say
 - Why they feel the way they do.
 - Why they made a particular choice.
 - Why they act the way they do.



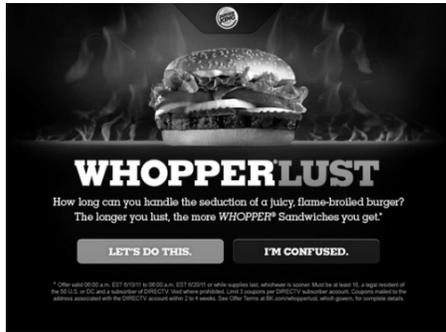
<http://www.cobethall.com/the-cobeth-report-video/2403/october-17-2005/the-word-truthiness>

Affect Can Come First

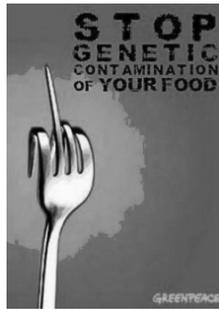
- Affect can also drive future cognition.



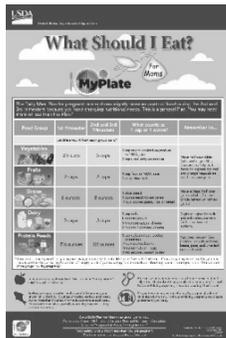
Food Advertising Often Relies on Affect



Activist's Messages Often Rely on Affect



Nutrition Information Relies on Cognition



Amount Per Serving		% Daily Value*	
Calories 20	Calories from Fat 10		
% Daily Value*			
Total Fat 1g			2%
Sodium 190mg			8%
Total Carbohydrate 2g			1%
Protein 1g			
Vitamin A 2%	Vitamin C 15%		
Iron 10%	Vitamin B6 20%		
Vitamin B12 4%			

Not a significant source of saturated fat, trans fat, cholesterol, dietary fiber, sugars, and calcium.
*Percent Daily Values are based on a 2,000 calorie diet.

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Food Safety Messages Rely on Cognition

Employees Must Wash Hands Before Returning To Work



4 SIMPLE STEPS TO FOOD SAFETY

-  Clean
-  Separate
-  Cook
-  Chill

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Risk Perception

- "Risk perception is a mix of facts and feelings, intellect and instinct, reason and gut reaction. And in many cases, the feelings/instinct/gut have the greater influence."
- David Ropeik

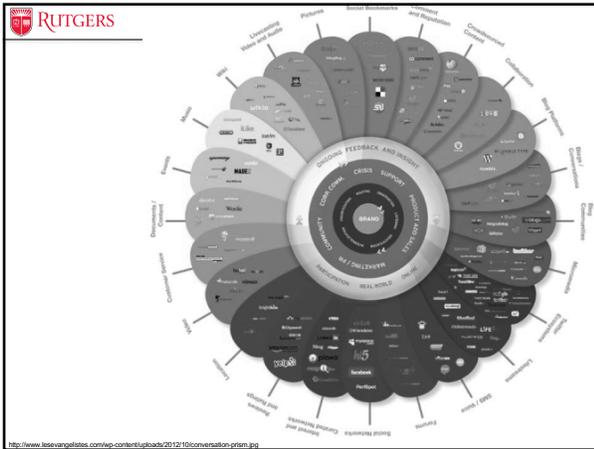
Risk communication must address each of these influences



Social Media Landscape



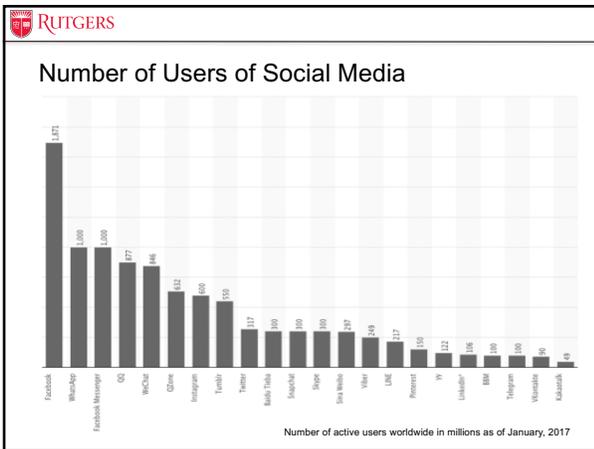
FredCavazza.net



SOCIAL MEDIA EXPLAINED BY Donuts

- 🐦 TWITTER: I'M EATING DONUTS
- 📘 FACEBOOK: I LIKE DONUTS
- 📍 FOURSQUARE: THIS IS WHERE I EAT DONUTS
- 📺 YOUTUBE: WATCH ME EAT DONUTS
- 🌐 LINKEDIN: I AM VERY SKILLED AT EATING DONUTS
- 👤 GOOGLE+: I AM A GOOGLE EMPLOYEE WHO EATS DONUTS
- 📍 MYSPACE: WHERE'D ALL THE OTHER DONUTS GO?
- 📷 INSTAGRAM: HERE IS A VINTAGE PHOTO OF MY DONUT
- 📺 QLOORA: WHY AM I EATING DONUTS?
- 📺 TOUT: WATCH ME EAT DONUTS REALLY FAST
- 📷 PHOTOVINE: SEE GOOGLE'S FAILED DONUT PHOTO
- 📷 PINTEREST: HERE IS MY DONUT RECIPE
- 📷 TUMBLR: HERE IS MY BRIEF STORY ABOUT DONUTS
- 📷 REDDIT: READ ABOUT HOW I EAT DONUTS
- 📷 YELP: READ A REVIEW OF MY DONUT
- 📷 FLIKR: ADD MY PHOTO OF DONUTS
- 📷 PRWEB: PRESS RELEASE: I ATE A DONUT
- 📷 STUMBLEUPON: EVER TRIED A FISH DONUT?
- 📷 CRAIGSLIST: ANYONE WANT TO BUY A DONUT?

http://thedigitaldope.in/wp-content/uploads/2015/02/SMD.jpg



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**“A lie can travel halfway around the world
while the truth is putting on its shoes.”**

- Mark Twain

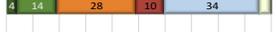


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Lies only have to be plausible to be accepted

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Beliefs about Eating GM Foods

Some people have had allergic reactions to genetically modified foods.	
Eating genetically modified wheat has caused more people to become sensitive to gluten.	
Eating genetically modified foods has caused an increase in cancer.	
Eating genetically modified foods is more likely to cause obesity than eating non-genetically modified foods.	
By eating a genetically modified fruit, a person's genes could also become modified.	

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ TRUE
 ■ Likely True
 ■ Likely false
 ■ FALSE
 ■ Unsure
 ■ Refused

Hallman, Cuite, Morin, 2013 Survey of 1148 American Adults

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THE WALL STREET JOURNAL

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BUSINESS

KFC Sues Chinese Companies Over Alleged Eight-Legged Chicken Rumors

Restaurant says three companies 'misleading the consumer' on Internet

A photograph of a KFC restaurant in Qidong city, southeast China's Jiangsu province. (2014 photo. KFC said it suing three companies in China for allegedly spreading rumors about the quality of its food, claiming that fast-foods have eight legs. March 2016 photo.)

By LAUREN BLOOMFIELD
March 29, 2016, 12:30 PM EDT

NO COMMENTS

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Internet hoax: KFC said one of the best-known fake rumors was that chickens used by the company are genetically modified and have six wings and eight legs (computer generated image)

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Beliefs about GMOs

Sugar made from genetically modified sugar beets is different from sugar made from regular sugar beets.

Genetically modified crops are harmful to bees.

A large fast-food company used chickens so altered by genetic modification that they can't be called chicken anymore.

Pollen from genetically modified corn was shown to kill butterfly larva in a laboratory.

Tomatoes genetically modified with genes from catfish would probably taste fishy.

Statement	TRUE	Likely True	Likely false	FALSE	Unsure	Refused
Sugar made from genetically modified sugar beets is different from sugar made from regular sugar beets.	6	32	18	5	35	6
Genetically modified crops are harmful to bees.	7	26	18	5	43	6
A large fast-food company used chickens so altered by genetic modification that they can't be called chicken anymore.	5	22	23	11	35	6
Pollen from genetically modified corn was shown to kill butterfly larva in a laboratory.	3	22	12	1	57	6
Tomatoes genetically modified with genes from catfish would probably taste fishy.	2	8	31	19	35	6

Hallman, Cuite, Morin, 2013 Survey of 1148 American Adults

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Our Audiences are International

- When the FDA announces a product recall
 - People in other countries often contact their own food authorities to determine if the product is sold there.

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The Internet is an Abundant Resource



Ancient Wisdom, Modern Technology

Home Bioelectronics Royal Rifle Halls Clark Frequencies CAPL NCPL
 SEARCH Naturopathy Regimens Therapies Site Map Contact Sponsors

Home > Naturopathy > Therapies > Toxins > Toxin Avoidance > Toxins in Foods

Toxin Free Food Suggestions

Summary: Avoid processed foods when possible. Limit grain consumption, especially of whole wheat products, peanut butter, and other potentially moldy foods unless steps are taken to detoxify them. Use vitamin C to help the liver detoxify mold toxins. Avoid bruises on fruits.



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The Messages are Often Consistent



The screenshot shows an eHow health article titled "How to Avoid Food Toxins". The article is by an author named "eHow.com" and has 62,110 views. It includes social media sharing options for Facebook, Twitter, and LinkedIn. The article text states: "Toxins are found in a lot of the food we eat every day. Toxins are dangerous to your body and can cause a range of health problems. If you want to avoid toxins in your food, follow these steps."

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Too Much Information Available

- The Public Depends on Curators and Interpreters of Food Safety Information
 - Health Professionals
 - Science Communicators
 - Government Agencies
 - Consumer Organizations
 - Authors / Journalists
 - Museums
 - Advertising
 - Interactions with Other People
 - Websites and Blogs
 - Social Media

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Trust Components

- **Credibility** - The extent to which a source or institution is perceived to have the knowledge and expertise to assess, manage and communicate about a risk.
- **Honesty** - The extent to which a source or institution conveys information about a risk in an open, truthful and transparent way.
- **Care** - Care for the interests of the other party and that the source or institution shares the same values and concerns.

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FOOD BABE 

Hot on the trail to **INVESTIGATE** what's really in **YOUR FOOD**

End the confusion. It's easy. Discover what is truly healthy and get a FREE guide to surprisingly powerful foods that will change your life.

First Name Email

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How To Choose The Healthiest Chicken For You & Your Family

By Food Babe
March 28, 2016 56 Comments

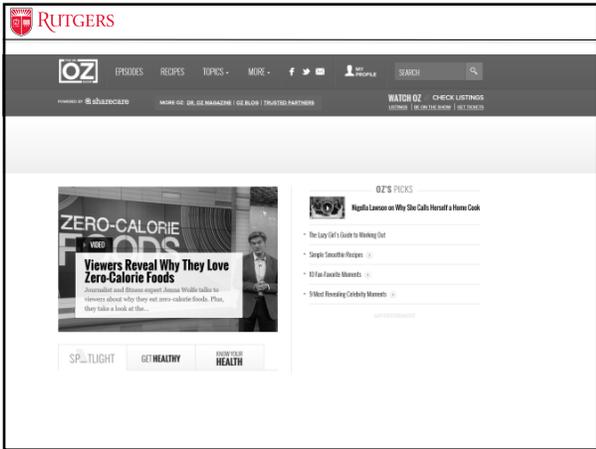
 

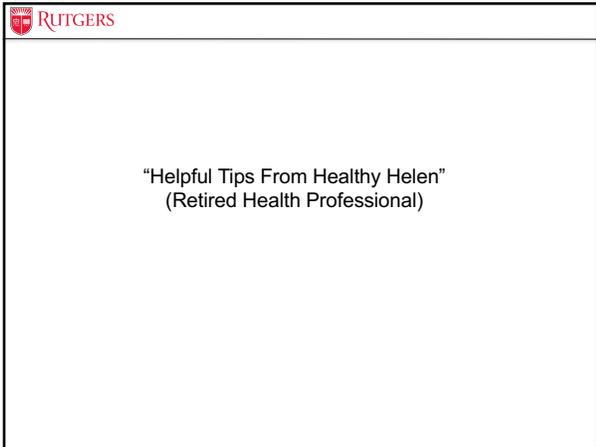
There is no doubt, that chicken is the most popular meat to consume in the United States. It's viewed as a cleaner, leaner protein than beef, and lots of people eat it while they are dieting or trying to get "healthy". Did you know that over 8 billion chickens are farmed for meat every year in the country? Right? Well...

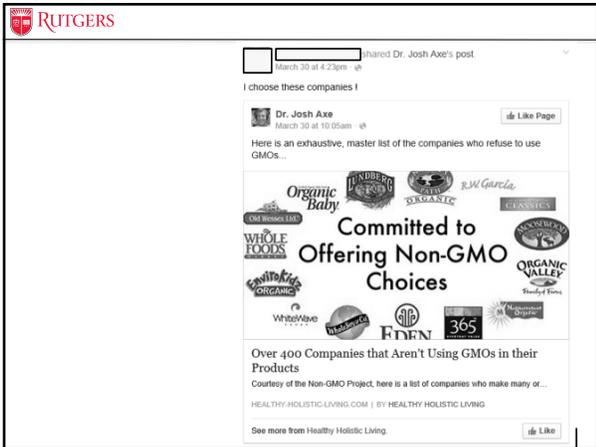
To meet this audience demand for chicken, much of the industry breeds and feeds chickens in a way that

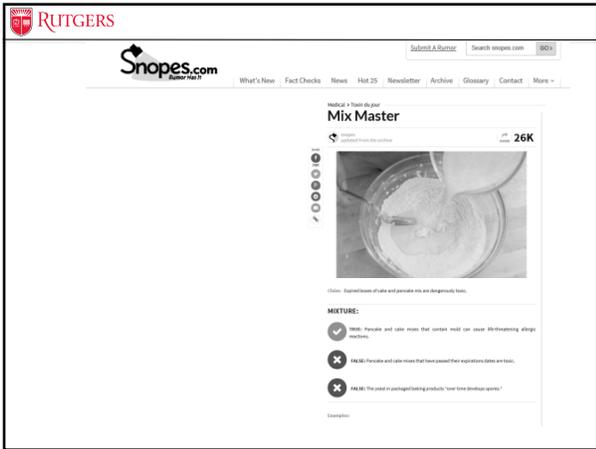


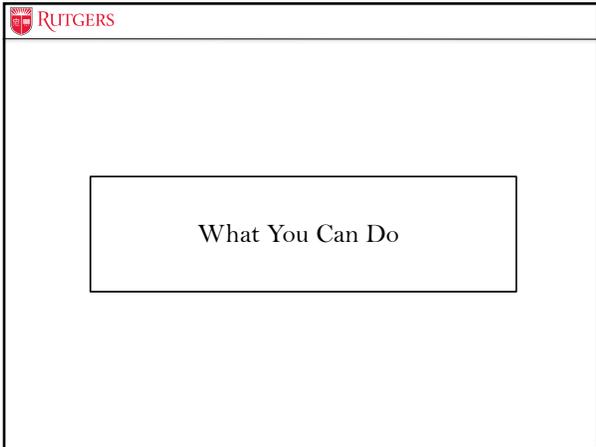
<http://foodbabe.com/>













Engage

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Understand the Starting Points of Audiences

- What is it that people:
 - Know
 - Should know
 - Want to know
- What mental models are people using?
 - How do they *understand* the nature of the problem and proposed solutions?
 - What intended and unintended consequences do they fear?
 - What motivations do they assume key actors have in trying to persuade them?

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Go Beyond the Deficit Model

- Virally Disseminated Nonsense is Pervasive and is Increasing
- Communicating the “facts” is important
 - But is only effective in the absence of information
 - People resist/resent being told that they are wrong
- Understand and connect with shared values and concerns
 - What underlying concern does this misinformation express?
 - Simply correcting information doesn't necessarily address the concern
- Use your status carefully
 - Indicate when you are speaking as an authority with expertise
 - Be clear when you are providing an opinion as an educated person who has reviewed the available evidence

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Learn the Science of Science Communication

- The public and the scientific community can both benefit when scientists engage
- But few scientists have had formal training in communicating science
 - Most of us rely on our intuitions
- Intuitions, even informed by experience, aren't always right
- We need to use scientific principles to determine how best to communicate about science.

For More Information:	
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