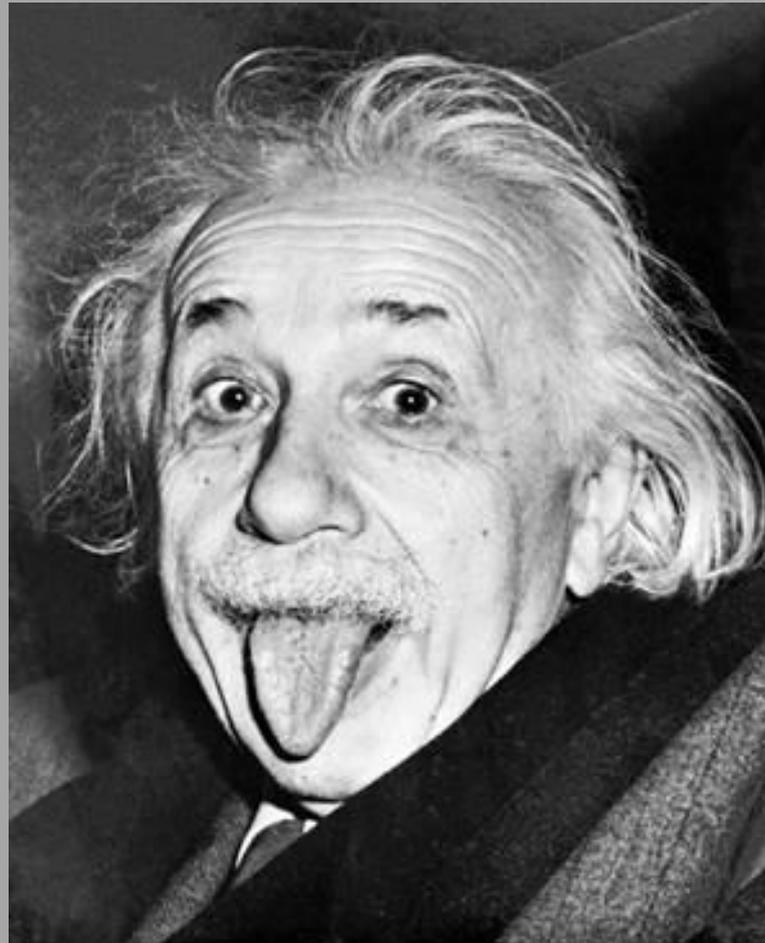


Vaccine Safety - Communicating with parents

- What is science?
- Why is the public understanding of science important?
- Can science help us discuss vaccine safety with patients?

Let's select the next principle oboist
for the New York Philharmonic
Orchestra. How are we going to go
about it?

“Science is nothing more than a
refinement of everyday thinking.” Albert
Einstein



Science is an investigation of nature based on the construction of empirically verifiable theories and hypotheses (***naturalism, empiricism, theory***)

- from *Nonsense on Stilts: How to Tell Science from Bunk* by Massimo Pigliucci, Professor of Philosophy, City University of New York

Characteristics of science

- “Science is nothing more than a refinement of everyday thinking.” Albert Einstein
- Generation of hypotheses that are rigorously tested and *shared* (here they are critiqued and evaluated)
- Requires work and reason
- Is prone to error, to a large extent because it is a human endeavor, must be on guard for bias and dishonesty
- Is self-correcting, especially in open free democracies
- It is a universal language understood by some members of all races and all religious beliefs

Characteristics of science (con't)

- A powerful characteristic is that it is predictive



- May never find Truth, but continually improves on truth (closer and closer approximations of Truth)

**“Why Most Published Research
Findings Are False,” *PLoS Med.* 2005
August
John P. A. Ioannidis**

This paper and others are sometimes used as example of the unreliability of science, when in fact such critiques serve to improve science by refining empiric testing of hypotheses and theories.

“...the probability that a research finding is indeed true depends on the prior probability of it being true (before doing the study), the statistical power of the study, and the level of statistical significance.” Ioannidis, John P.A., *PLoS Med.* 2005 August

Hypothesis	Prior probability	Number of observations	Meets statistical significance (p < 0.05, but p < 0.001 better)	(t) rue ?
World is flat	Highly unlikely	Many	Rarely	Highly unlikely
Laetrile or shark cartilage cures cancer	Unlikely	Many	Rarely	Highly unlikely
Penicillin cures strep throat	Likely	Many	Often	Highly likely
Homeopathy effective	Highly unlikely	Many	Rarely	Highly unlikely

"Extraordinary claims require extraordinary proof." If prior probability is very low then evidence to support claim should be correspondingly high.

What is not science?

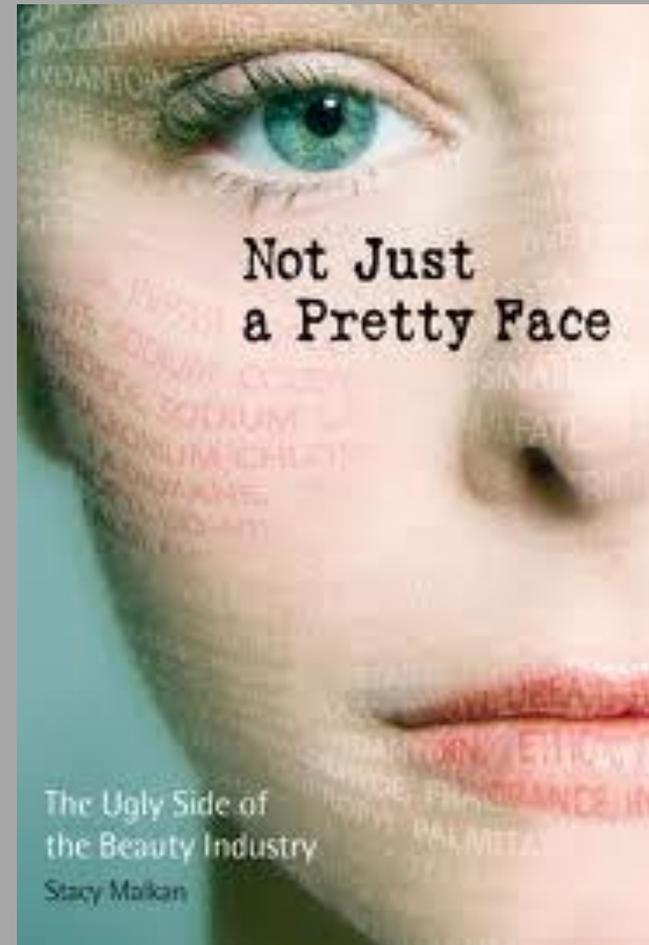
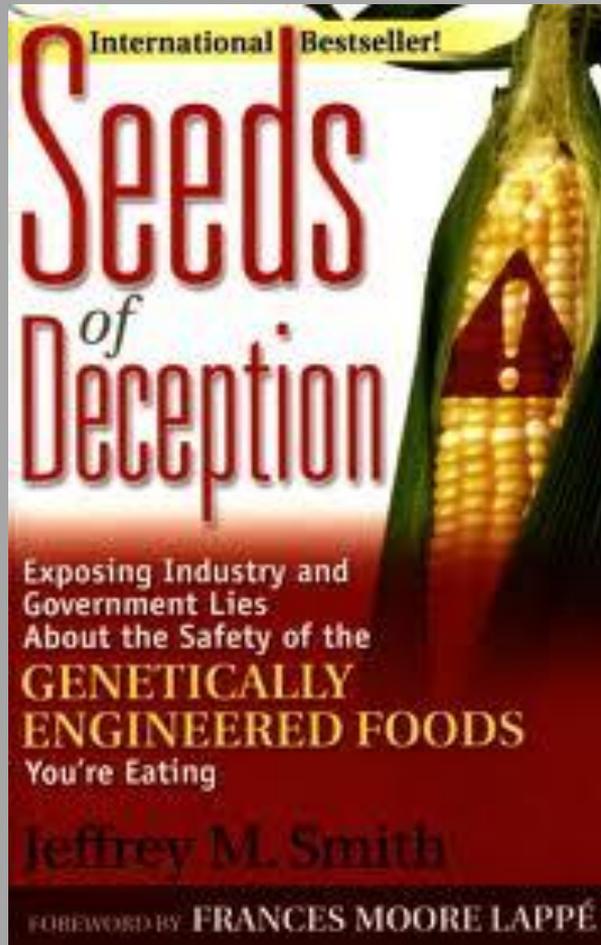
This table contrasts some of the characteristics of science and pseudoscience

Science	Pseudoscience
Their findings are expressed primarily through scientific journals that are peer-reviewed and maintain rigorous standards for honesty and accuracy.	The literature is aimed at the general public. There is no review, no standards, no pre-publication verification, no demand for accuracy and precision.
Reproducible results are demanded; experiments must be precisely described so that they can be duplicated exactly or improved upon.	Results cannot be reproduced or verified. Studies, if any, are always so vaguely described that one can't figure out what was done or how it was done.
Failures are searched for and studied closely, because incorrect theories can often make correct predictions by accident, but no correct theory will make incorrect predictions.	Failures are ignored, excused, hidden, lied about, discounted, explained away, rationalized, forgotten, avoided at all costs.
As time goes on, more and more is learned about the physical processes under study.	No physical phenomena or processes are ever found or studied. No progress is made; nothing concrete is learned.
Convinces by appeal to the evidence, by arguments based upon logical and/or mathematical reasoning, by making the best case the data permit. When new evidence contradicts old ideas, they are abandoned	Convinces by appeal to faith and belief. Pseudoscience has a strong quasi-religious element: it tries to convert, not to convince. You are to believe in spite of the facts, not because of them. The original idea is never abandoned, whatever the evidence.
Does not advocate or market unproven practices or products.	Generally earns some or all of his living by selling questionable products (such as books, courses, and dietary supplements) and/or pseudoscientific services (such as horoscopes, character readings, spirit messages, and predictions).

Science is an investigation of *nature* based on the construction of *empirically verifiable theories and hypotheses (naturalism, empiricism, theory)*

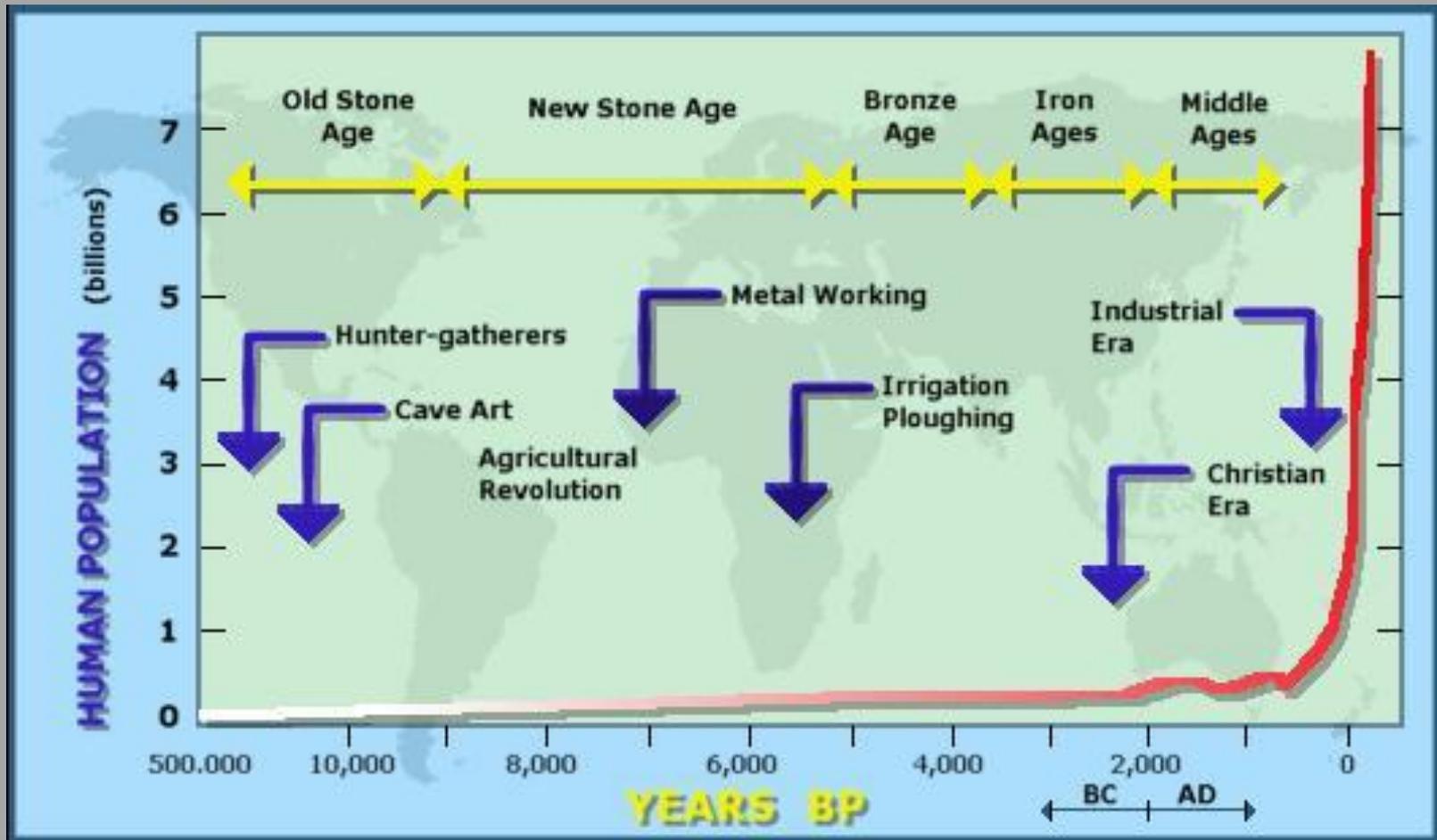
- Science
 - evolution
 - evolutionary biology
 - astronomy
 - relativity
 - genetics
 - germ theory
- Pseudoscience
 - creation “science” and intelligent design, anti-vaccination beliefs
 - astrology
 - Homeopathy and much “alternative care”
 - search for extra-terrestrial life and cosmology (?)

There is a subtle but critical difference between following where the evidence leads without preconceived bias (science) and using evidence to support ideology



Why is a public understanding of science important?

Historical world population growth



Here is one remarkable but little appreciated reason
the public understanding of science is important.



From Hans Rosling, PhD and <http://www.gapminder.org/>

Why is the public understanding of science important?

- More skeptical and open minded (the result of a better appreciation of the power and workings of science)
- Better citizenship
 - Resource allocation decisions
 - Education decisions
 - Legal issues
 - Policy decisions
 - Global warming
 - Genetically modified foods
 - Stem cell research
 - Bioengineering

How should we talk to patients,
especially those who are hesitant,
about immunizations?

A suggestion from the Autism Science Foundation

New 4-step Framework for Communicating Science: Making the CASE for Vaccines

- **C**orroborate: Acknowledge the parents' concern and find some point on which you can agree. Set the tone for a respectful, successful talk.
- **A**bout Me: Describe what you have done to build your knowledge base and expertise
- **S**cience: Describe what the science says
- **E**xplain/Advise: Give your advice to patient, based on the science





Communicating Effectively About Vaccines

Summary of a Survey of U.S. Parents and Guardians

Figure 2. Reasons for Delaying or Refusing Vaccines.

Stated reasons for delaying or refusing vaccines	Total	Significant Refuser	Minor Refuser	Vax-Major Concern	Vax-Minor Concern	Vax-No Concern
<i>Unweighted Base</i>	(278)	(130)	(57)	(47)	(31)	(13)
% Selecting Each Reason						
Did not want too many vaccines given at same time	53%	59%	66%	51%	51%	35%
Doctor recommended delaying the vaccine	12	14	6	12	15	8
Child was sick	9	8	2	23	11	5
Family/friend recommended delaying	5	7	3	12	4	0
Other (Grand Net)	33	32	35	30	30	37
Insurance Concerns (Net)	3	0	2	1	3	10
Had no insurance	2	0	1	1	0	10



Communicating Effectively About Vaccines

Summary of a Survey of U.S. Parents and Guardians

Stated reasons for delaying or refusing vaccines	Total	Significant Refuser	Minor Refuser	Vax-Major Concern	Vax-Minor Concern	Vax-No Concern
Not covered by our insurance	1	0	1	0	3	0
Safety Concerns (Net)	9	9	18	10	10	0
Concerned about side effects	4	3	3	0	10	0
Risk of autism	2	3	2	4	0	0
Too new	1	0	5	0	0	0
Other safety concerns	3	4	8	8	0	0
Unnecessary (Net)	4	4	6	9	2	0
Wait for child to acquire it naturally	2	2	1	7	0	0
Didn't think it was necessary	2	1	5	1	2	0
Miscellaneous						
My own research/ research myself	4	5	2	2	0	8
Waiting for the child to be older	3	3	5	0	4	0
Not comfortable with it	2	5	3	0	2	0



Communicating Effectively About Vaccines

Summary of a Survey of U.S. Parents and Guardians

Negative Messages about Vaccinations

Overall Ratings of Negative Messages

Average Rating* High Above Avg Average Below Avg Low

	HEARD BEFORE	BELIEVABLE	CONVINCING
Vaccines can cause serious health problems like auto-immune disorders, asthma or autism.	58	42	25
Vaccines are unsafe due to ingredients such as thimerosal (a mercury-containing preservative) or aluminum.	52	46	30
Vaccine-preventable diseases are no longer real threats. Diseases like measles and pertussis (whooping cough) are virtually unheard of in this day and age.	63	38	17
Some vaccine-preventable diseases, like flu and chickenpox, are not that serious.	66	44	23
Vaccines don't fully protect a child from disease and may even increase a child's risk of getting the disease.	55	40	21
Data supporting vaccine safety and effectiveness are unreliable because they are biased by pharmaceutical companies and other special interests out to make a profit.	56	48	24
Data supporting vaccine safety and effectiveness are unreliable because the government covers up information that suggests vaccines are not safe.	50	41	24
Proper sanitation and healthy lifestyle provide adequate protection against vaccine-preventable diseases, so vaccines are not necessary.	45	28	17
There are safer, more natural and equally effective alternatives to vaccines. For some diseases, natural infection provides better, longer immunity.	50	44	22
The government requires too many vaccinations. The number of required vaccines has greatly increased in the last decade.	57	52	22
Too many vaccines given too soon can harm children.	56	50	27
Requiring childhood vaccinations infringes on civil liberties. Parents should have the right to make their own decisions about their children's health care.	68	48	19
Combination vaccines (that protect against more than one disease) are more likely to cause adverse reactions.	51	49	25



Communicating Effectively About Vaccines

Summary of a Survey of U.S. Parents and Guardians

Positive Messages about Vaccinations

Overall Ratings of Positive Messages

Average Rating* High Above Avg Average Below Avg Low

	HEARD BEFORE	BELIEVABLE	CONVINCING
Vaccination is one of the most important ways I can protect my child from life-threatening illness, offering the best-known protection against a number of infectious diseases.	82	81	66
Vaccination is a social obligation , to protect not only your children but others as well, and to prevent disease outbreaks. The only protection unvaccinated people (i.e. those who cannot receive vaccines for medical reasons) have is derived from the immunity of vaccinated people.	65	71	57
Vaccine-preventable diseases are still a threat. Disease outbreaks in under-vaccinated communities have become common and pose a threat to the community at large. Moreover, in an increasingly global environment, diseases are just a plane ride away.	68	74	61
We have less disease because vaccines prevent tens of thousands of deaths and millions of disease episodes in the U.S. alone.	73	76	62
Scientific studies do not support the concern that thimerosal (a mercury-containing preservative) causes autism. Thimerosal is no longer contained in childhood vaccines, other than some flu vaccines. Autism cases in the U.S. have continued to increase since thimerosal was removed from childhood vaccines.	52	62	44
Rigorous scientific studies have proven that vaccines are very safe. The small risks associated with vaccination are being reduced through ongoing medical advances and monitoring of vaccine safety. Previous safety issues have been quickly identified and resolved.	67	69	54
Vaccination has the potential to completely wipe out diseases that remain a threat. It eradicated smallpox and has nearly eradicated polio.	73	73	61



Communicating Effectively About Vaccines

Summary of a Survey of U.S. Parents and Guardians

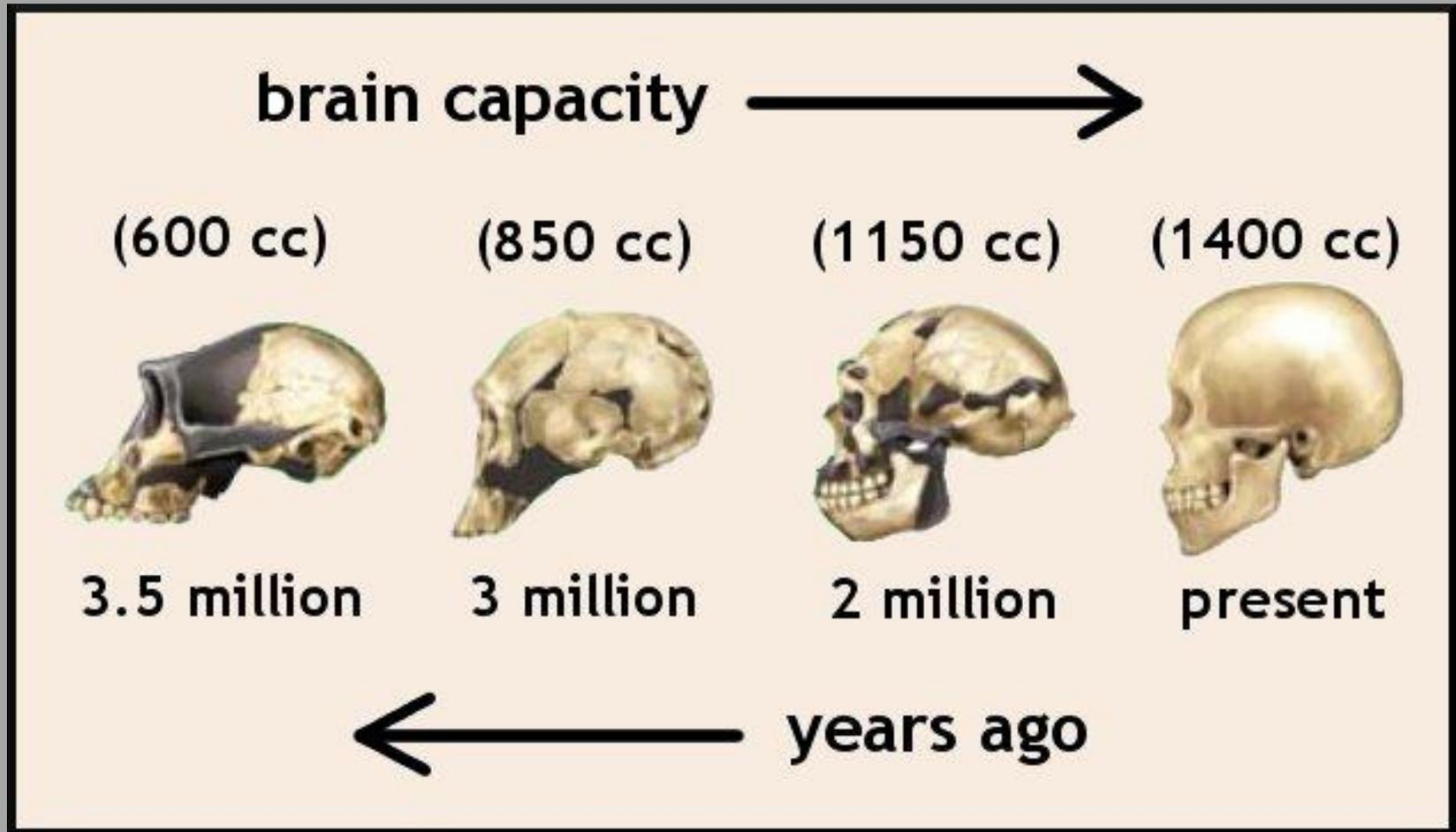
“The results of this survey bolster the notion that a strong majority of parents support vaccinations, but continue to have concerns about their safety and the potential for adverse effects.

While immunization rates continue to be high, concerns about vaccine safety are increasing.

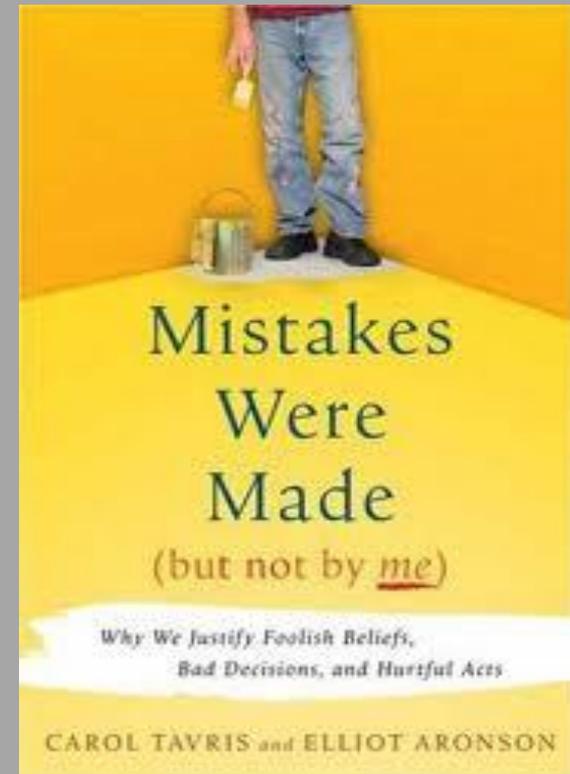
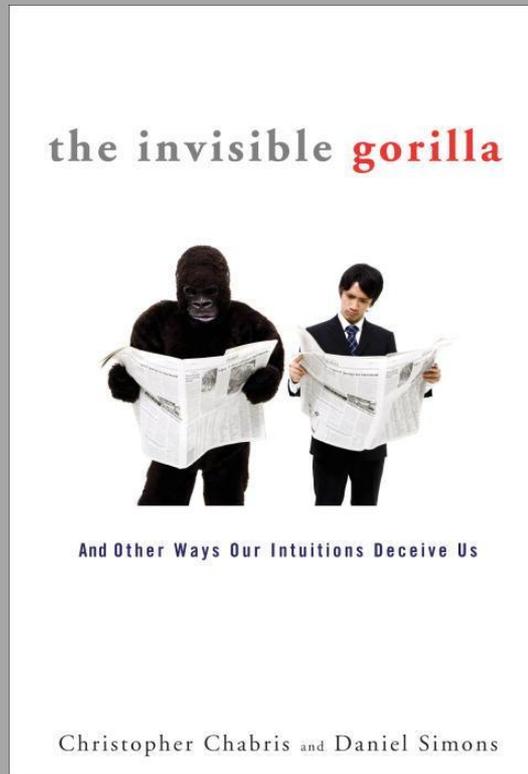
Current communication methods based on scientific research do not appear to lead to more comfort with vaccines.”

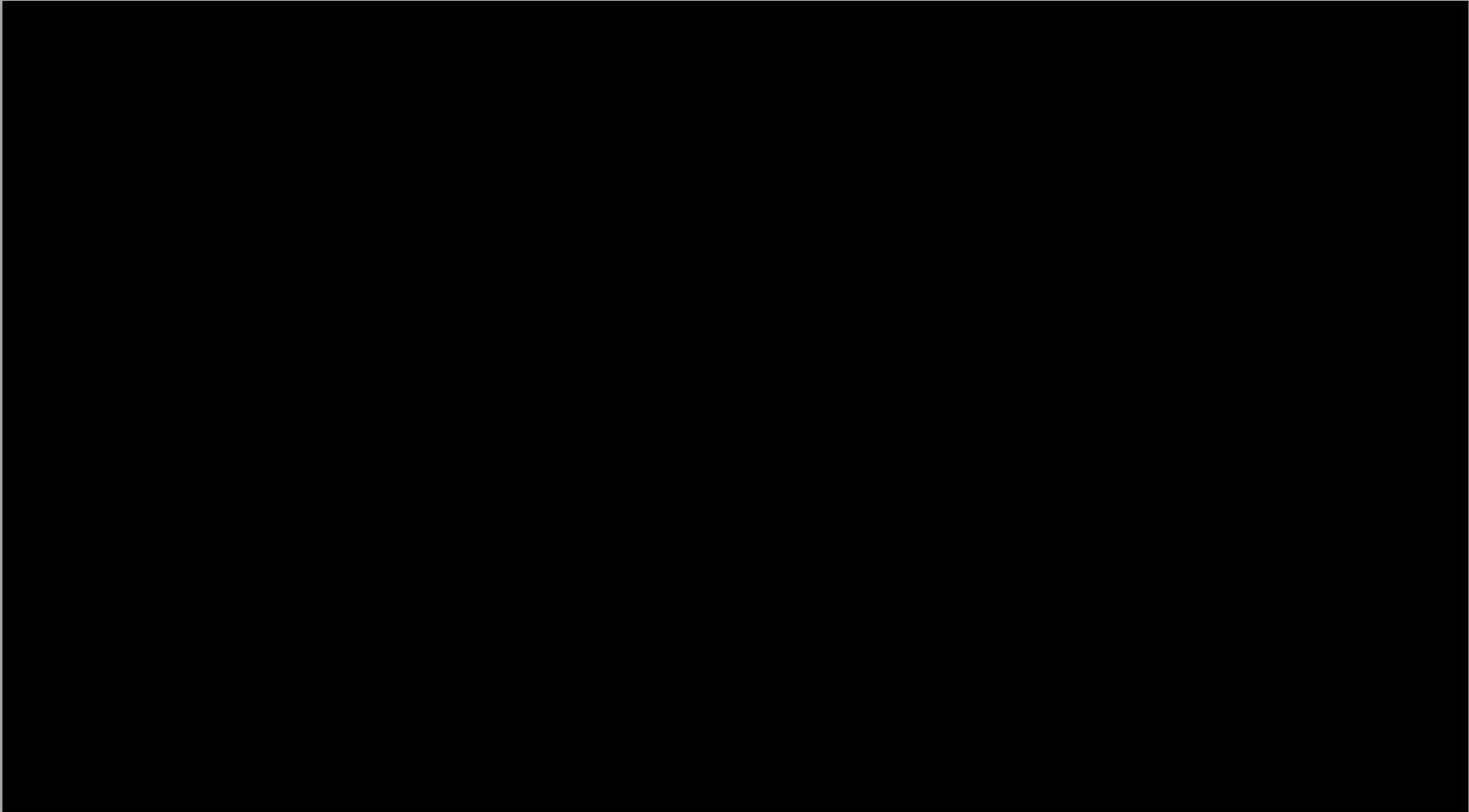
Can science help us to communicate
about immunizations, especially to
the hesitant?

What do we know about our brains?



Can we get hints about how to talk to patients from the science of cognitive psychology?





Perhaps we should tell stories

Personal stories and visual images of patients and parents affected by vaccine-preventable diseases and reports of disease outbreaks serve as useful reminders of the need to maintain high immunization rates. Ongoing dialogue including provider recommendations may successfully reassure vaccine-hesitant parents that immunization is the best and safest option for their child.

“How to Communicate With Vaccine-Hesitant Parents,” *Pediatrics* 2011;127:S127–S133

This was also the “off the cuff” answer to how to improve immunization acceptance among those who are resistant by cognitive psychologists Christopher Chabris and Daniel Simons, authors of *The Invisible Gorilla*.

This is a common method used by anti-vaccine supporters and seems to work.

http://jennymccarthybodycount.com/Jenny_McCarthy
_Body_Count/Home.html

The screenshot shows a Safari browser window displaying the website 'Jenny McCarthy Body Count'. The browser's address bar shows the URL 'http://jennymccarthybodycount.com/Jenny_McCarthy_Body_Count/Home.html'. The website's navigation menu includes links for HOME, PREVENTABLE ILLNESSES, PREVENTABLE DEATHS, FAQ, VACCINE SCHEDULE, ANTI-VACCINE HISTORY, ILLNESS TIMELINES, WHAT'S THE HARM?, and LINKS. The main content area features three large, dark grey boxes with white borders, each containing a red number. The first box displays '77976' under the heading 'Number of Preventable Illnesses'. The second box displays '719' under the heading 'Number of Preventable Deaths'. The third box displays '0' under the heading 'Number of Autism Diagnoses Scientifically Linked to Vaccinations'. Each box also includes the date range 'From June 3, 2007 To April 23, 2011'. Below these boxes, the text 'WELCOME TO THE JENNY MCCARTHY BODY COUNT' is displayed, followed by a quote: 'I do believe sadly it's going to take some diseases coming back to realize that we need to change and develop vaccines that are safe. If the vaccine companies are not listening to us, it's their f___ing fault that the diseases are coming back. They're making a product that's s___. If you give us a safe vaccine, we'll use it. It shouldn't be polio versus autism.' attributed to 'Jenny McCarthy in Time Magazine, April 2009'.

HOME PREVENTABLE ILLNESSES PREVENTABLE DEATHS FAQ VACCINE SCHEDULE ANTI-VACCINE HISTORY ILLNESS TIMELINES WHAT'S THE HARM? LINKS

JENNY MCCARTHY BODY COUNT

Number of Preventable Illnesses

77976

From June 3, 2007
To April 23, 2011

Number of Preventable Deaths

719

From June 3, 2007
To April 23, 2011

Number of Autism Diagnoses
Scientifically Linked to Vaccinations

0

From June 3, 2007
To April 23, 2011

WELCOME TO THE JENNY MCCARTHY BODY COUNT

"I do believe sadly it's going to take some diseases coming back to realize that we need to change and develop vaccines that are safe. If the vaccine companies are not listening to us, it's their f___ing fault that the diseases are coming back. They're making a product that's s___. If you give us a safe vaccine, we'll use it. It shouldn't be polio versus autism."

Jenny McCarthy in Time Magazine, April 2009

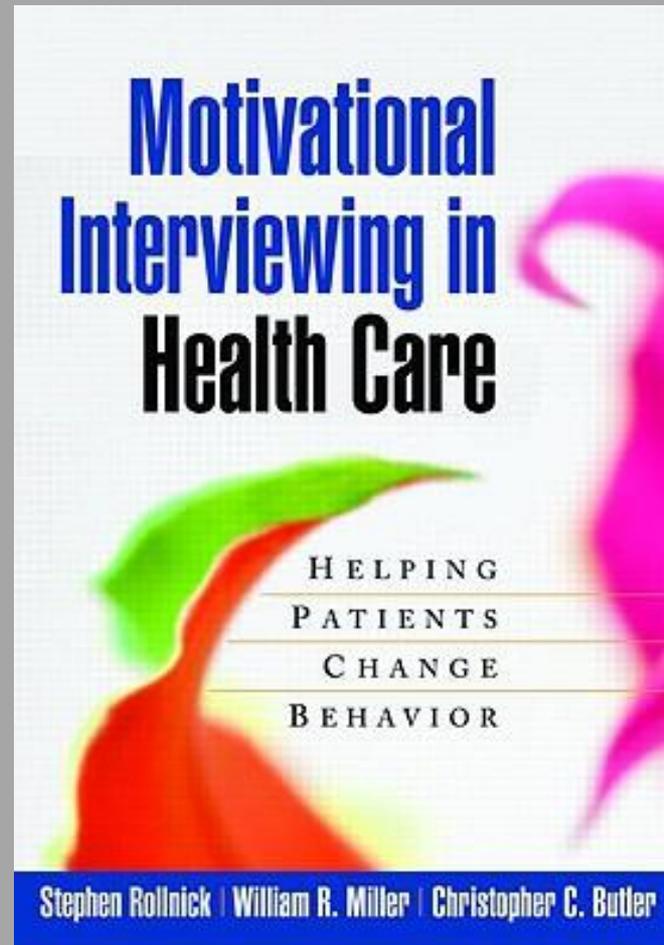


“In 1736 I lost one of my sons, a fine boy of four years old, by the small-pox, taken in the common way. I long regretted bitterly, and still regret that I had not given it to him by inoculation. This I mention for the sake of parents who omit that operation, on the supposition that they should never forgive themselves if a child died under it, my example showing that the regret may be the same either way and that, therefore, the safer should be chosen.”

Benjamin Franklin

An undated handout image of a painting of Benjamin Franklin's son, Franky, who died of smallpox. Photo: Ann C. Boswell via The New York Times

Motivational interviewing



Motivational Interviewing- Guiding style

- Guiding style best suited to address change
- Use three principles with guiding style:
 - Work in collaboration with patient
 - Emphasize patient autonomy over decisions
 - Elicit patient motivation for change
- Examples:
 - Directing style: "OK, so your weight is putting your health at serious risk. You already have early diabetes. *(Patient often resists at this point.) . . . Overweight is conceptually very simple, if you think about it. Too much in, not enough out. So you need to eat less and exercise more. There no way you can get around that simple fact.*" *(Patient replies with a "yes, but . . ." argument.)*
 - Guiding style: "OK, let's have a look at this together and see what you think. From my side, losing some weight and getting more exercise will help your diabetes and your health, but what feels right for you? *(Patient often expresses ambivalence at this point.) . . . So you can see the value of these things, but you struggle to see how you can succeed at this point in time.* OK. It's up to you to decide when and how to make any changes. I wonder, what sort of small changes might make sense to you? *(Patient says how change might be possible.)*

Motivational Interviewing- Vaccines: notes of lecture by Laurence Baker, PhD, (Clinical Associate Professor, UHSU) Anchorage, April, 2011

- 3 categories of parents
 - Social contract (get vaccines)
 - Entrenched (non-vaccinators, about conspiracy)
 - Vaccine hesitant (largest group of non-vaccinators)
- How to rapidly build trust
 - Become curious
 - “On 1 to 10 scale where do you stand on this vaccine?” (if entrenched move on)
 - “What makes you say this number versus a higher number?” (forces a positive comment)
 - “What could you imagine that would make you choose a higher number?”
 - Empathize
 - “This is really a tough decision.”
 - Let person think about this dilemma.
 - Often they will resolve this by turning to someone they trust.
 - Ask permission to provide advice
 - Gives person some control
 - Now you can educate

Questioning our own motives and our own process is critical to a skeptical and scientific outlook. We must realize that the default mode of human psychology is to grab onto comforting beliefs for purely emotional reasons, and then justify those beliefs to ourselves with post-hoc rationalizations. It takes effort to rise above this tendency, to step back from our beliefs and our emotional connection to conclusions and focus on the process. The process (i.e. science, logic, and intellectual rigor) has to be more important than the belief.

-Stephen Novella

Science is a way of trying not to fool yourself.

-Richard Feynman

Summary

- Good science is powerful
- It was developed to overcome the default mode of the human brain for self preservation (good at pattern recognition not with statistics)
- Patients make decisions with the default mode, not by science
- We are learning how to help guide patients to make the safest and most effective decisions based on the best science
- Motivational interviewing may be a useful method

