

Understanding Research
Findings:
A Lay Person's Approach...

or

Approaching the Lay Person
with Research Findings

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Today, we'll discuss...

- I. Our roles in presenting research findings to the public
- II. Assessing the quality of research
- III. Presenting numbers to the public
- IV. Additional resources

I. Research findings to the public

- Good news: People are hungry for this information
- Bad news: It's easy for them to jump to the wrong conclusions
- Ethical obligations

Osteopathic research

- Alternative medicine may carry strong positive or negative images
- Base of research evidence

Our role

- Distinguish good from bad research
- Educate readers/patients about research methods
- Become comfortable with numbers
- Always place new research in context of previous work



“If you were to boil your book down to a few words, what would be its message?”

II. Assessing research quality

1. Who is in the study?

- Generalizability
- Number of patients

Why larger studies are more convincing

Study findings as *estimates* of true effect

Estimates made from small studies are imprecise: if the study were repeated, the new estimate might be wildly different

A confidence interval is a way of quantifying the precision of an estimate

Confidence intervals

“The intervention reduced systolic blood pressure by an average of 10 mm Hg (95% CI, 5 to 15 mm Hg).”

“The intervention reduced systolic blood pressure by an average of 10 mm Hg (95% CI, -1 to 21 mm Hg).”

2. Is it a comparative study?

- Natural course of illness

- What is the control therapy?

3. Effect size

- Big enough to make a difference?
- Attempt to assess the role of chance through statistical testing?

If the effect is much bigger than any variability expected by chance alone, then we conclude that the effect is “statistically significant.”

Small P values indicate “statistically significant” results

Confidence intervals and P values

“The intervention reduced systolic blood pressure by an average of 10 mm Hg (95% CI, 5 to 15 mm Hg; $P = .01$).”

“The intervention reduced systolic blood pressure by an average of 10 mm Hg (95% CI, -1 to 21 mm Hg; $P = .11$).”

Other aspects of research studies

4. Prospective or retrospective?
5. Blinded?
6. Randomized?

Placing results in context

7. Have other studies of the same thing produced similar results?

“Hierarchy of evidence”



A. Randomized trials

B. Well-designed prospective observational studies

C. Well-designed retrospective observational studies

D. Small retrospective case series

F. Case reports, anecdotal evidence, physiological explanations



"Are you just pissing and moaning, or can you verify what you're saying with data?"

III. Presenting numbers to the public

- Become comfortable with numbers to ensure that *you're* not getting manipulated
- Become familiar with common flaws in scientific reports of numbers
- Understand ways in which readers are likely to misunderstand numbers

Numbers in graphs

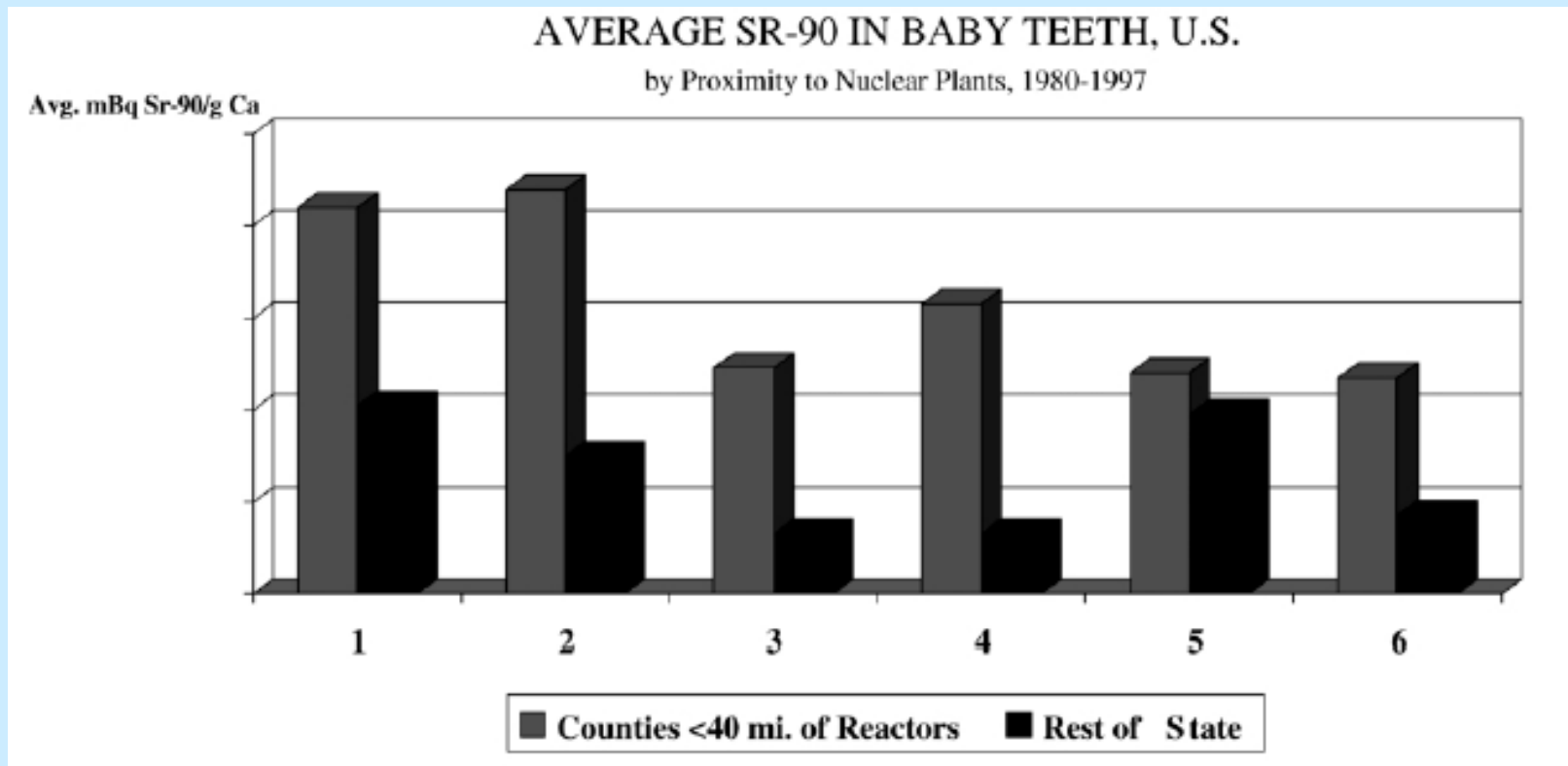


Fig. 1. Average Sr-90 levels in baby teeth, by proximity to nuclear plants (from Mangano et al, Sci Total Env 2003;317:37-51)

Numbers in graphs

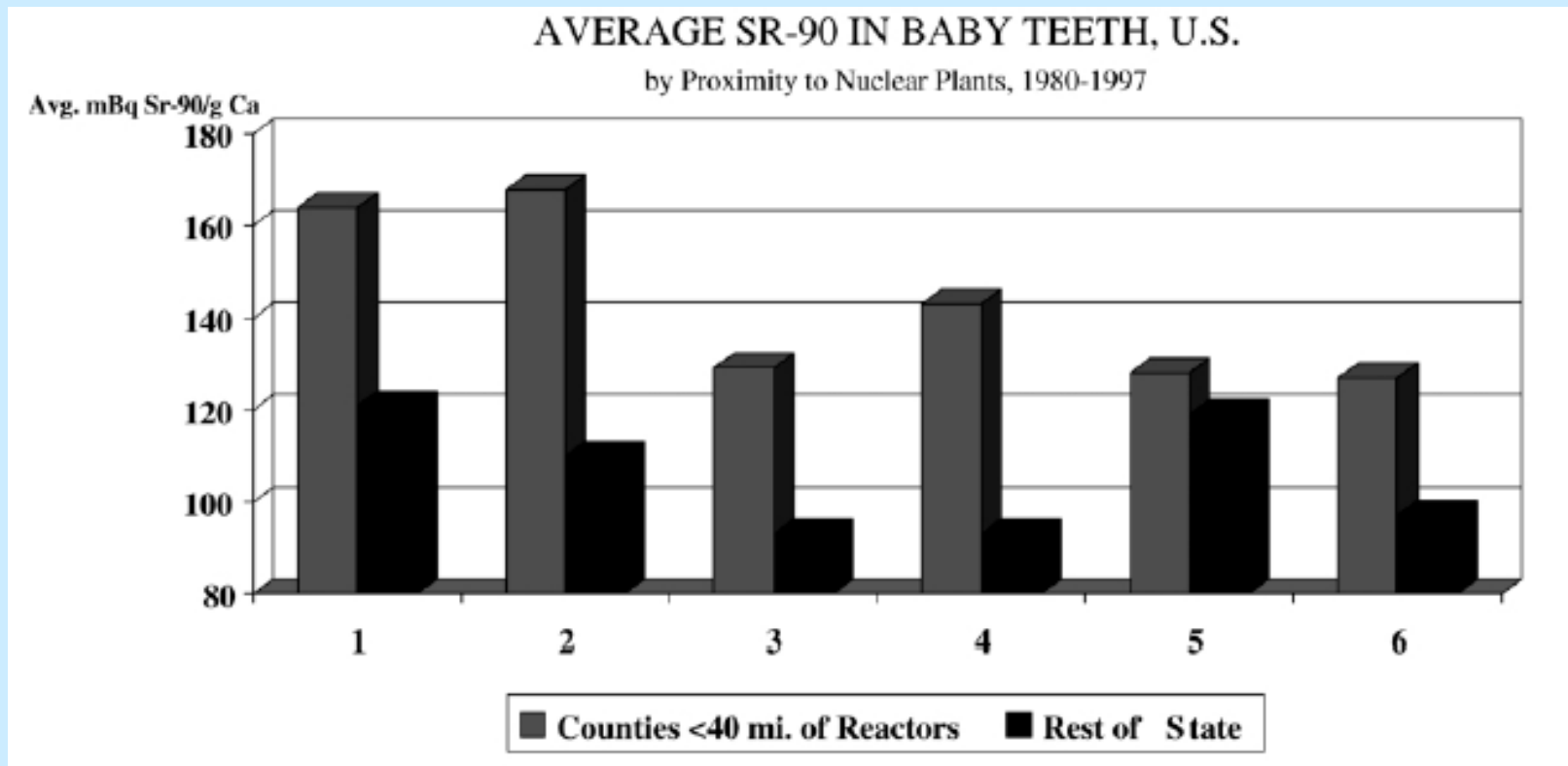
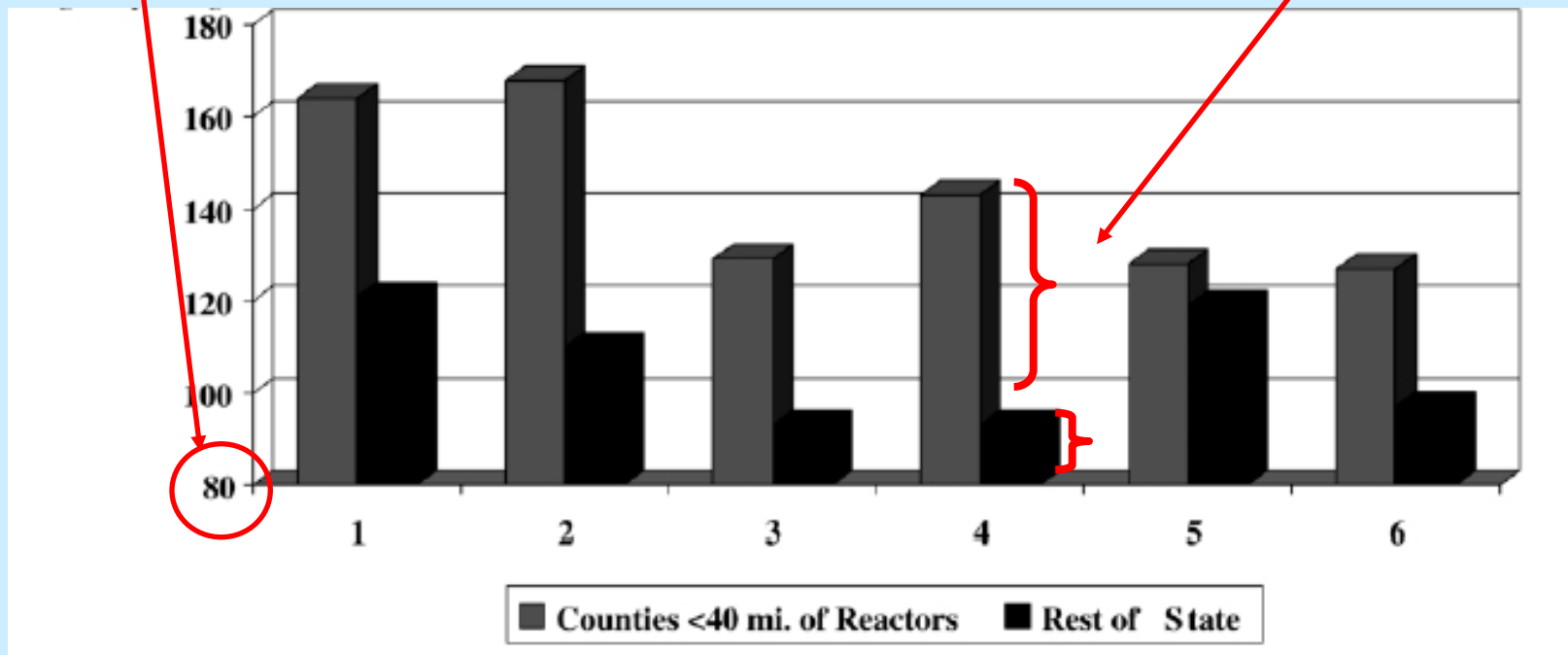


Fig. 1. Average Sr-90 levels in baby teeth, by proximity to nuclear plants (from Mangano et al, Sci Total Env 2003;317:37-51)

**Y axis starts
at 80**

**Grey bar is 3
times size of
black bar**



Truncated y axis inflates apparent effect size

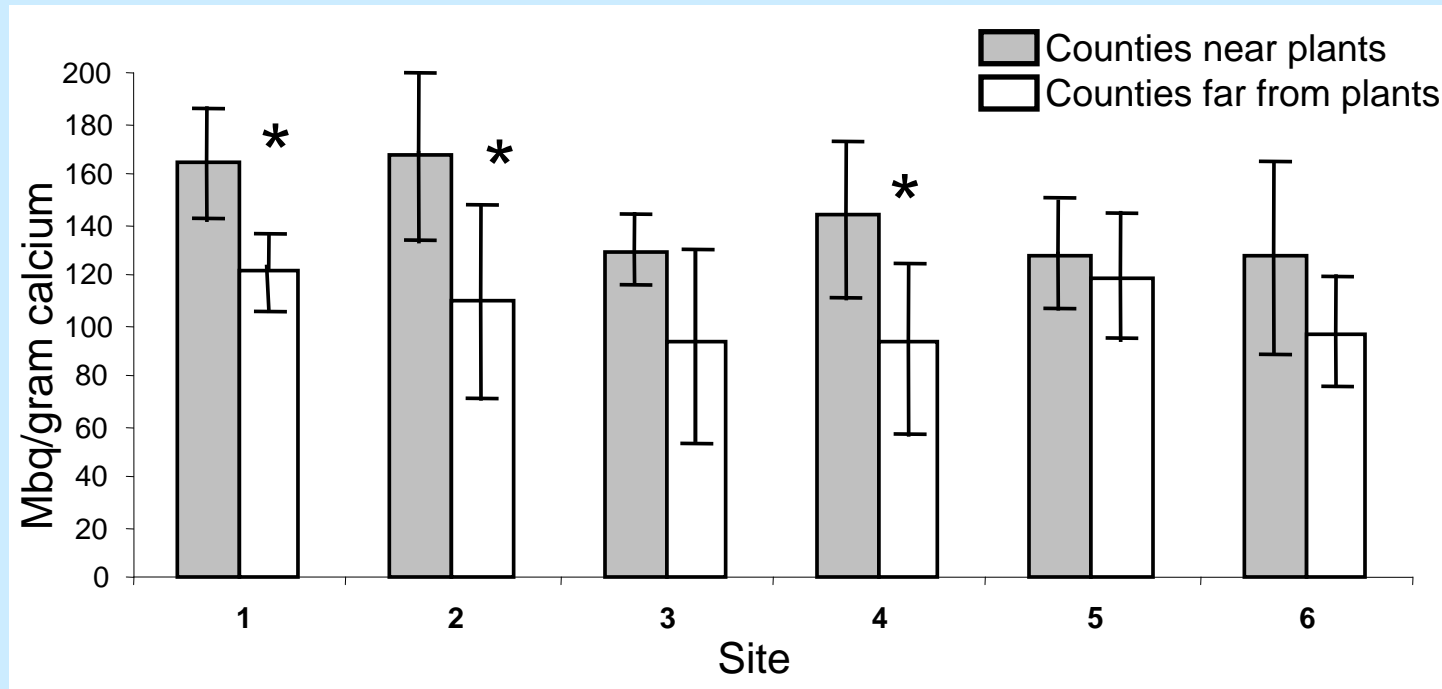


Fig. 1. Mean Sr-90 levels in baby teeth, by proximity to nuclear plants (with confidence intervals). * indicates $P < .05$.

Relative and absolute

Researchers OFTEN present only relative differences.

“This environmental toxin doubles your risk of cancer.”

“The intervention reduced cholesterol levels by 10%.”

Ten percent of what????

Relative and absolute

Risk of cancer: 1 in 10 (10%)

Doubled risk: 2 in 10 (20%)

Comment: “Yikes!”

Risk of cancer: 1 in 10 million (0.0000001%)

Doubled risk: 2 in 10 million (0.0000002%)

Comment: “Maybe there are more serious health risks we should worry about instead.”

In communicating numbers...

**Whenever there's a relative number,
always present an absolute number
for context**

“The intervention reduced total cholesterol by 10%, from 200 mg/dL to 180 mg/dL.”

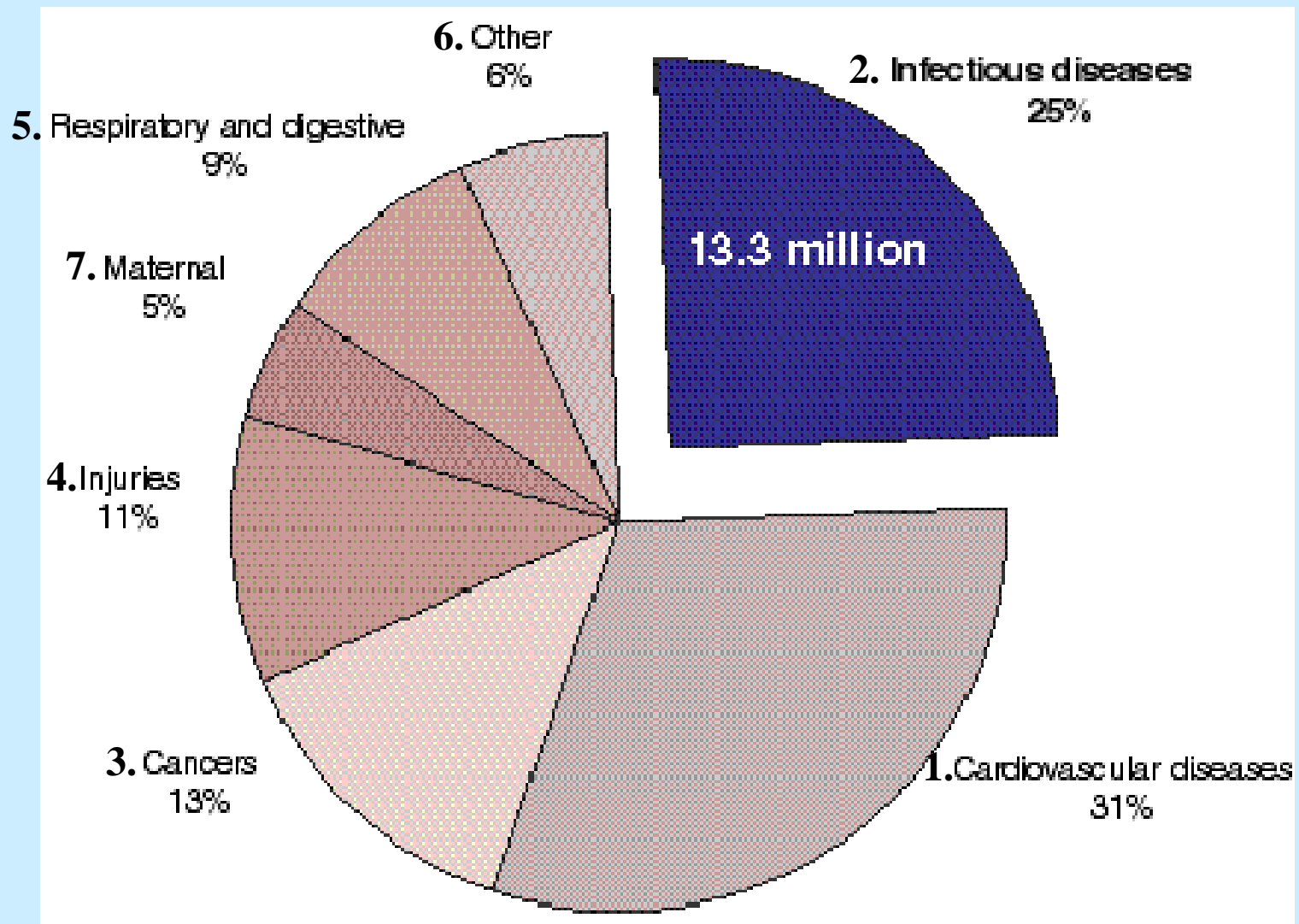
“The risk of cancer was doubled, from 1 in 10 million to 2 in 10 million.”

Causes of death, USA

1. Heart disease	710,760
2. Cancer	553,091
3. Stroke	167,661
4. Chronic lower respiratory disease	122,009
5. Accidents	97,900
6. Diabetes	69,301
7. Pneumonia/Influenza	65,313
8. Alzheimer's disease	49,558
9. Nephritis, other kidney	37,251
10. Septicemia	31,224

(www.cdc.gov/nchs/fastats)

Causes of Death, World



Risk perception doesn't match risk frequency

Paul Slovic: Lay people's definition of risk is
"much richer" than experts'

Dread factor

worse

better



beyond personal control

under personal control

catastrophic

gradual

fatal

damaging

inequitable or unfair

equitable

involuntary

voluntary

continues to threaten future generations

expires soon

Knowability factor

worse

better



new or exotic

old

unknown to science

familiar

unknown to those exposed

known

debated by scientists

agreed upon

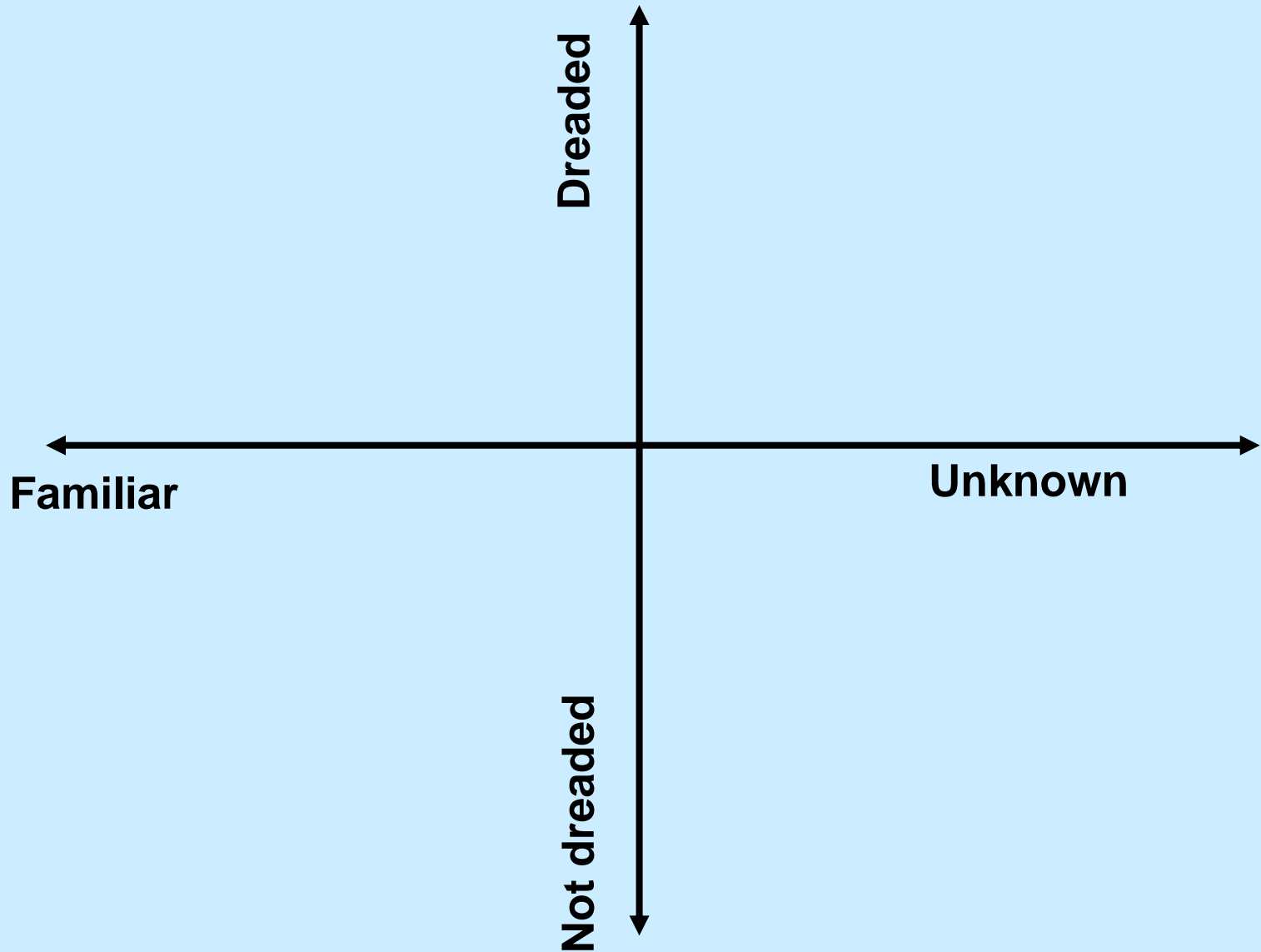
invisible

visible

undetectable

detectable

Model



Other factors

Perceived risk also increases with:

- “availability” (recency, vividness, frequency - sometimes, education)
- gripping anecdotes
- suspicion of source of information

and decreases with:

- perceived benefit
- person’s expertise in field
- white, male, wealthy, powerful
- trustworthy source of information

Framing

Negative framing, loss framing

1 death among 100 patients

Positive framing, gain framing

99 survivors among 100 patients

Pain caused by a loss is worse than pleasure caused by a gain of the same size: “Losses loom larger”

Framing and persuasiveness

Gain-framed: “By doing BSE now, you can learn what your normal, healthy breasts feel like so you will be better prepared to notice any small, abnormal changes that might occur as you get older.”

Loss-framed: “By not doing BSE now, you will not learn what your normal, healthy breasts feel like, so you will be ill prepared to notice any small, abnormal changes that might occur as you get older.”

Gambling

Gain framing may appeal to desire to gamble

(e.g., cancer patients who feel they have little to lose may find positive framing persuasive)

IV. Other resources

1. Books and articles on epidemiology and medical research design

Gehlbach SH. *Interpreting the Medical Literature.*

Grimes DA, Schulz KF. An overview of clinical research: the lay of the land. *Lancet* 2002 Jan 5; 359: 57-61.

Grimes DA, Schulz KF. Bias and associations in observational research. *Lancet* 2002 Jan 19; 359: 248-52.

Guyatt G, Rennie D, eds. *User's Guides to the Medical Literature: A manual for evidence-based clinical practice.*

2. Books on understanding basic statistics and data analysis

Lang T, Secic M. *How to Report Statistics in Medicine.*

Riegelman RK, Hirsch RP. *Studying a Study and Testing a Test: How to Read the Health Science Literature.*

Rowntree D. *Statistics without Tears.*

3. Professional training workshops in epidemiology, statistics, research methods

American Medical Writers Association
(www.amwa.org)

4. Readings on risk perception

Slovic P. Perception of risk. *Science* 1987; 236(4799): 280-5.

Plous S. *The Psychology of Judgment and Decision-Making*.