

Communicating the Costs and Benefits of Medical Interventions

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Imagine you have angina

- Bypass surgery

- 75% chance of cure
- But a major surgery!

- Balloon angioplasty

- 50% chance of cure
- In and out in two days!

Patient testimonial

- I had been having chest pains for about a year. It got so I couldn't even take a walk.
- Now that I had my bypass, I'm walking to church again every Sunday. Praise the Lord!

Patient testimonial

- I had always been active until the angina stuff started. I hoped the bypass would cure me and get me out on the tennis courts again.
- But it didn't. Looks like game, set and match for the angina.

Testimonials and Rx choice

- Balanced testimonials

- Bypass testimonials

- 1 +

- 1 -

- Balloon testimonials

- 1 +

- 1 -

- How many choose bypass surgery?

- 20%

How effective did people think bypass was?

- We told them it had a 75% chance of cure
- But the testimonials looked like this
 - | Bypass testimonials
 - 1 +
 - 1 -
 - | Balloon testimonials
 - 1 +
 - 1 -
- Does the 50% success rate of the testimonials overwhelm the 75% success rate presented in the statistics?

Are choices different when the number of testimonials changes?

■ Testimonials that reinforce statistics

| Bypass testimonials

■ 3 +

■ 1 -

| Balloon testimonials

ä 1 +

ä 1 -

■ How many choose bypass?

| 41%

What this study shows

- The number of positive and negative testimonials matters
 - Even when people have received statistical information
 - Even though testimonials
 - Completely uninformative

Goals of my talk

■ Comprehension

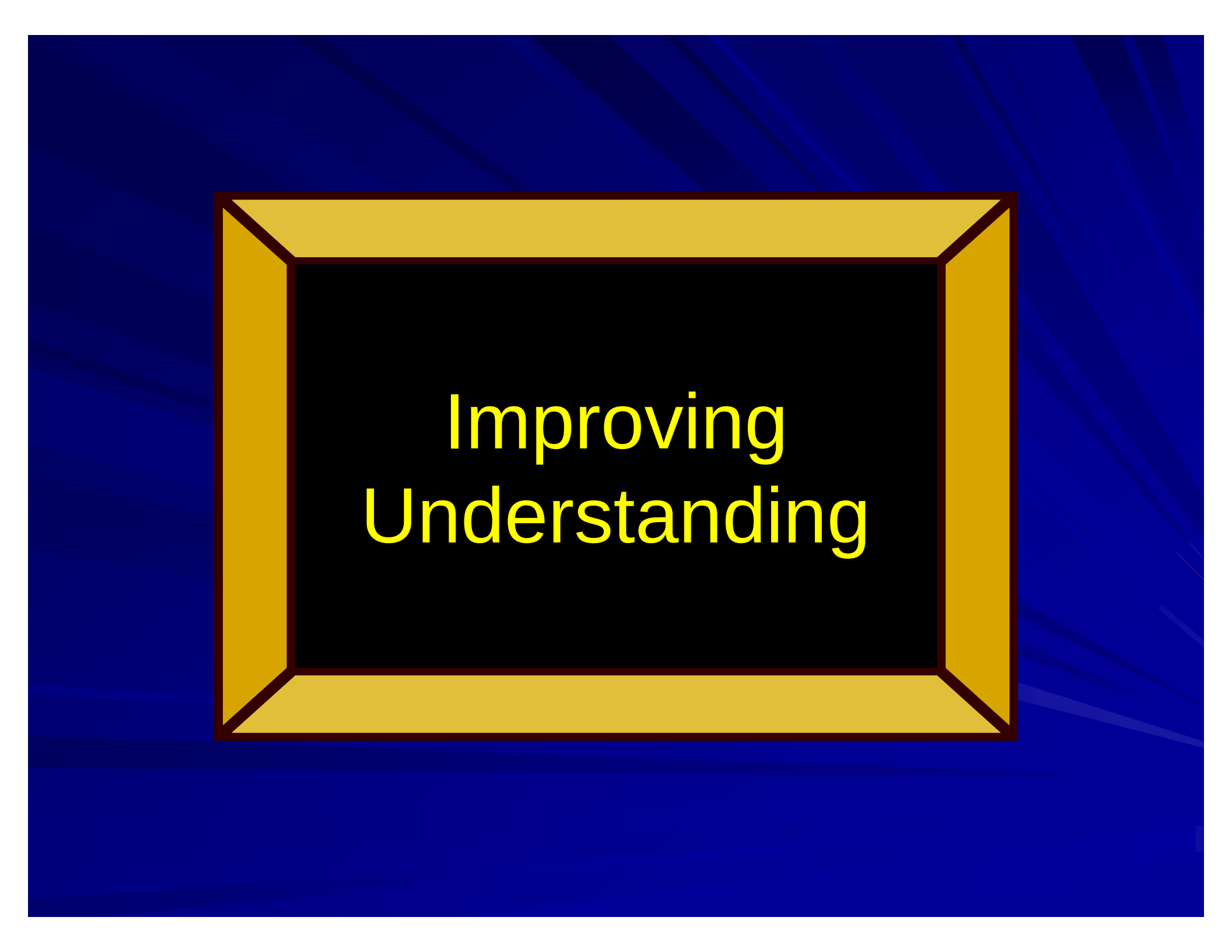
- Demonstrate a few techniques to improve
 - Comprehension of risk/benefit information

■ Beyond comprehension

- Show that comprehension is not enough
 - Biased decisions can still occur
- Demonstrate a few techniques to reduce bias

■ Social setting

- Outline social forces that impede rational decision-making



Improving Understanding

What does 26% mean?

- Innumeracy

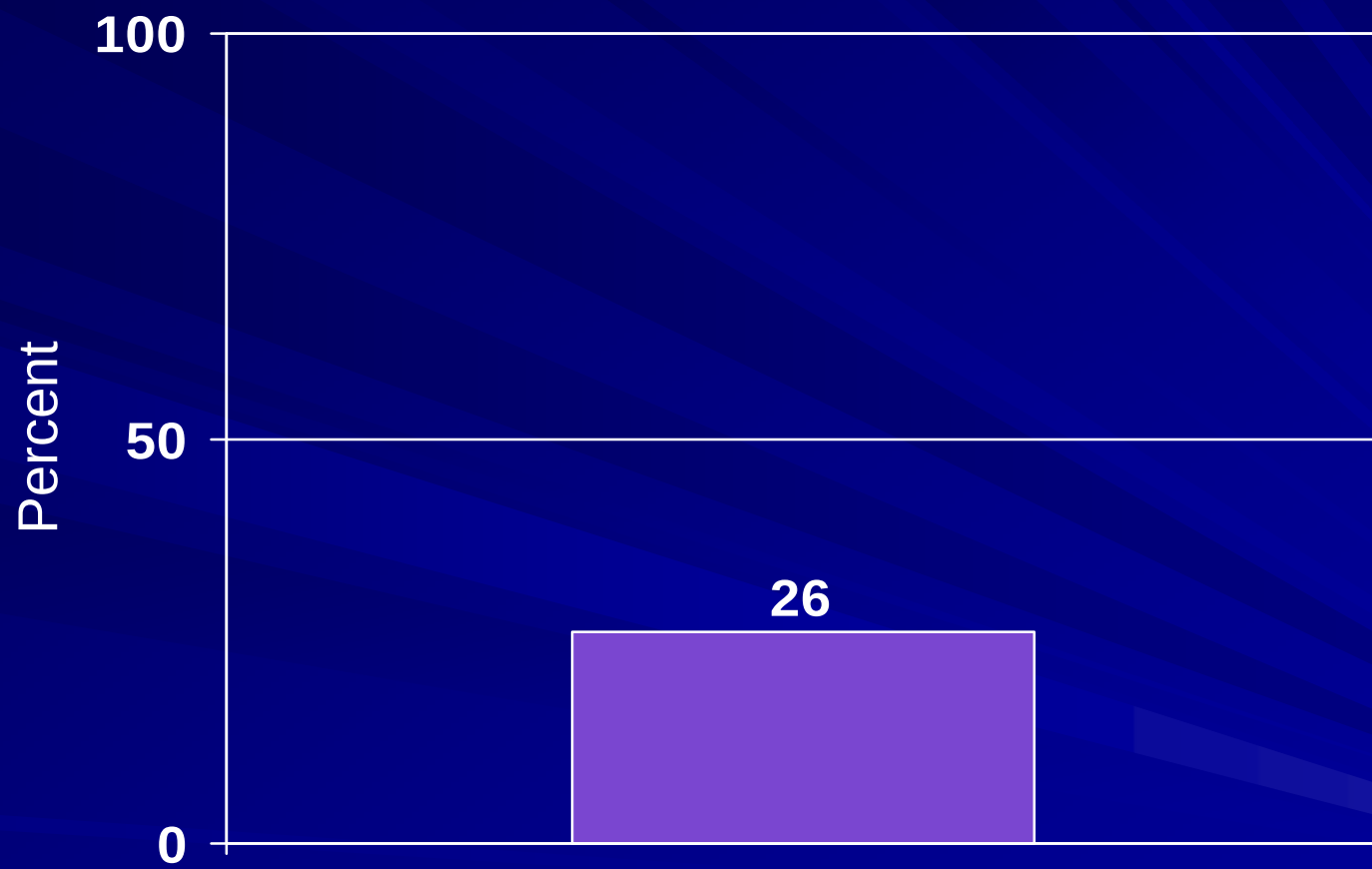
- Many people don't know $26\% = 26$ out of 100

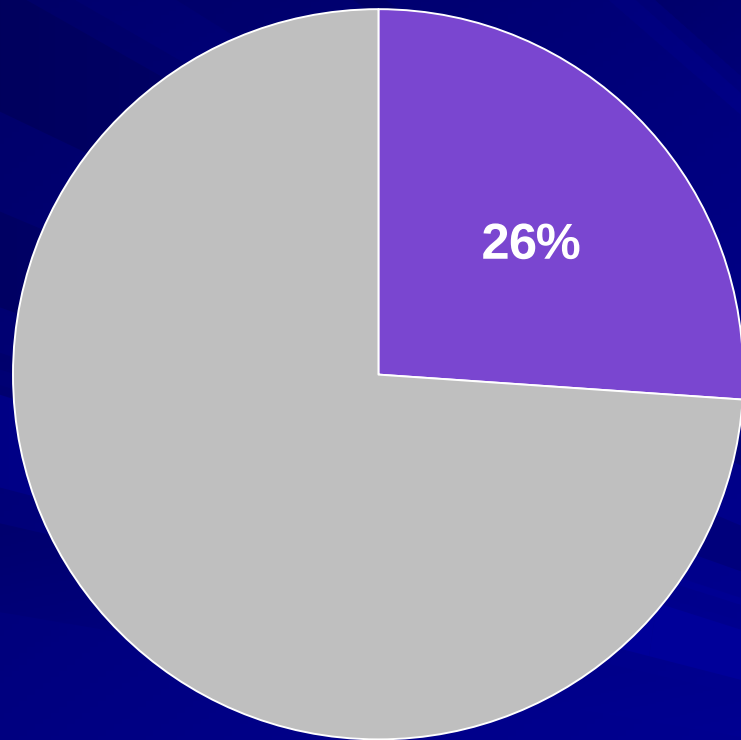
- Guideline #1: Give people both

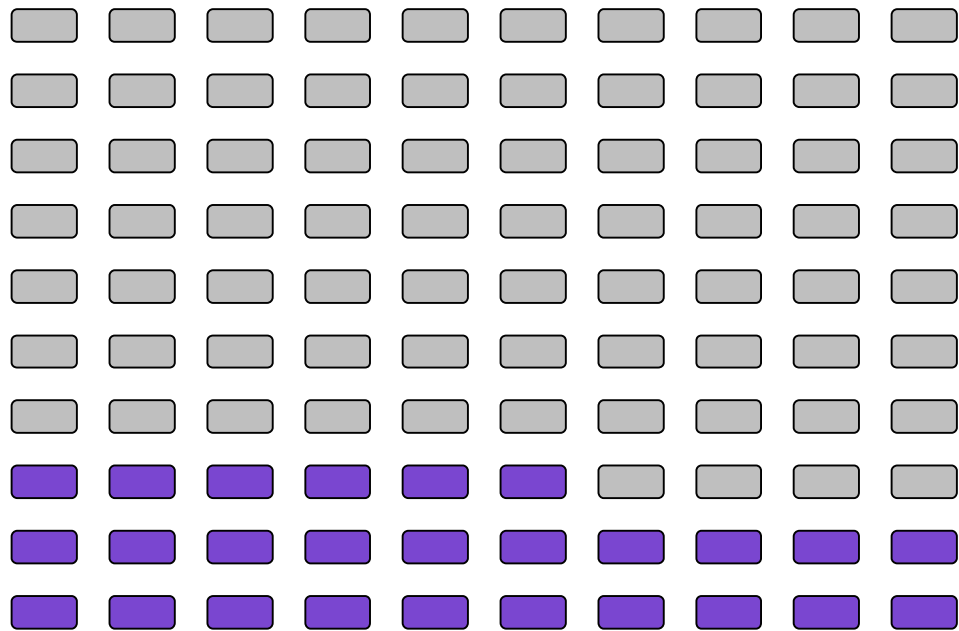
- %'s and
 - Frequencies

What does 26% look like?

- People better at understanding
 - If they have multiple ways to process info
- Thus, don't just give them numbers
 - Give them pictures too!







 26 of 100

What picture is best?

- Ask people
 - Many like pie chart
- Test comprehension
 - Pictograph and bar perform better
 - For high and low numeracy people
- Test gist knowledge
 - Pictograph better than bar
- Guideline #2: Use pictographs

What should we do about complicated decisions

- Often medical decisions involve
 - Complex tradeoffs
 - Many options
 - Numerous outcomes

Adjuvant Online

Shared Decision Making

Name: _____ (Breast Cancer)

Age: 59 General Health: Good

Estrogen Receptor Status: Positive Histologic Grade: 3

Tumor Size: 2.1 - 3.0 cm Nodes Involved: 0

Chemotherapy Regimen: CMF-Like (Overview 2000)

Decision: No Additional Therapy



 70 out of 100 women are alive in 10 years.

 23 out of 100 women die because of cancer.

 7 out of 100 women die of other causes.

Decision: Hormonal Therapy



 7 out of 100 women are alive because of therapy.

Decision: Chemotherapy



 3 out of 100 women are alive because of therapy.

Decision: Combined Therapy



 9 out of 100 women are alive because of therapy.

Simpler Format

Hormonal Therapy



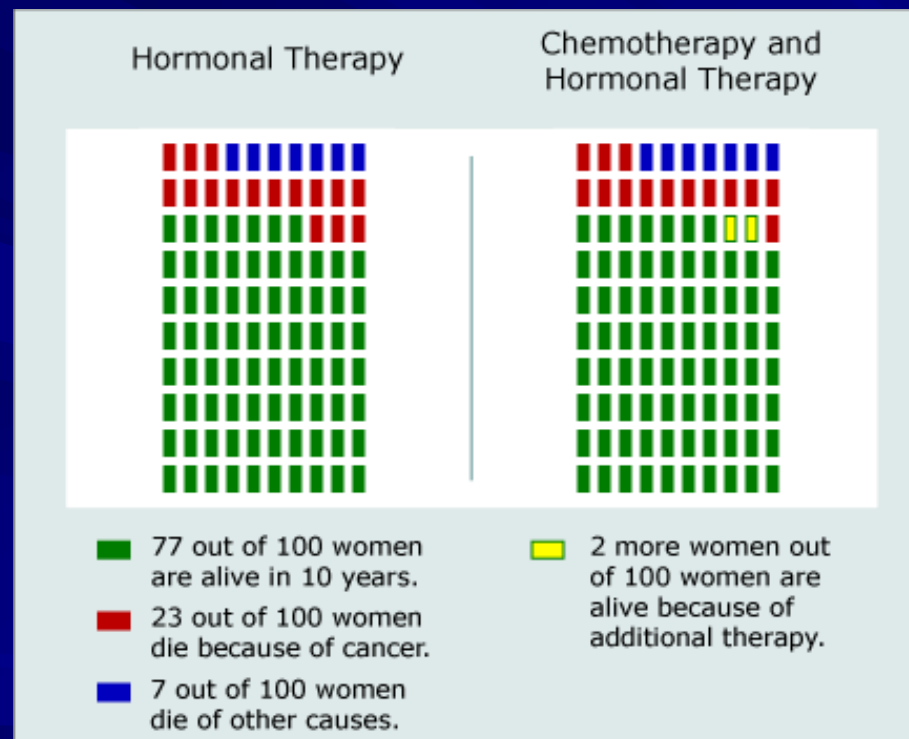
- 77 out of 100 women are alive in 10 years.
- 23 out of 100 women die because of cancer.
- 7 out of 100 women die of other causes.

Chemotherapy and
Hormonal Therapy

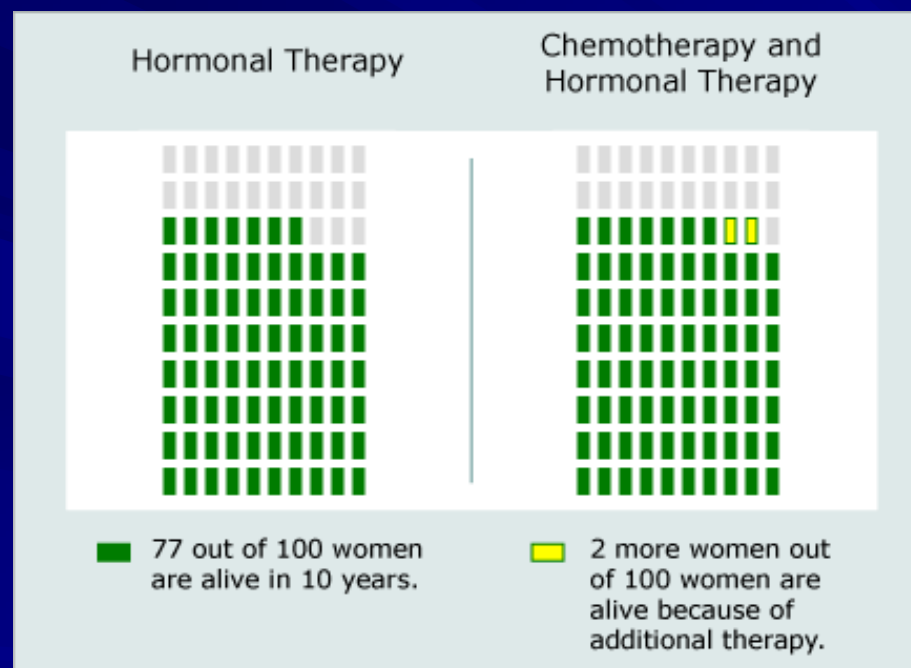


- 2 out of 100 women are alive because of additional therapy.

Pictograph Format



Even More Simplified Pictograph



Guideline #3

- Whenever possible
 - Simplify!



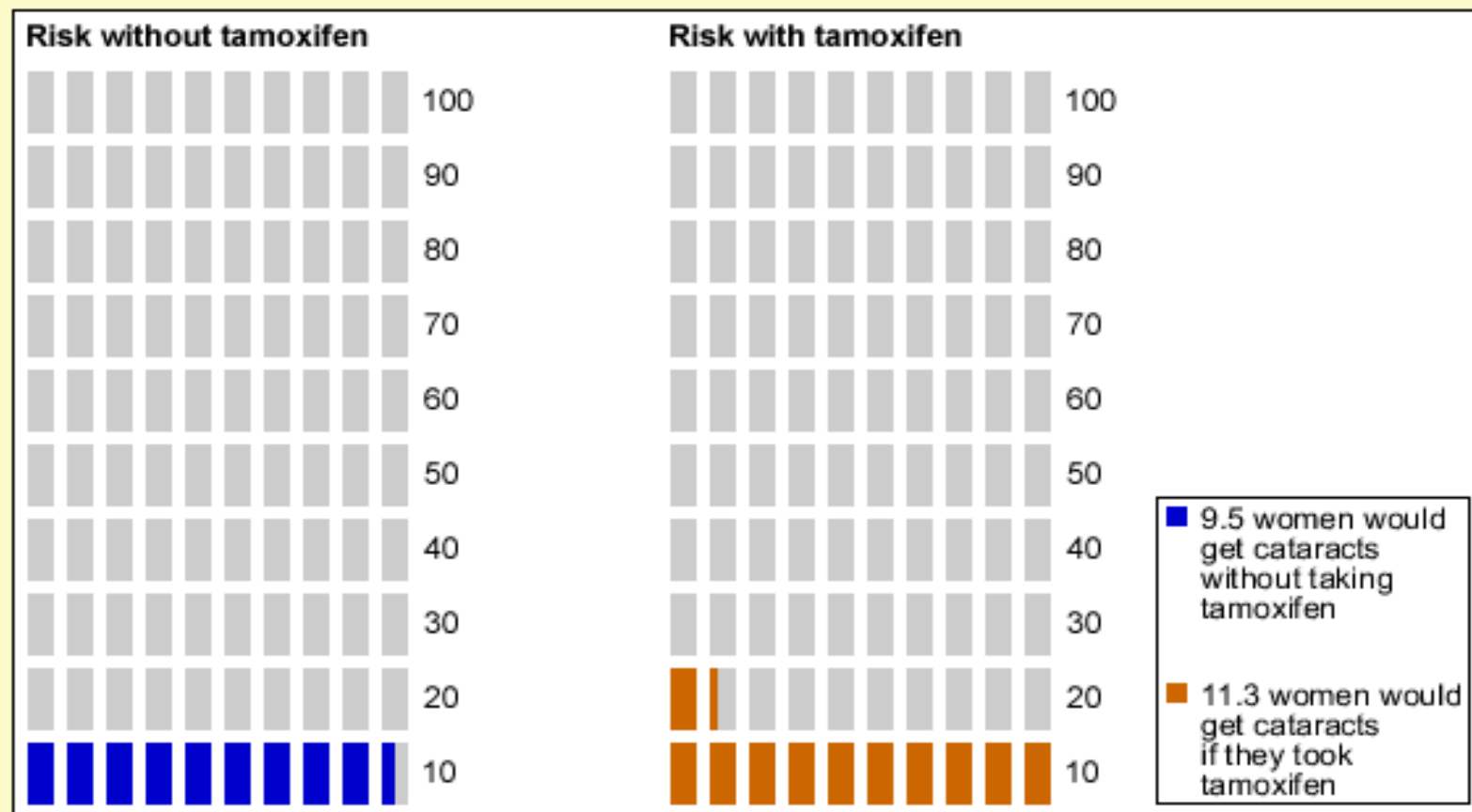
What about biases?

More good things à Better?

- Goal= win \$5 by picking a red jelly bean out of a bowl
- Two bowls
 - Big bowl: 9/100 red jelly beans
 - Small bowl: 1/10 red jelly beans
- People know that small bowl has best odds
 - But the big bowl's odds feel better

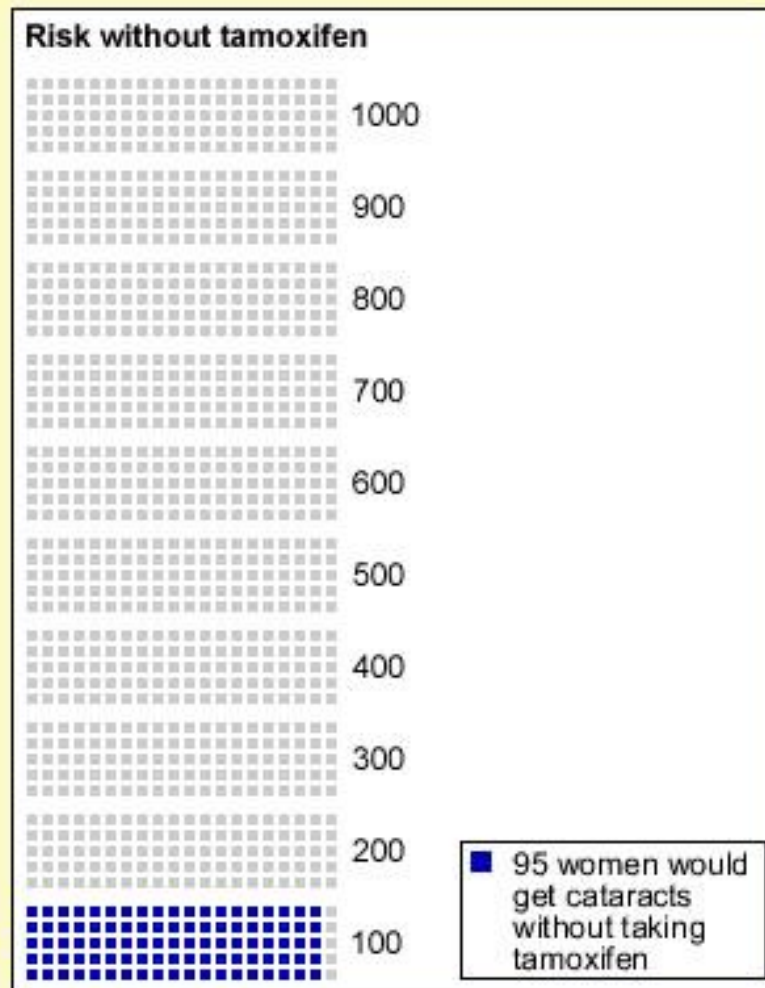
Risk of cataracts: out of 100

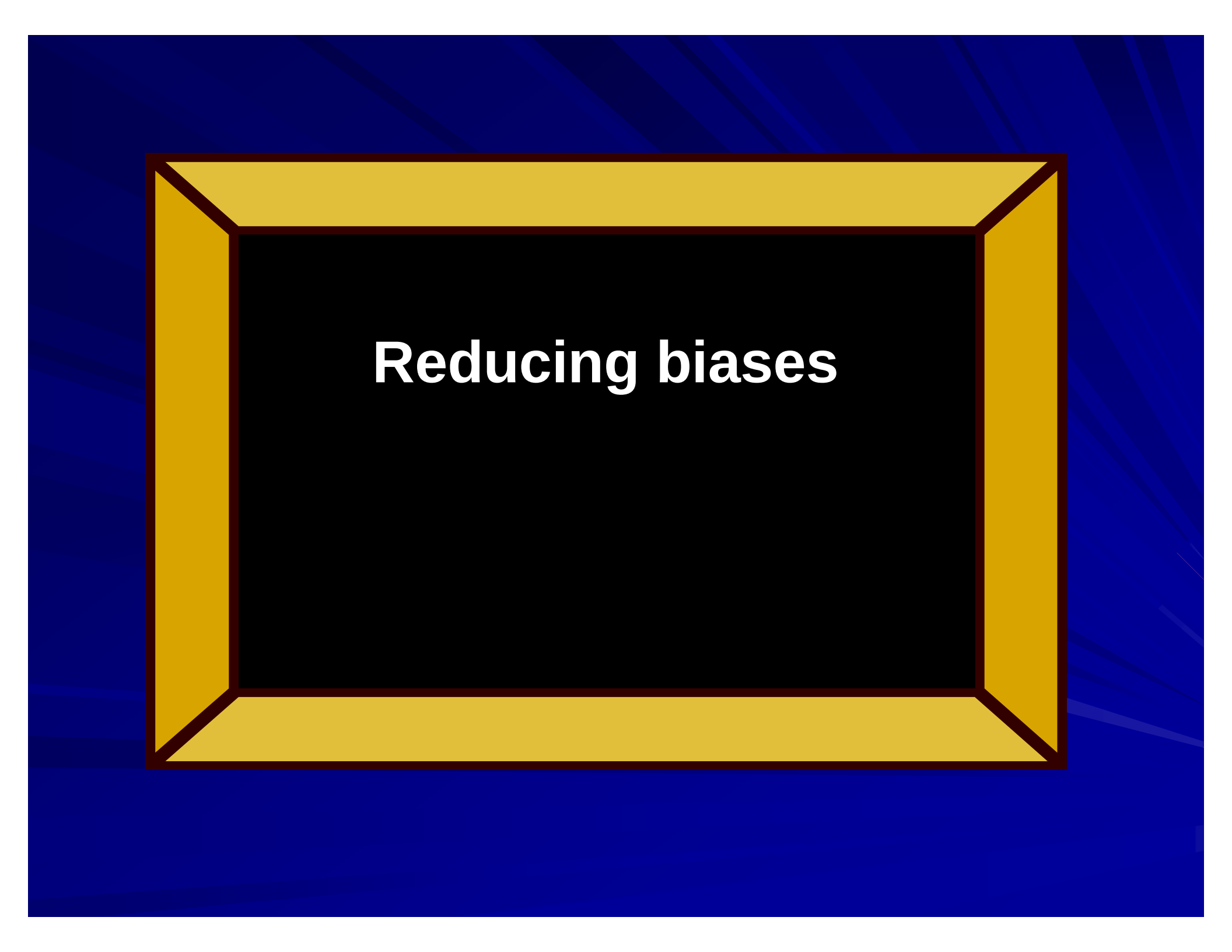
The graph on the left shows the number of women out of 100 who would get cataracts without taking tamoxifen. The graph on the right shows the number of women out of 100 who would get cataracts if they took tamoxifen.



Risk out of 1000

This graph shows the number of women out of 1000 who would get cataracts without taking tamoxifen.





Reducing biases

Bland Statistics

Bypass surgery cures angina (or chest pain) in 75%, or 75 out of 100 people.

More vivid statistics



Percent choosing bypass

Testimonials	Pallid statistics	Vivid statistics
Reinforcing	41	38
Balanced	20	44

What's going on here?

- A pictograph reduced the influence of uninformative anecdotes
 - But how?
- Improved comprehension of statistics?
 - Statistical quiz was no different across groups
- Helped people with low numeracy get better feel for statistics?
 - Numeracy not associated with
 - Choice of treatment
 - Influence of pictograph on choice

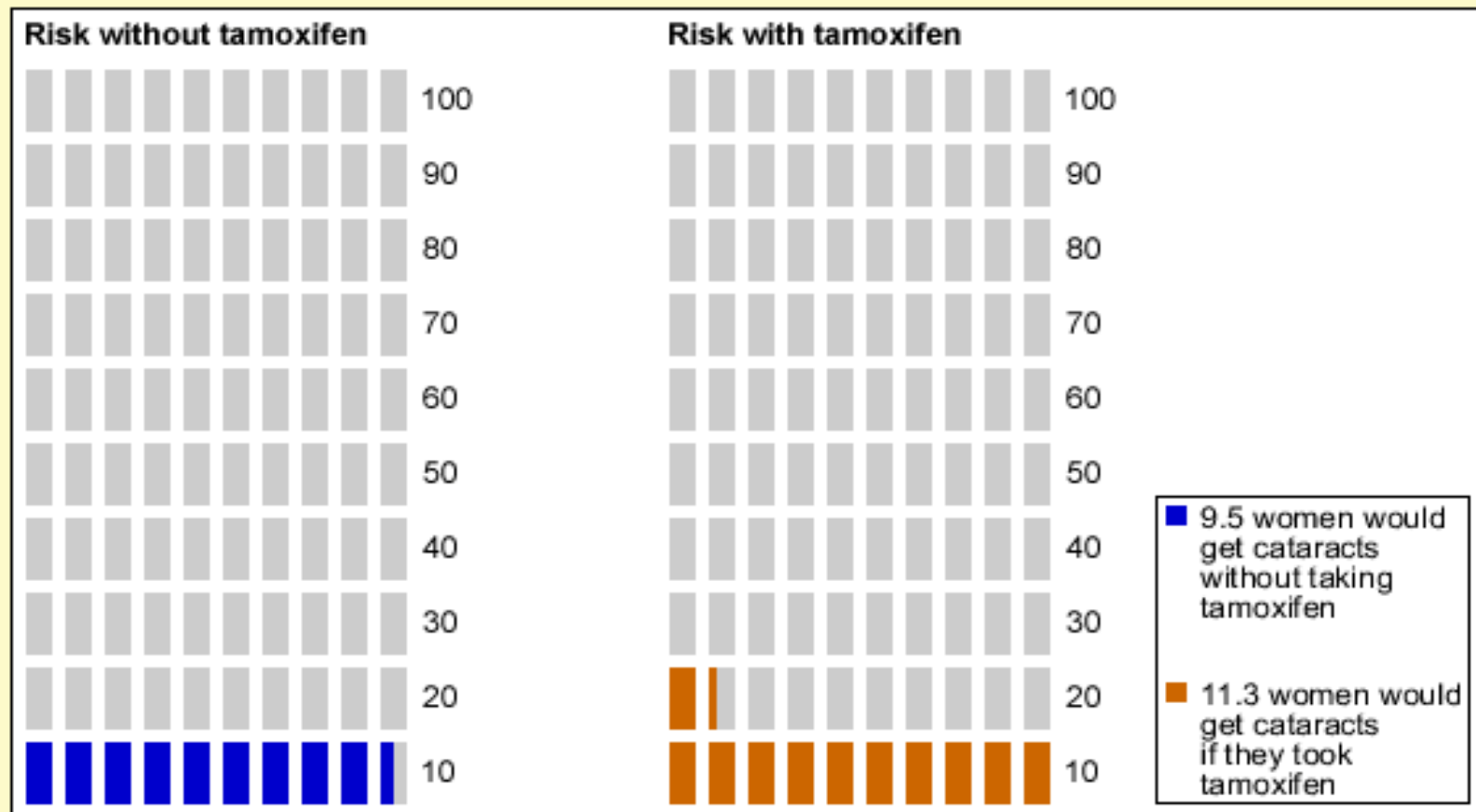
Maybe the picture changes the way the risks feel



**“Incremental
Risk” Displays
and Risk
Perceptions**

Total Risk Comparisons

The graph on the left shows the number of women out of 100 who would get cataracts without taking tamoxifen. The graph on the right shows the number of women out of 100 who would get cataracts if they took tamoxifen.



Problems with Total Risk

- **Ignore baseline risks:** People may fail to see the relevance of the baseline info
 - See *entire* risk as caused by treatment
- **Mental arithmetic:** People must add or subtract risk statistics to identify the *change in risk*.

Our Context:

Side Effects of Tamoxifen

- Endometrial cancer

0.3% => 0.6%

- Cardiovascular events

2.1% => 2.8%

- Cataracts

9.5% => 11.3%

- Menopausal symptoms

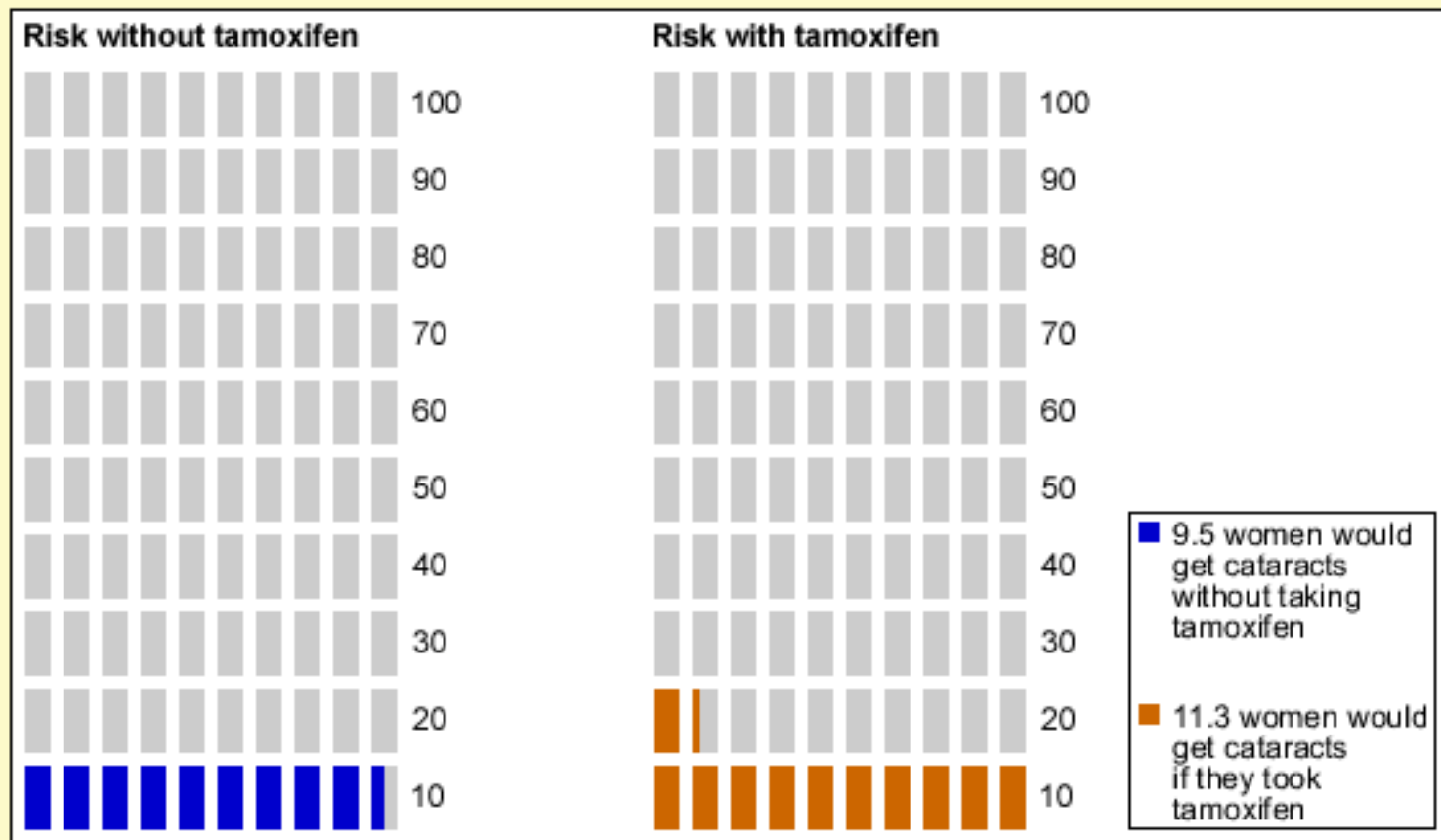
68% => 86%

“Incremental” Risk

- When a treatment adds side effect risk, describe it *in those terms!* e.g.,
 - 9.5 women out of 100 get cataracts without tamoxifen
 - 1.8 additional women out of 100 would get cataracts with tamoxifen

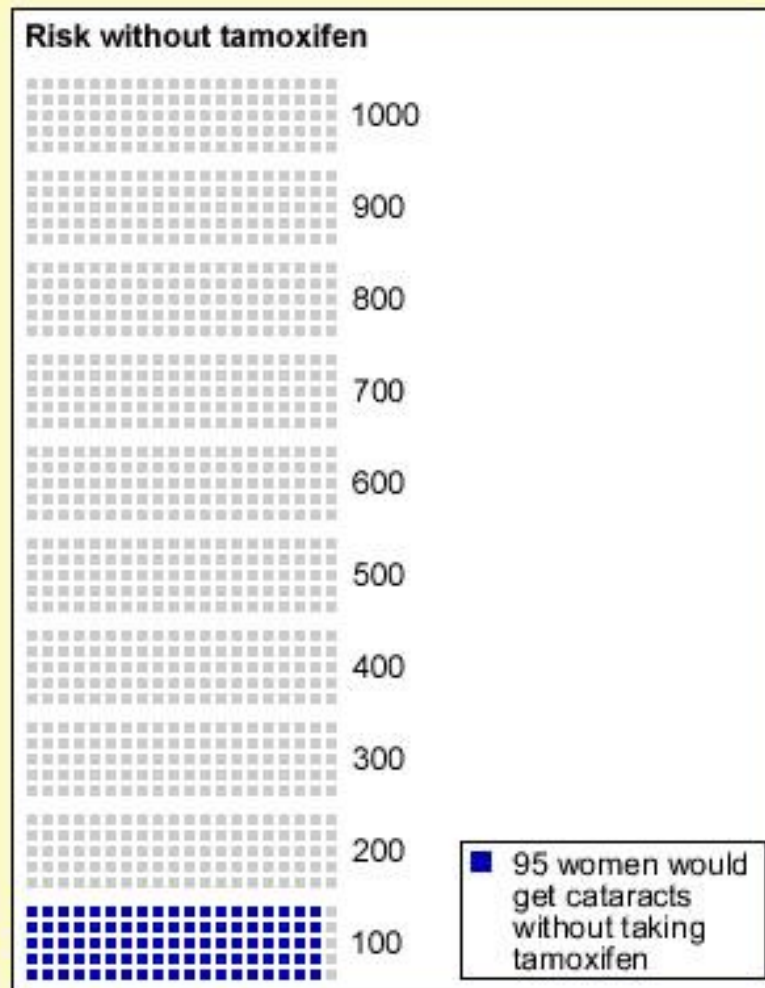
Total Risk

The graph on the left shows the number of women out of 100 who would get cataracts without taking tamoxifen. The graph on the right shows the number of women out of 100 who would get cataracts if they took tamoxifen.



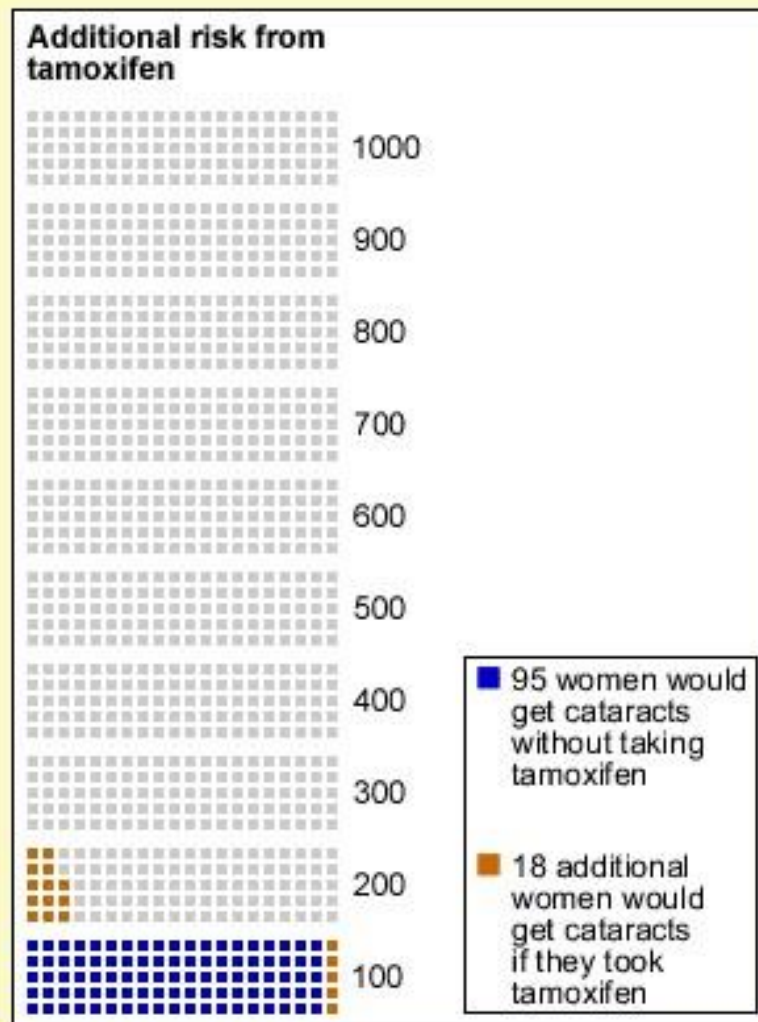
Incremental Risk 1

This graph shows the number of women out of 1000 who would get cataracts without taking tamoxifen.



Incremental Risk 2

This graph shows the number of women out of 1000 who would get cataracts without taking tamoxifen, and the additional number of women who would get the conditions if they took tamoxifen.



Secondary Factors

- Risk denominator
 - Risks “out of 100” versus “out of 1000”
- Probability order
 - Low P , high severity risks first versus last

Total vs. Incremental Risk: Worry

Worry about side effect (0-10) :

Total	4.6
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Incremental	4.0
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p	<.01
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Effect of Risk Denominator on Worry

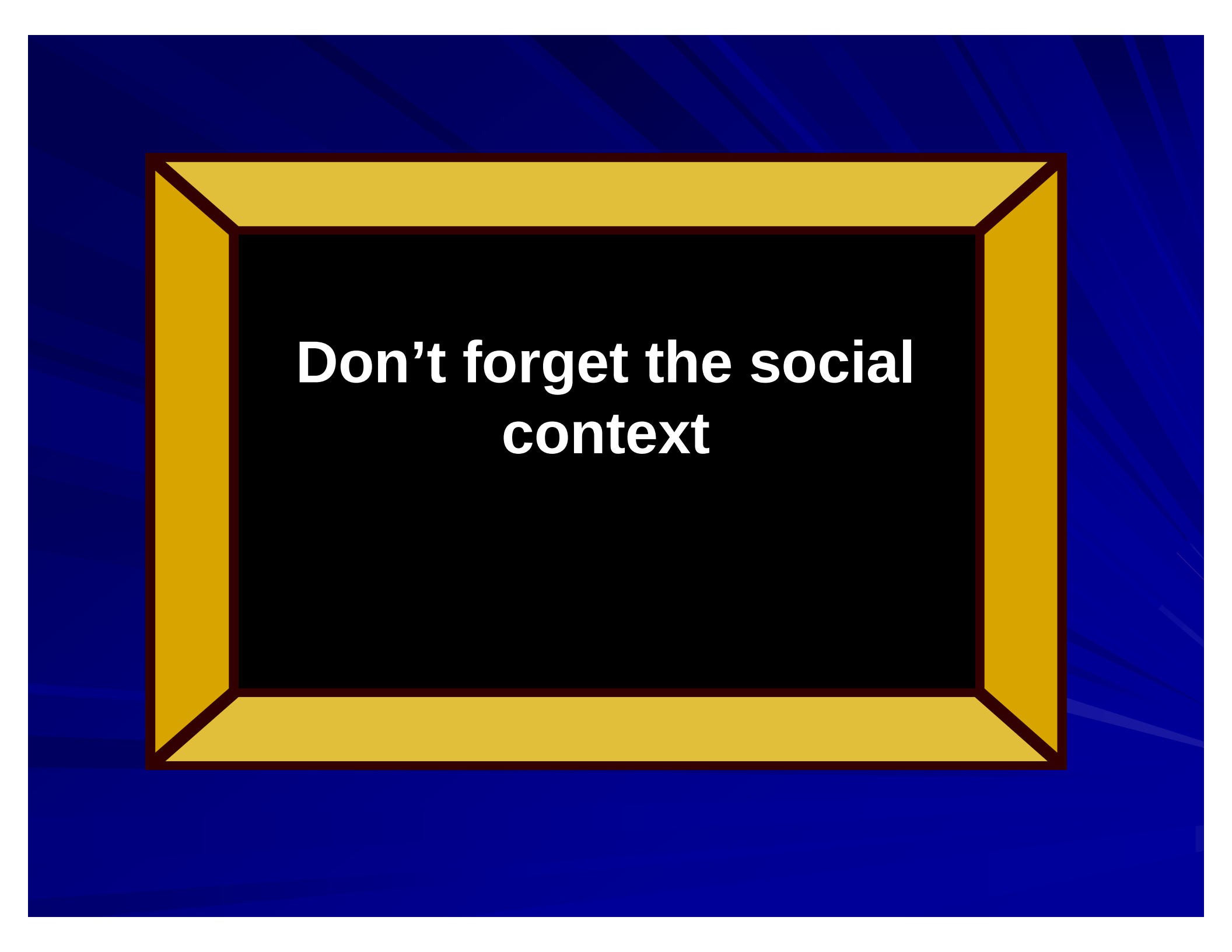
	<u>Out of 100</u>	<u>Out of 1000</u>	<u>p-value</u>
Total	3.9	5.2	<.001
Incremental	4.1	3.8	n.s.

Effect of Probability Order on Worry

	<u>Low P first</u>	<u>High P first</u>	<u>p-value</u>
Total	4.9	4.2	<.05
Incremental	4.1	3.8	n.s.

This study shows that

- Additional risk presentations...
 - Evoke less worry than total risk presentations
 - Emphasize how much risk exists at baseline
 - Are more resistant to denominator and probability order biases



**Don't forget the social
context**

“Costs” and benefits

■ My prediction

- Ask doctors to list the costs/harms of a medical intervention
- And most will think about
 - Side effects, adverse events, etc.

■ Probably not high on the list:

- Patient out-of-pocket costs

Is it okay to talk about money?

- The doctor-patient relationship has typically
 - Been spared the need to talk about money
 - Exceptions: e.g. cosmetic procedures
- Now imagine finally talking about money with your doctor
 - When you have life-threatening cancer

Apples to Apples Vs. Apples to Oranges

- Survival trade-offs
 - Short-term mortality risk
 - Versus long-term mortality gain
- Quality versus quantity
 - Increased chance of five-year survival
 - But with potential adverse events
- Money versus survival
 - Feels incommensurable

Take-home message

- We have good ways of communicating
 - Medical risks and benefits
- We are increasingly learning how
 - To avoid biasing decisions
- The next big challenge
 - Figuring out how to talk about money