


Ethical considerations for the role of a statistician in medical research



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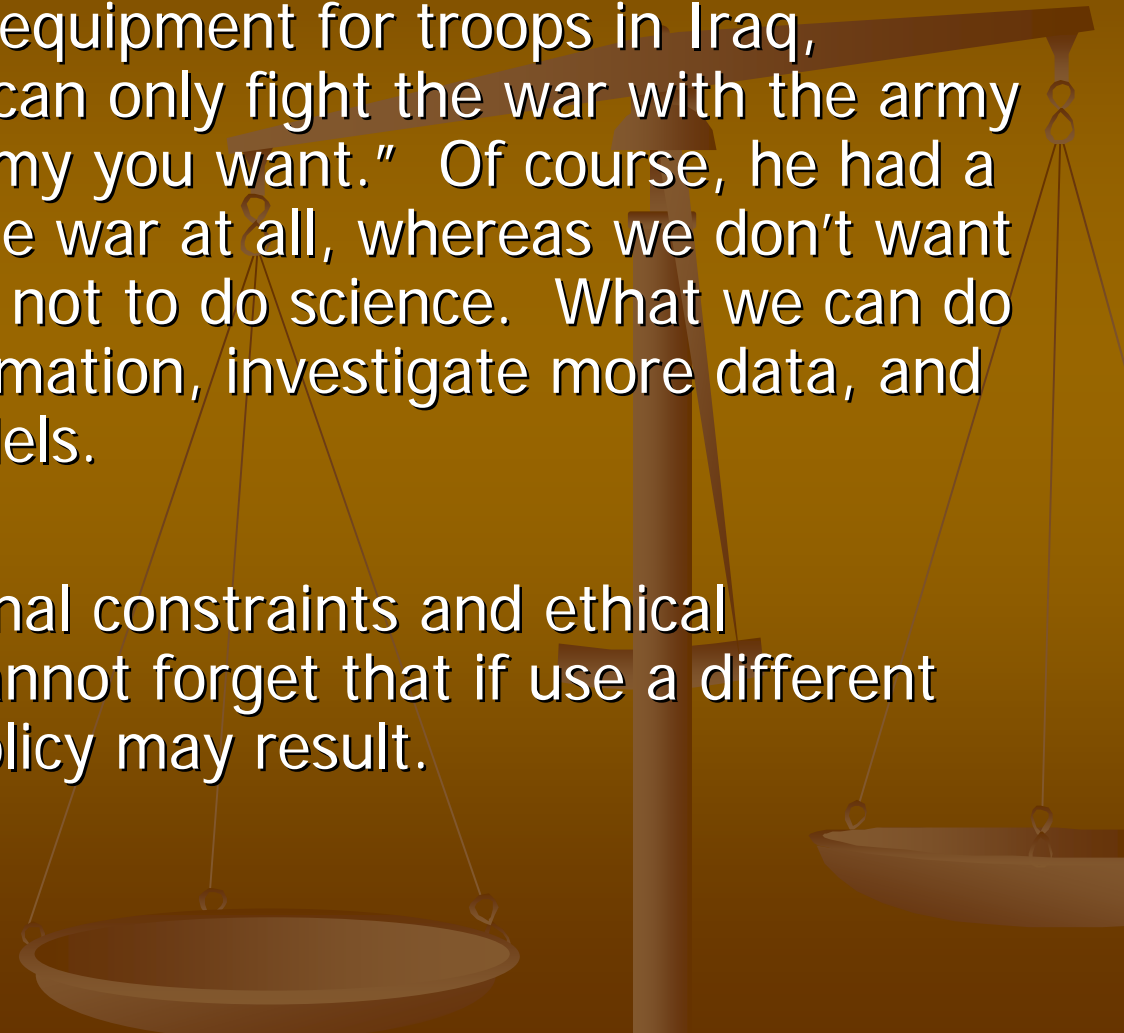
Science and policy



In response to the formulation of the task confronting us, I would like to express my concern about the attempt to divorce science from policy.

Do we not have an ethical obligation to concern ourselves with what is done with our science?

Perhaps “you can only do what you can do,” but what can you do about making it possible to do more?



U. S. Secretary of Defense Rumsfeld, in excusing the failure to provide adequate equipment for troops in Iraq, famously said, "You can only fight the war with the army you have, not the army you want." Of course, he had a choice to not fight the war at all, whereas we don't want to choose the option not to do science. What we can do is to seek more information, investigate more data, and construct better models.

We are bound by external constraints and ethical principles, and we cannot forget that if use a different model, a different policy may result.

Ethical issues

1. "Hired guns"—who produce any results for enough money or other incentives

- Drug company employees or consultants

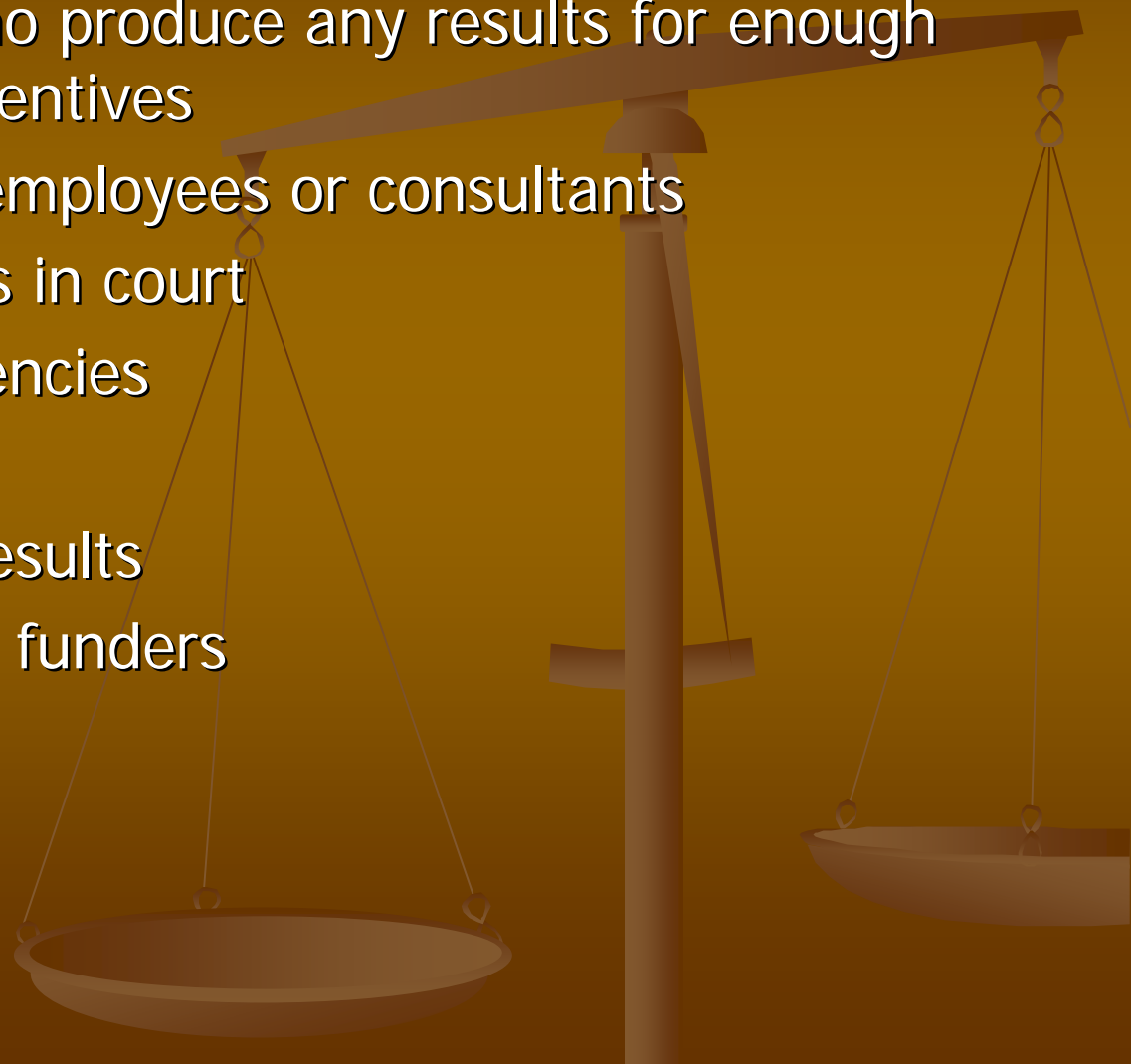
- Expert witnesses in court

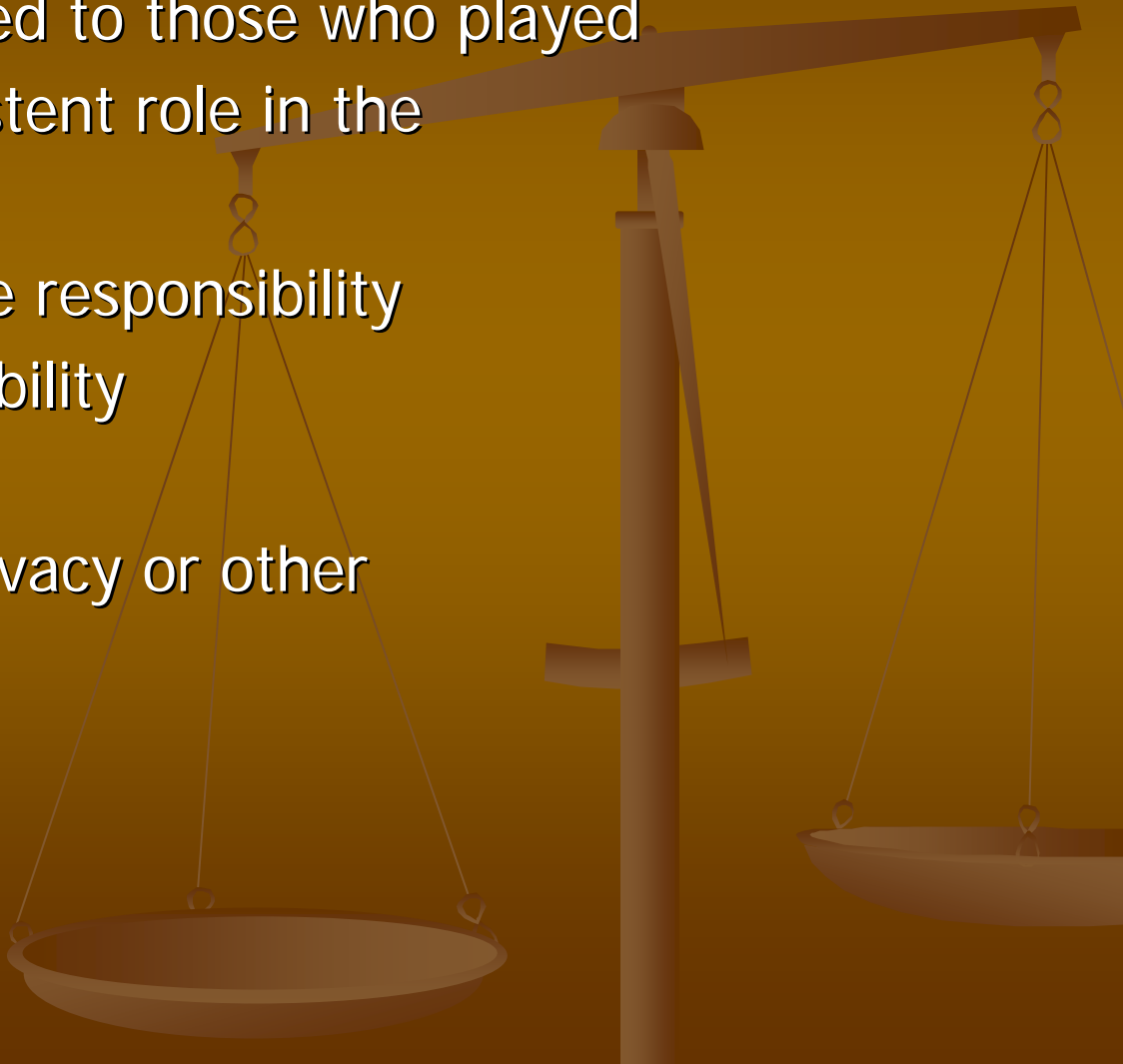
- Government agencies

2. Suppression of results

- By employers or funders

- Self-censorship





3. Credit falsely assigned to those who played a minor or non-existent role in the research

Failure to assume responsibility

Lack of accountability

4. Failure to protect privacy or other individual rights

Recognition of ethical concerns

In the middle of the Merck crisis recently, a headline appeared:

“Vioxx Kept Trial Going In Spite of Concerns”

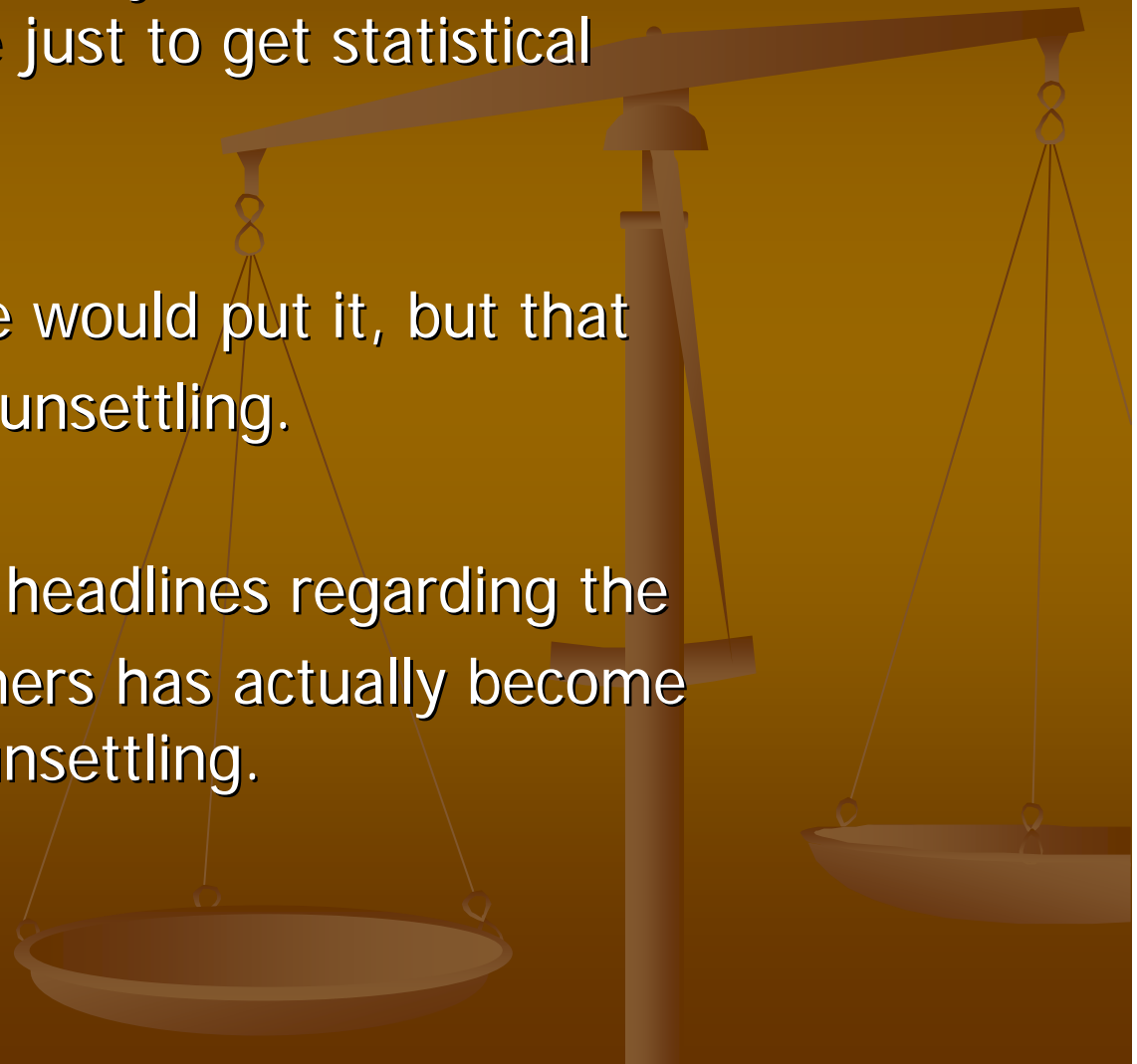
Some of my undergraduate statistics students saw the headline and, observing the words “statistically significant,” read the article (online, I should mention—I sometimes think no one under 25 reads print media).

The story related how concerns arose regarding possible increased risk of certain heart problems after as little as four months’ use of Vioxx, but the trial continued until the adverse events became statistically significant.

Does this mean, asked my students, that more people had to die just to get statistical significance?

Not, perhaps, how we would put it, but that THEY did is a bit unsettling.

The pervasiveness of headlines regarding the ethics of researchers has actually become more than a bit unsettling.



Further on Merck

“Merck Canceled an Early Study of Vioxx”

More expansively,

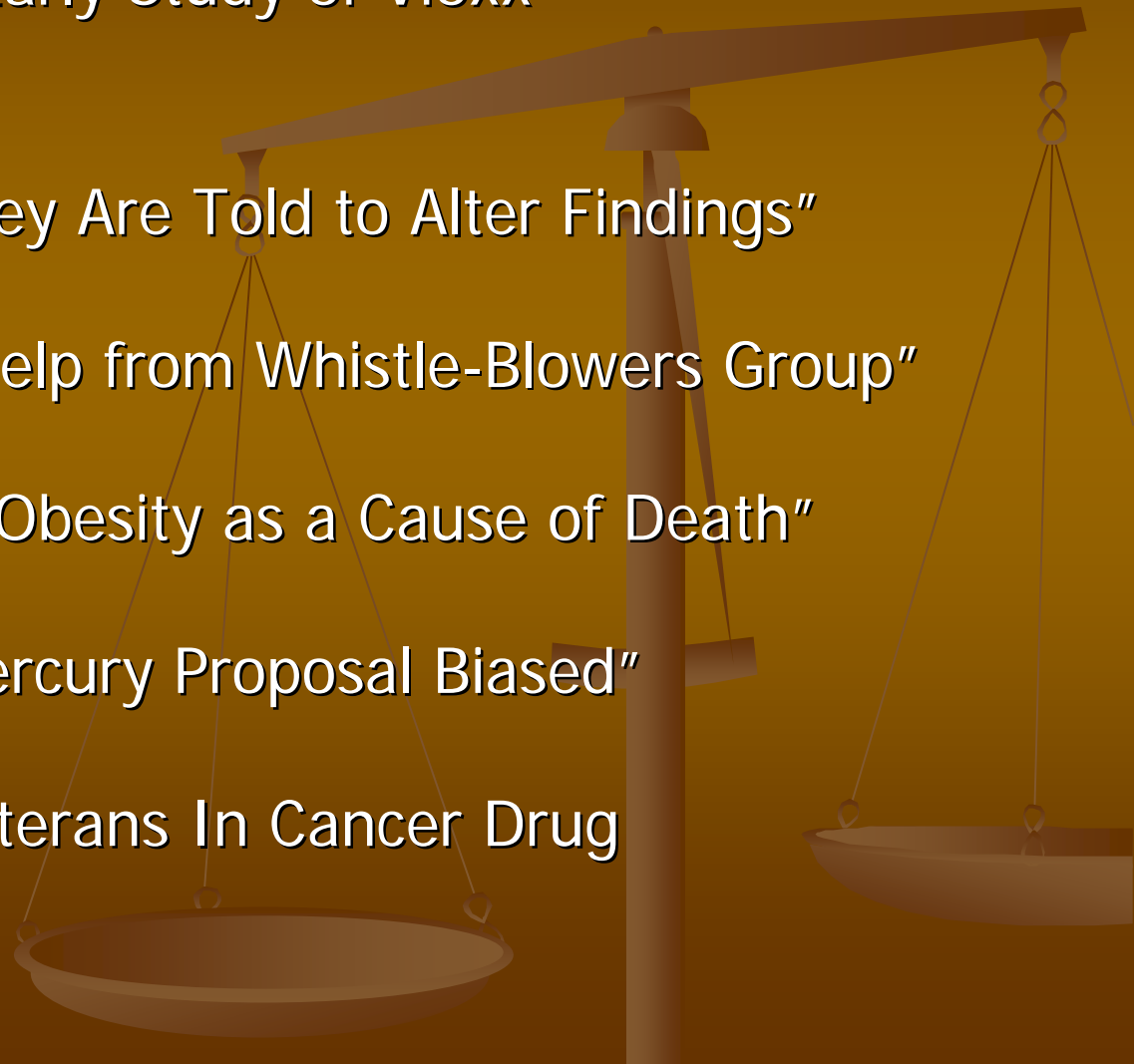
“US Scientists Say They Are Told to Alter Findings”

“FDA Employee Seeks Help from Whistle-Blowers Group”

“CDC Study Overstated Obesity as a Cause of Death”

“EPA Inspector Finds Mercury Proposal Biased”

“Abuses Endangered Veterans In Cancer Drug Experiments”



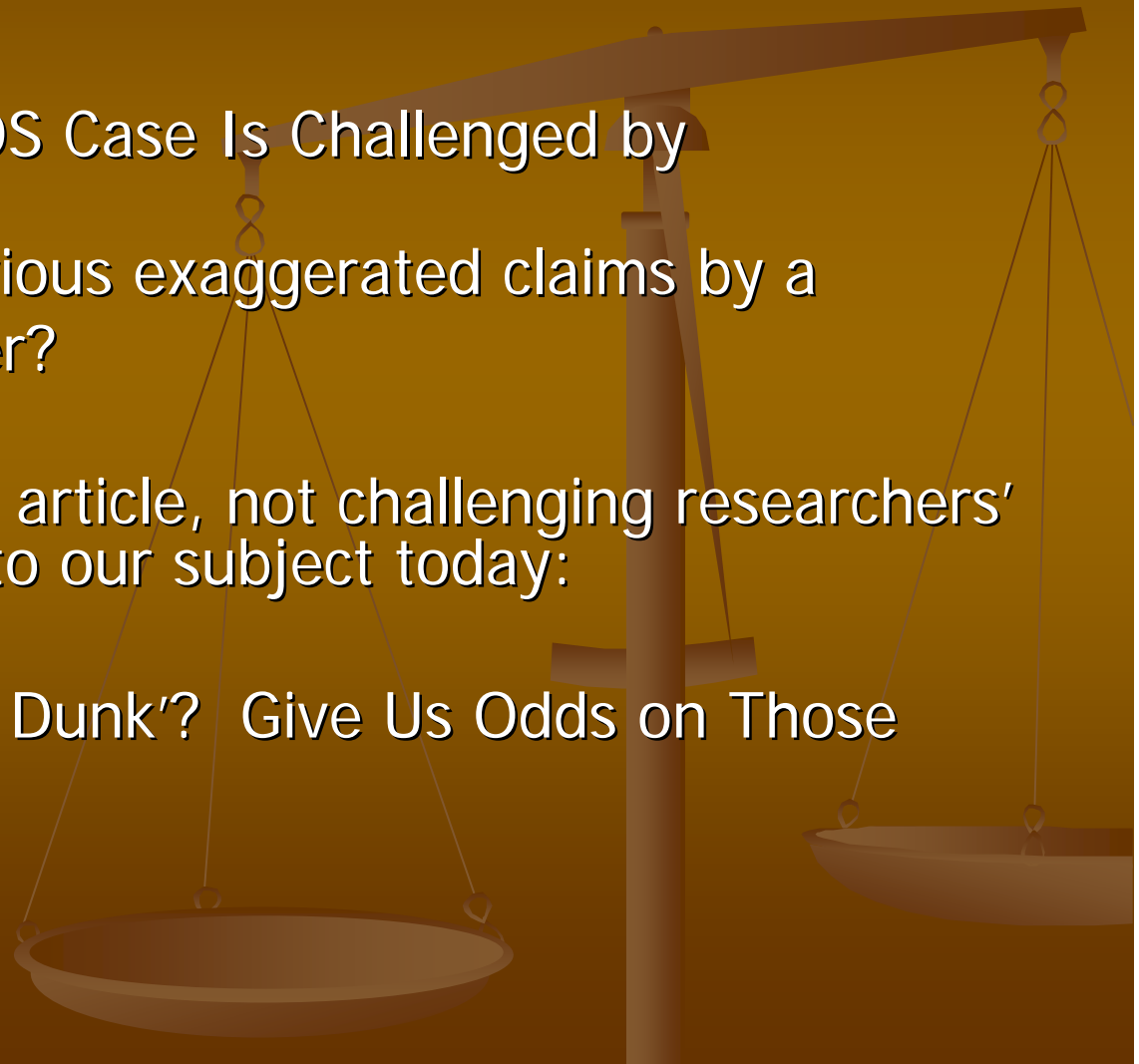
Or how about

“Alarm Over Single AIDS Case Is Challenged by Questioners”

in a story citing previous exaggerated claims by a prominent researcher?

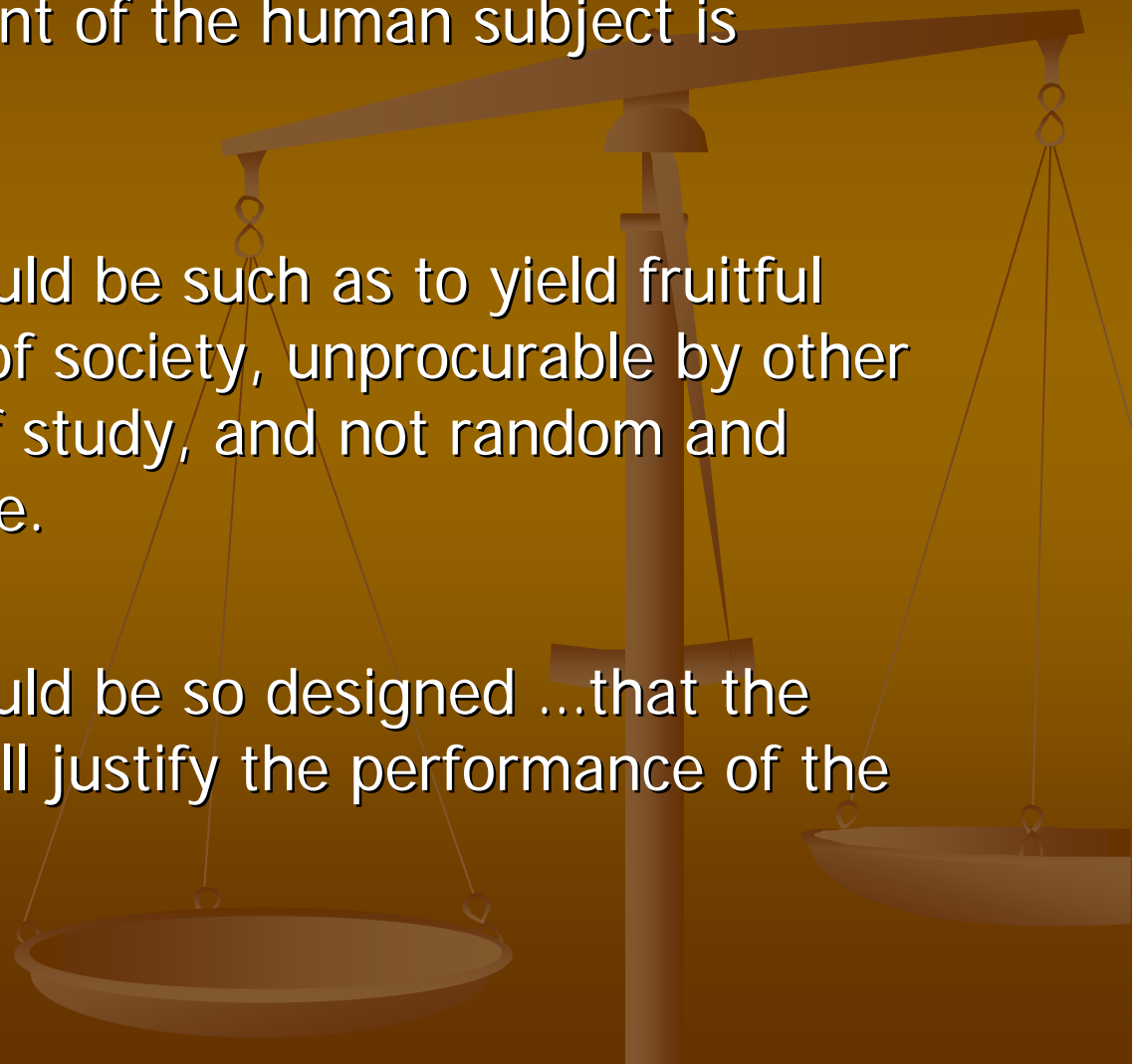
And finally, a hortatory article, not challenging researchers' ethics, but relevant to our subject today:

“What Percent is ‘Slam Dunk’? Give Us Odds on Those Estimates”



The Nuremberg Code

1. The voluntary consent of the human subject is absolutely essential.
2. The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.
3. The experiment should be so designed ...that the anticipated results will justify the performance of the experiment.

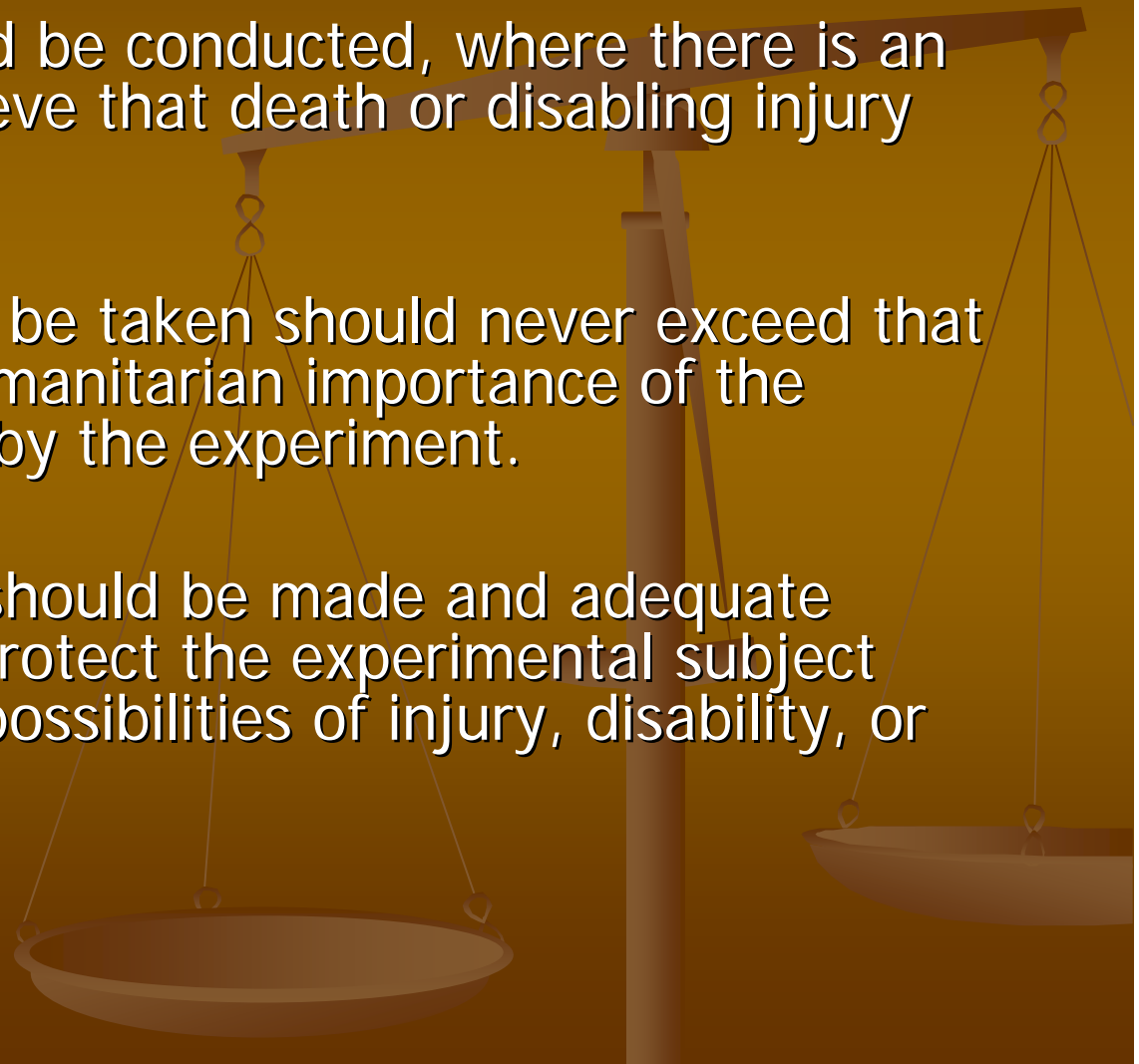


4. The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.

5. No experiment should be conducted, where there is an *a priori* reason to believe that death or disabling injury will occur... .

6. The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.

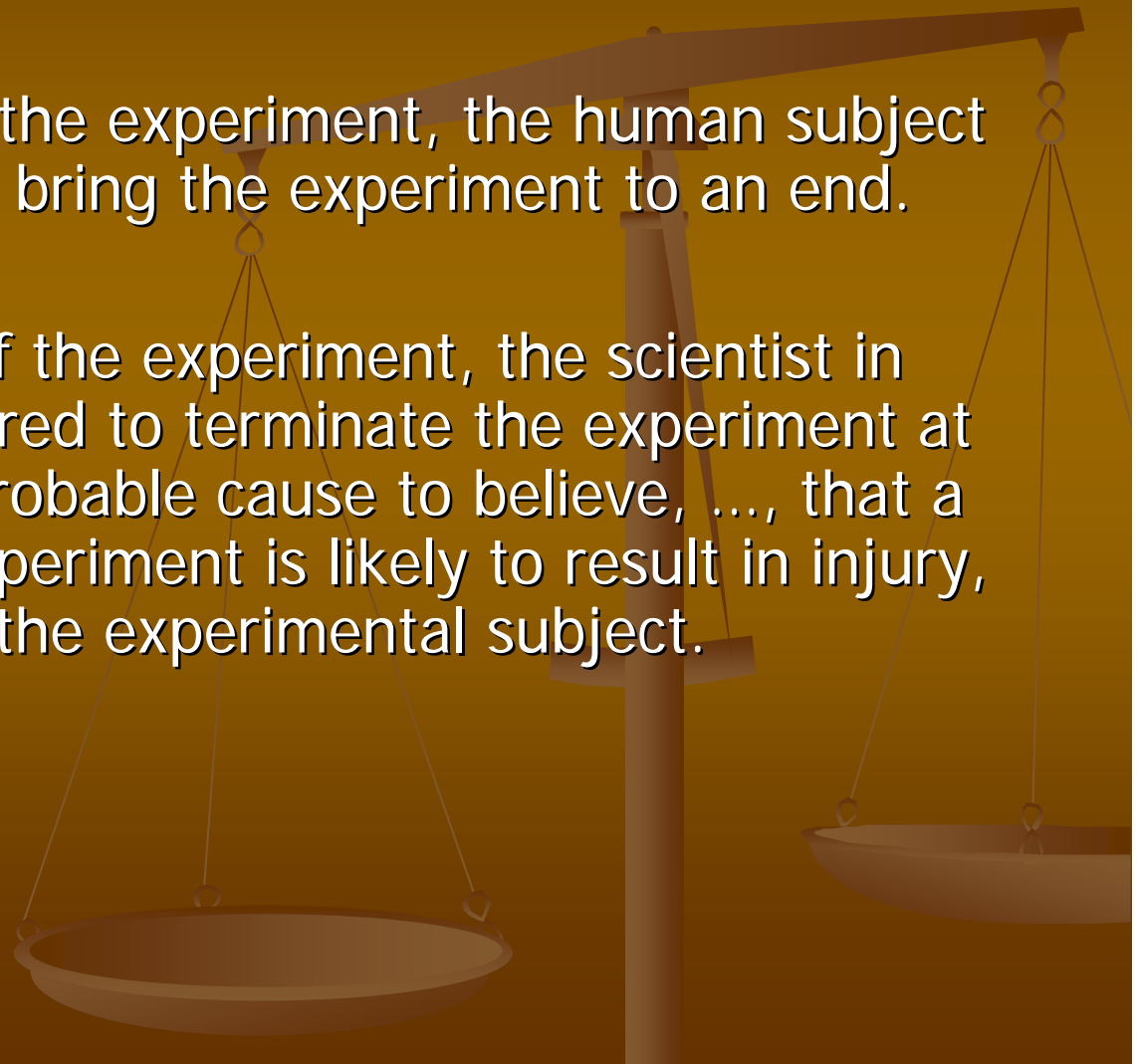
7. Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.



8. The experiment should be conducted only by scientifically qualified persons.

9. During the course of the experiment, the human subject should be at liberty to bring the experiment to an end.

10. During the course of the experiment, the scientist in charge must be prepared to terminate the experiment at any stage, if he has probable cause to believe, ..., that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.



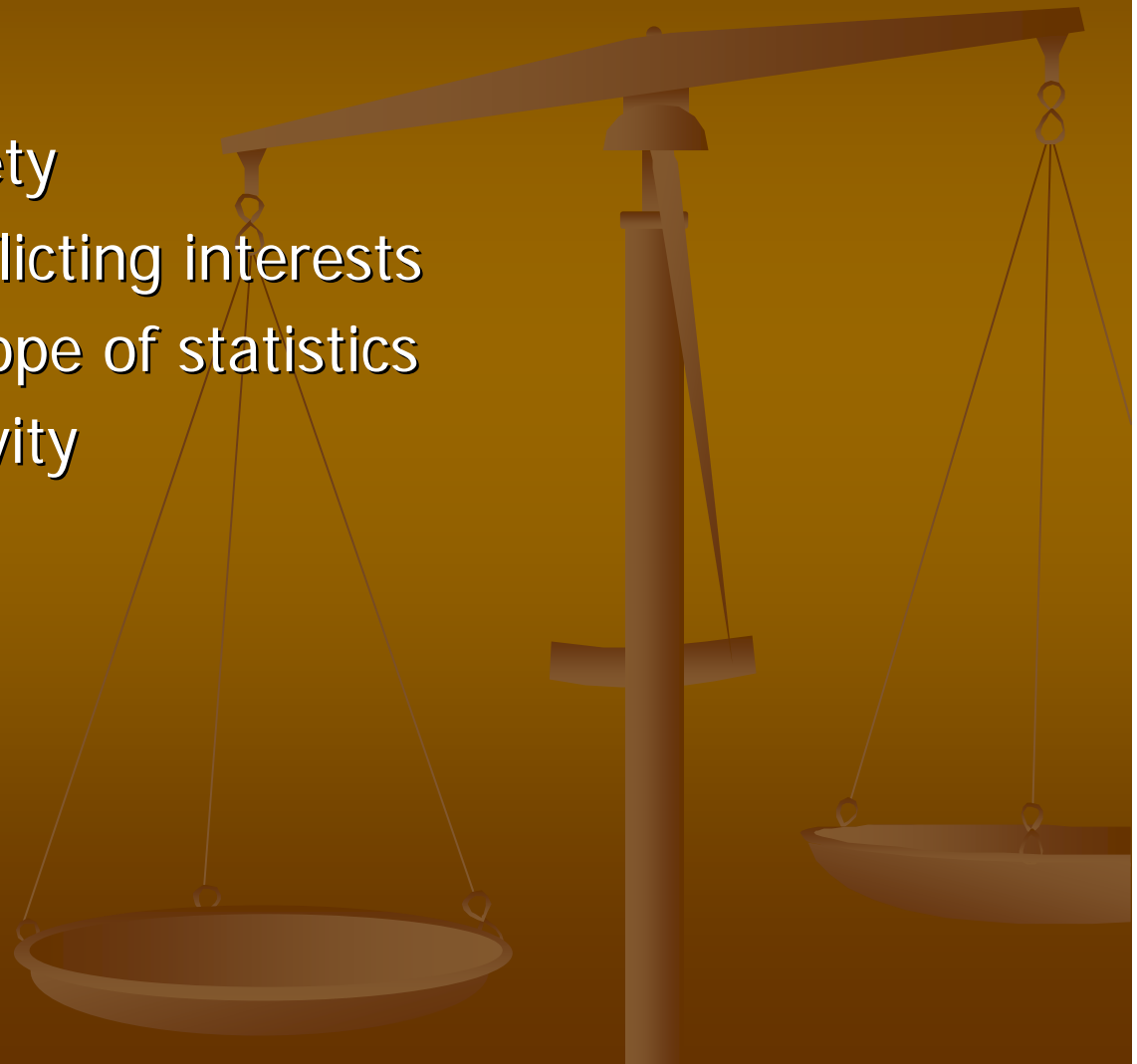
International Statistical Institute Code of Ethics

1. Obligations to society

Considering conflicting interests

Widening the scope of statistics

Pursuing objectivity

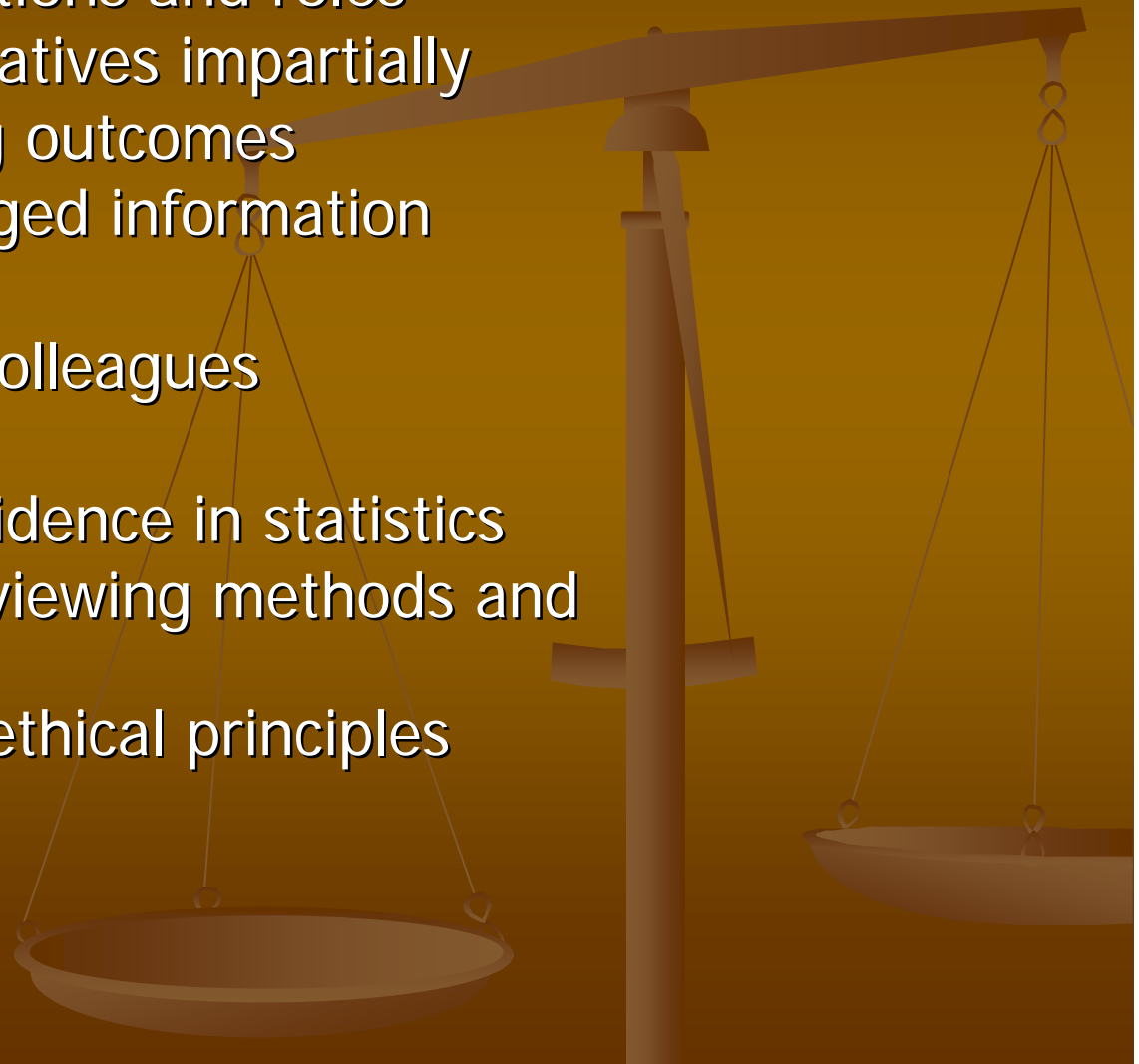


2. Obligations to funders and employers

Clarifying obligations and roles
Assessing alternatives impartially
Not pre-empting outcomes
Guarding privileged information

3. Obligations to colleagues

Maintaining confidence in statistics
Exposing and reviewing methods and findings
Communicating ethical principles



Contexts for ethical considerations

1. Clinical trials

2. Surveys

Medicine

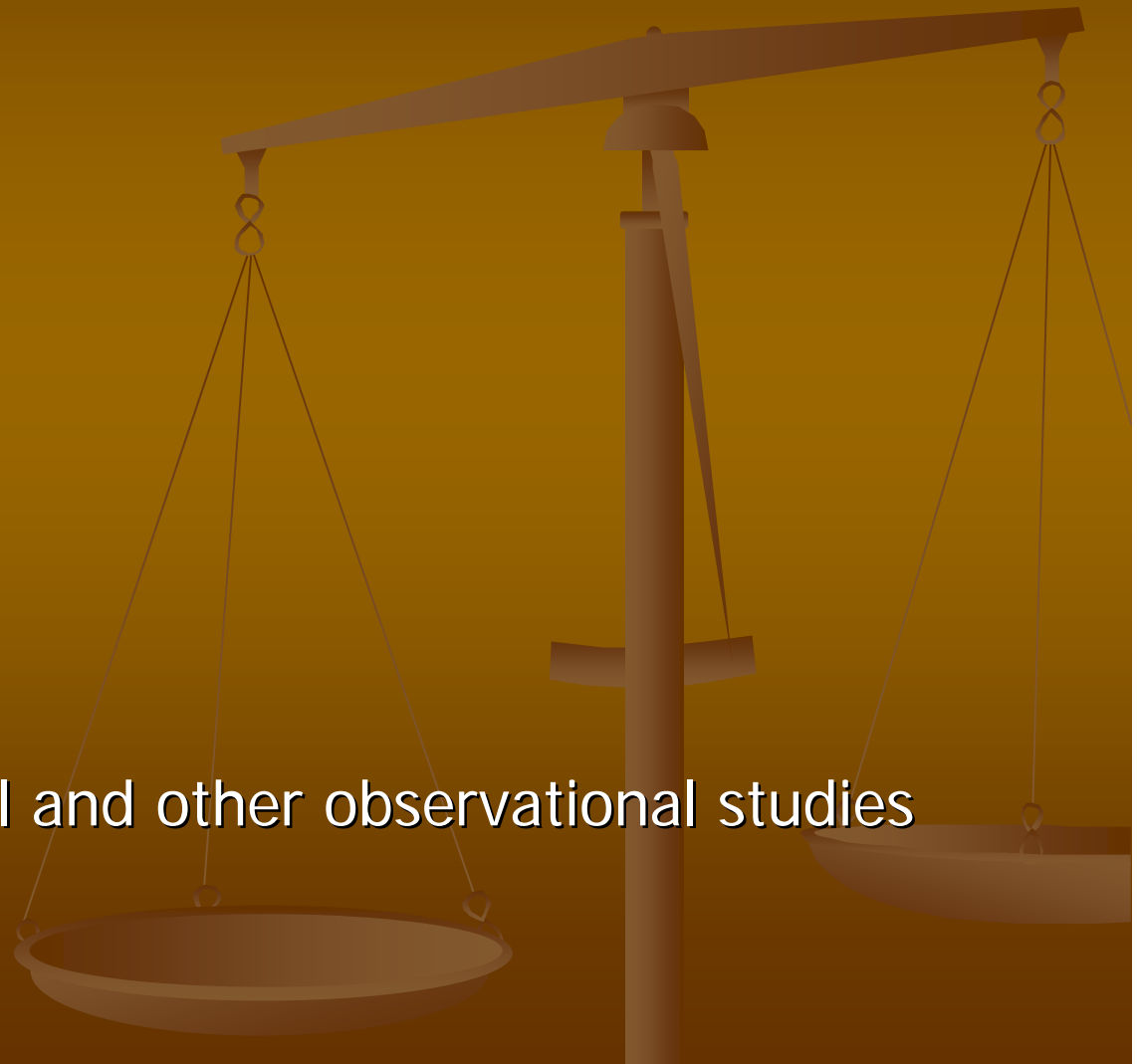
Economics

Education

Social welfare

Politics

3. Epidemiological and other observational studies



4. Planning

Financial markets

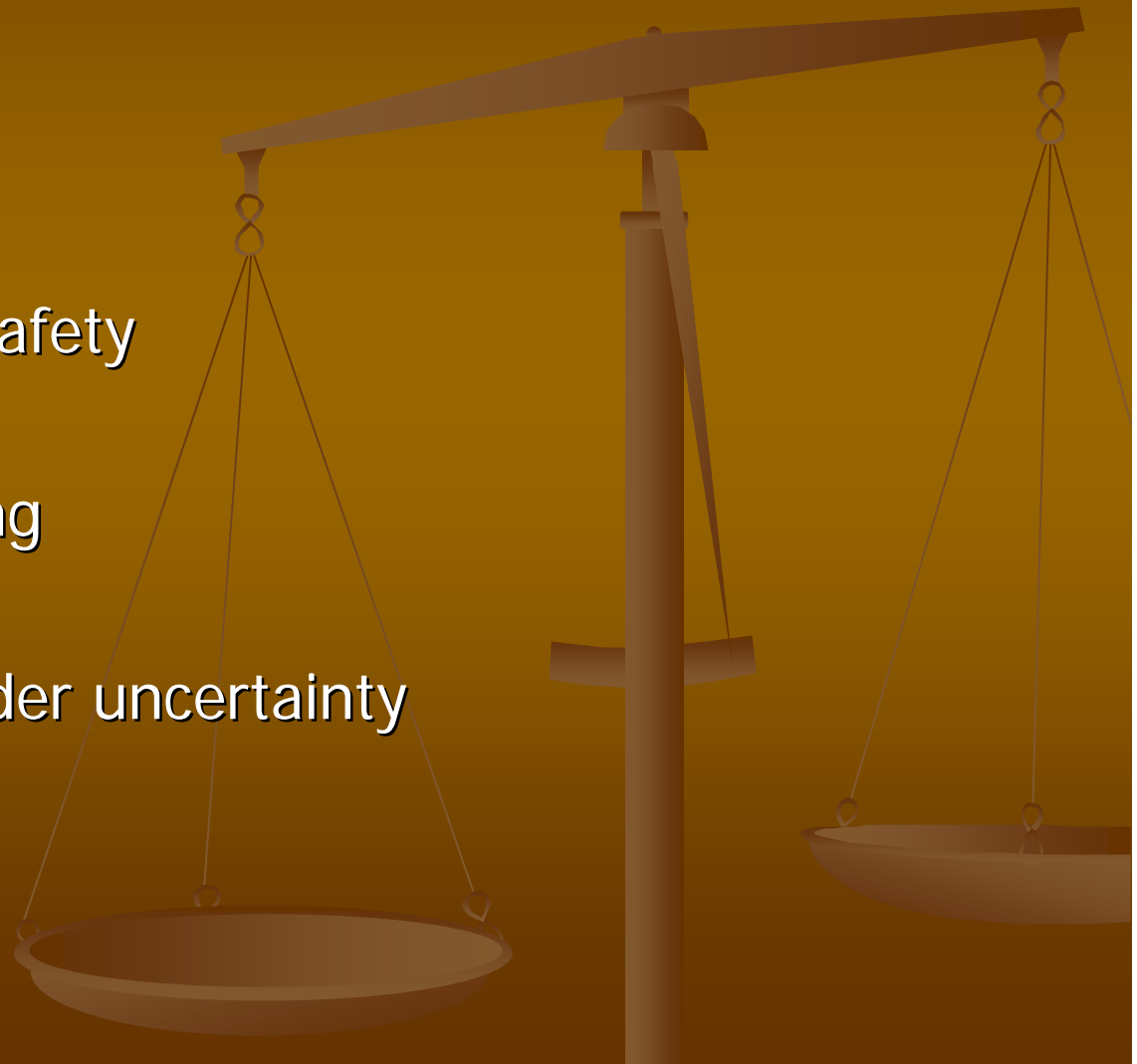
World Bank

Healthcare

Public health and safety

5. Teaching and training

6. Risk assessment under uncertainty

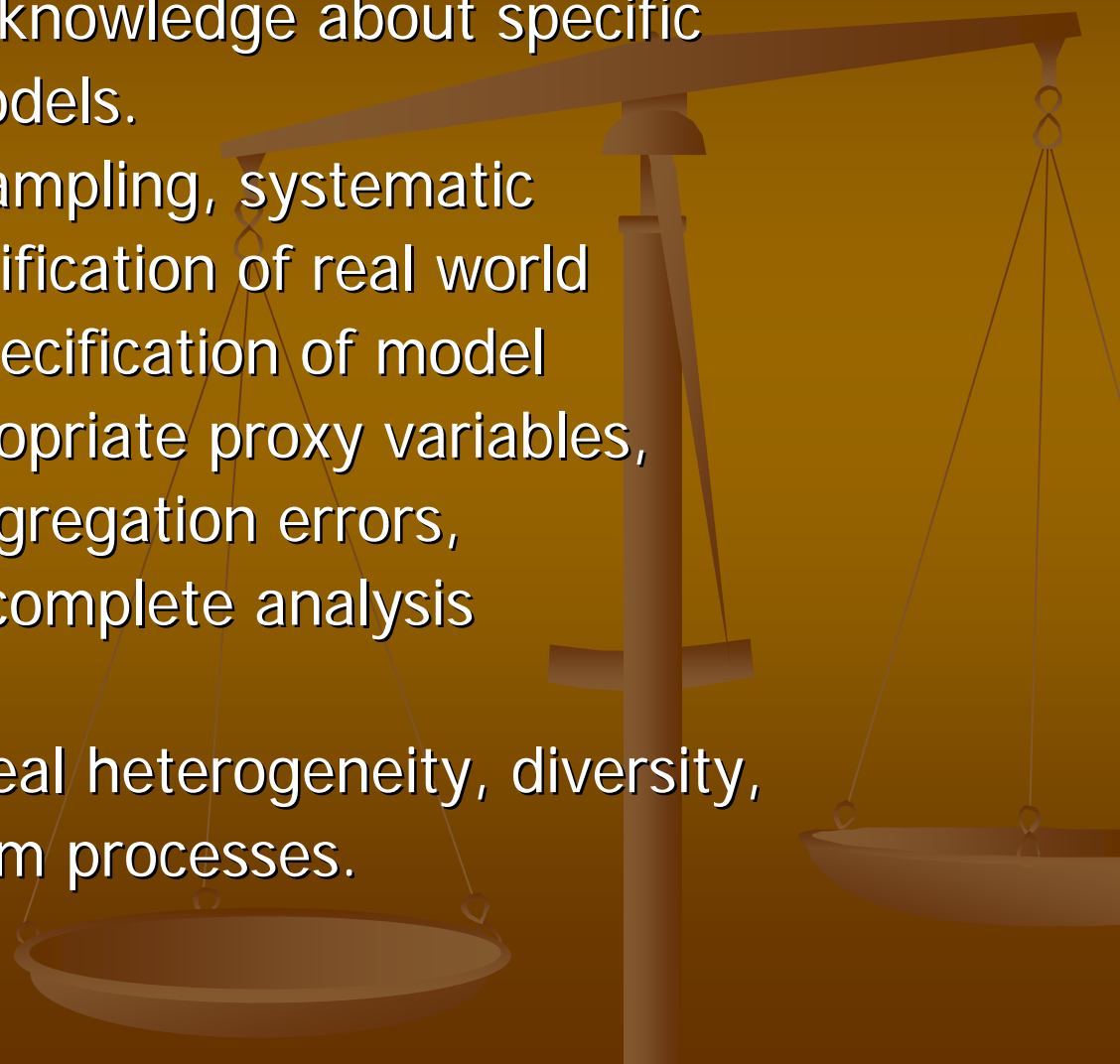


Uncertainty and variability

Uncertainty is a lack of knowledge about specific factors, parameters, models.

measurement, sampling, systematic errors, oversimplification of real world processes, misspecification of model structure, inappropriate proxy variables, descriptive or aggregation errors, misjudgment, incomplete analysis

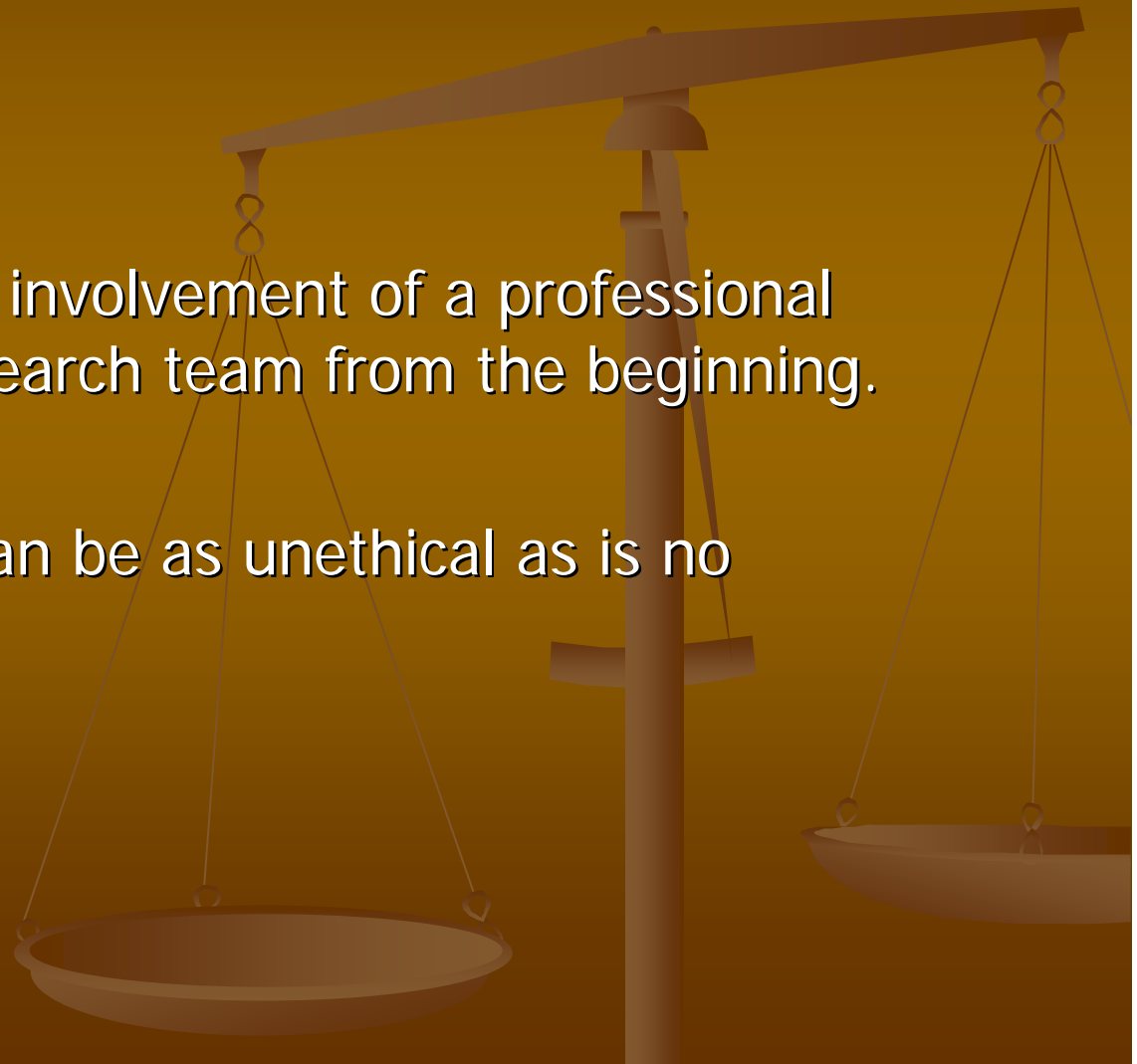
Variability arises from real heterogeneity, diversity, results of natural random processes.



Basic principle

There should be formal involvement of a professional statistician in the research team from the beginning.

Informal involvement can be as unethical as is no involvement at all.



Other issues



A professional statistician will serve as a filter for errors and misconceptions earlier in the review process and facilitate the progress of scientific research.

Respect for randomization and inclusion of all relevant evidence

What about the training of non-statistician researchers in statistics?

Cautions

Responsibility

Accountability

Conflicts of interest

Guard your reputation

Enforcement

Internal review

Journals

Professional societies



Techniques under conditions of uncertainty

Scenario analysis—address rather than minimize uncertainty

Epidemiological studies

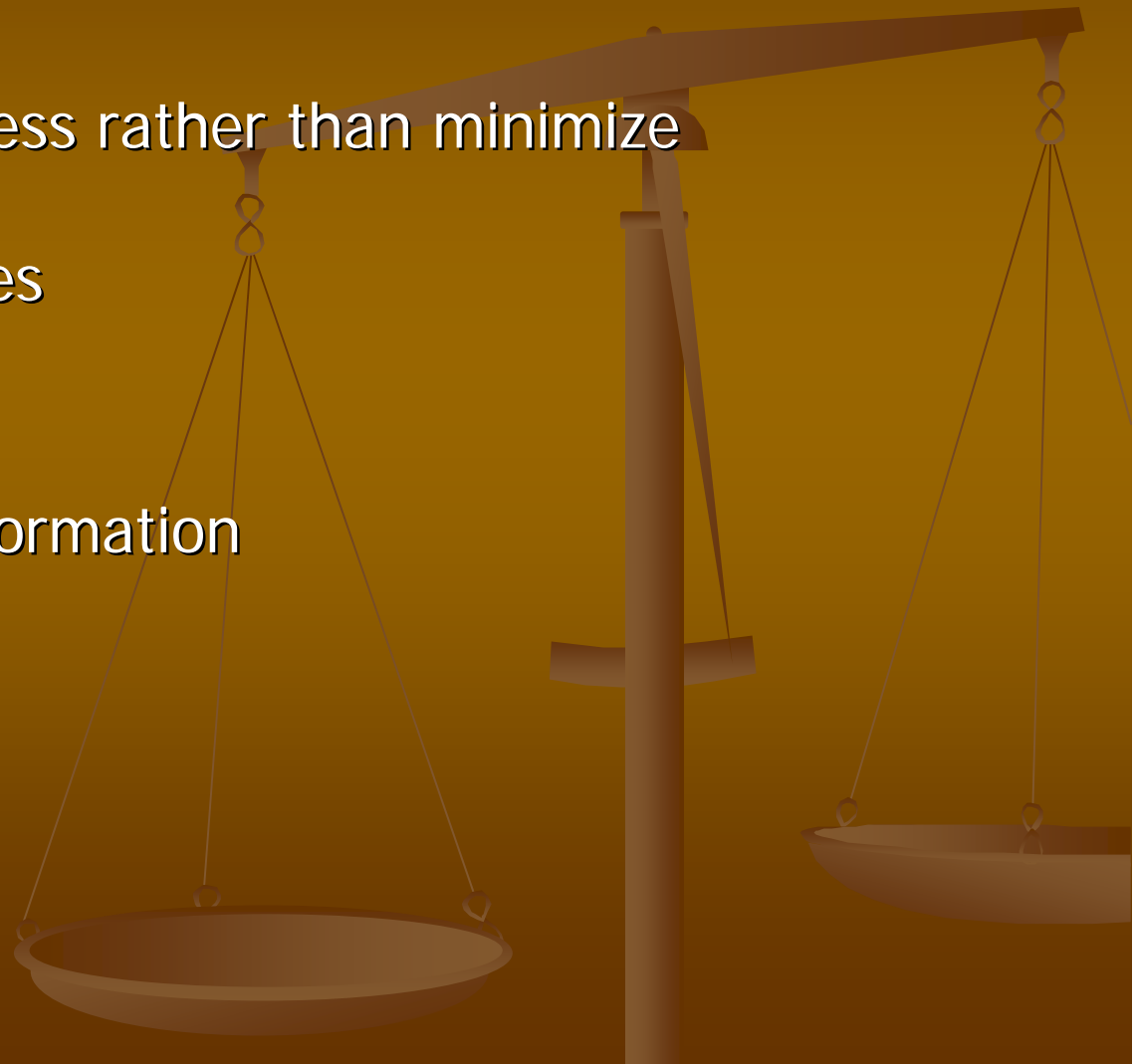
Expert opinion

Anecdotal evidence

Verifiable relevant information

Simulation

Sensitivity analysis



Considerations



Focus on areas of greatest uncertainty

Responsibility to include many perspectives from stakeholders to bring up issues that otherwise would not be considered and to expose underlying forces

Avoid advocacy

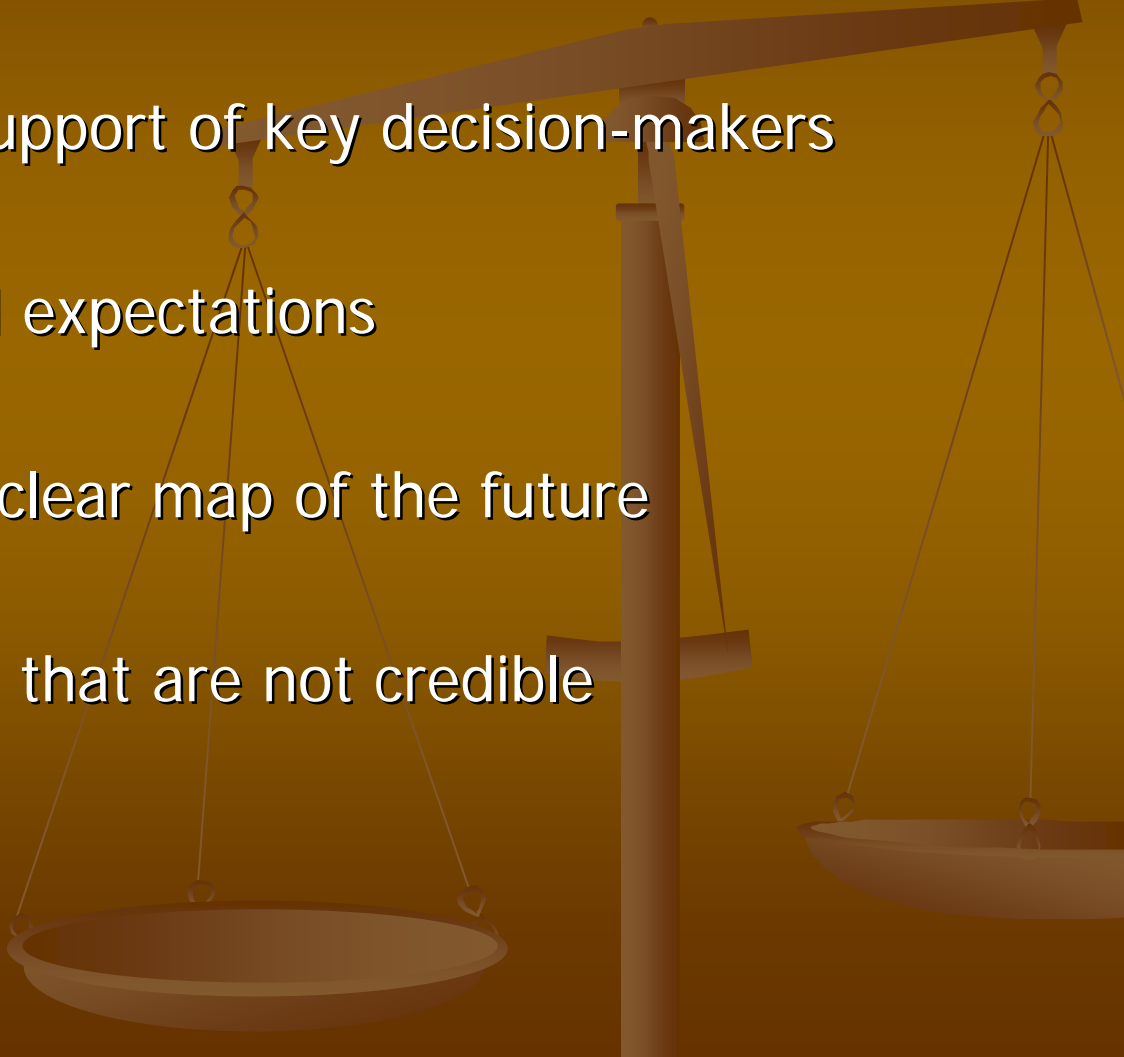
SEEPT—social, economic, environmental, political and technological factors

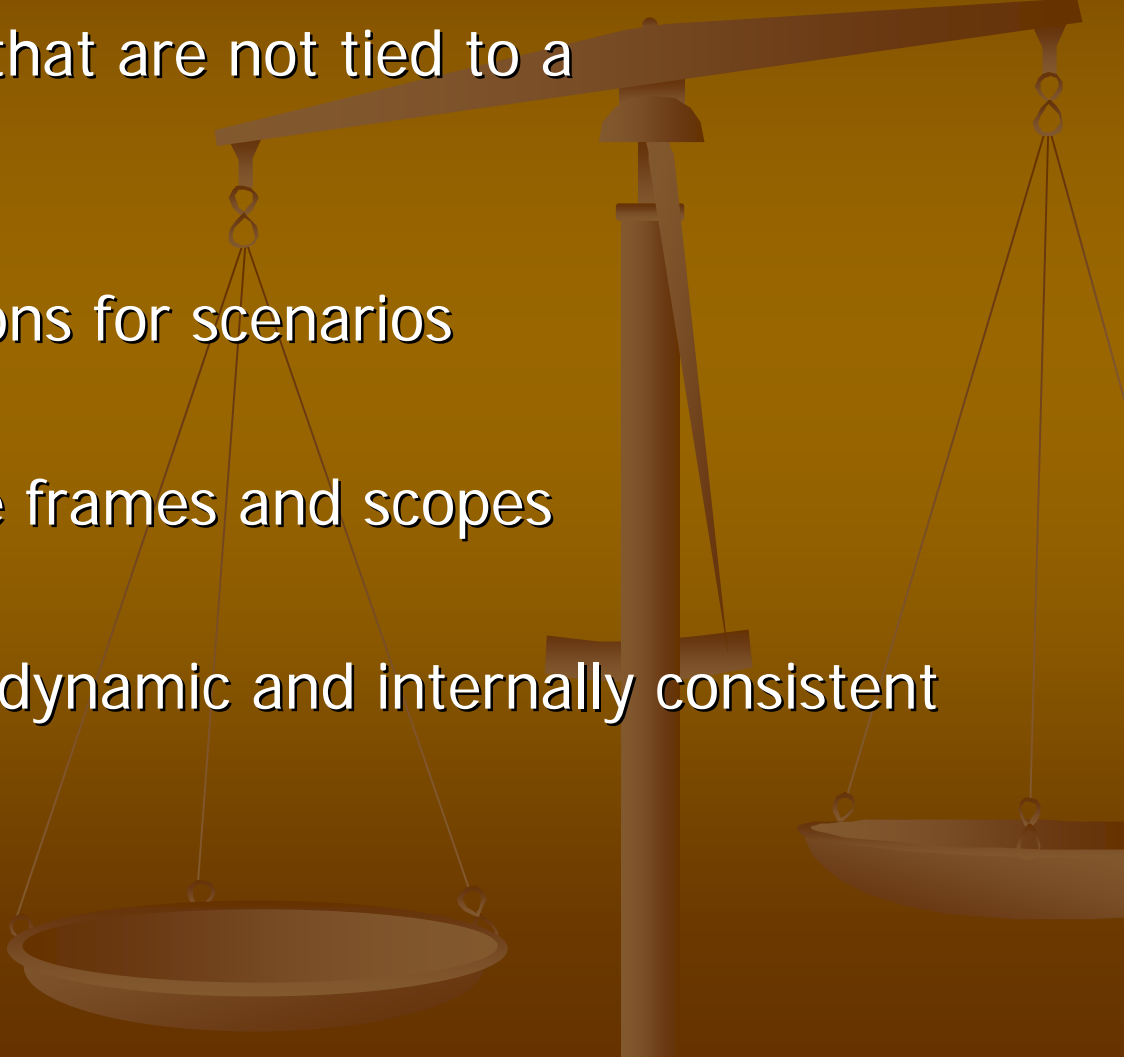
Build accountability system

Monitor progress and test results

Re-examine environment and strategy

Pitfalls for which statisticians may share responsibility

1. Failure to gain the support of key decision-makers
 2. Unrealistic goals and expectations
 3. Failure to develop a clear map of the future
 4. Building of scenarios that are not credible
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5. Building scenarios that are not tied to a planning process
 6. Mistaking projections for scenarios
 7. Inappropriate time frames and scopes
 8. Failure to relate a dynamic and internally consistent story

Communication



Statisticians should attempt to promote and preserve the confidence of the public without exaggerating the accuracy or explanatory power of their data.

Statisticians should provide adequate information to permit their methods, procedures, techniques, and findings to be assessed.

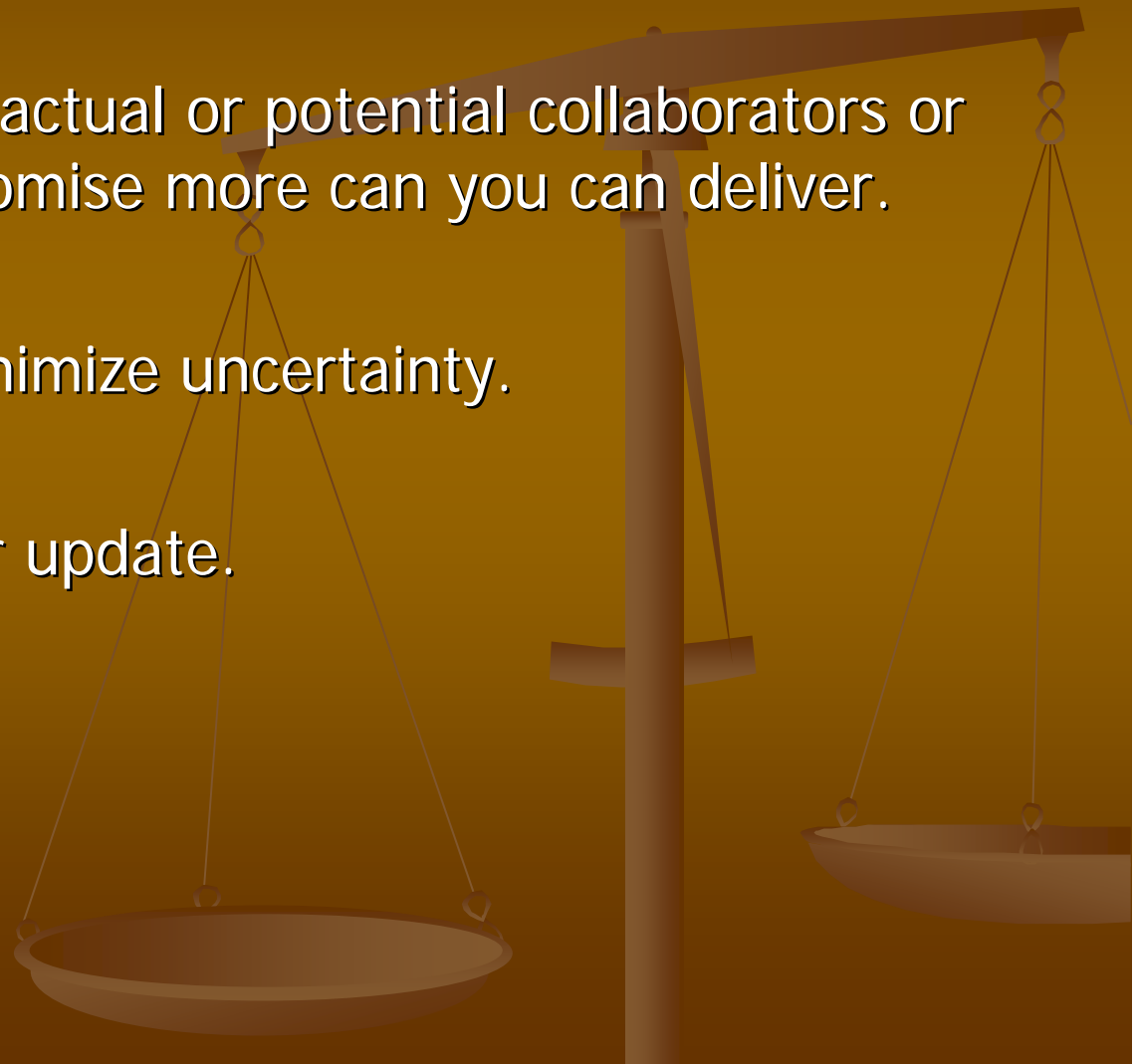
Statisticians need to collaborate with colleagues and participants in making their own ethical principles clear and taking account of the ethical principals of collaborators.

Decision making under uncertainty

In communicating with actual or potential collaborators or the public, do not promise more than you can deliver.

Address rather than minimize uncertainty.

Be prepared to modify or update.



Ethical frameworks

Utilitarian

Social justice

Non-interference

Virtual certainty



Statistician's role

To decide which framework?

To help someone else to decide which framework?

If so, how?

