

PPDAC

Statistical Modelling

There are three kinds of lies:
lies, damned lies, and
statistics.

There are two kinds of statistics:
the kind you look up,
and the kind you make up.

A Frank Statement to Cigarette Smokers

RECENT REPORTS on experiments with mice have given wide publicity to a theory that cigarette smoking is in some way linked with lung cancer in human beings.

Although conducted by doctors of professional standing, these experiments are not regarded as conclusive in the field of cancer research. However, we do not believe that any serious medical research, even though its results are inconclusive should be disregarded or lightly dismissed.

At the same time, we feel it is in the public interest to call attention to the fact that eminent doctors and research scientists have publicly questioned the claimed significance of these experiments.

Distinguished authorities point out:

1. That medical research of recent years indicates many possible causes of lung cancer.
2. That there is no agreement among the authorities regarding what the cause is.
3. That there is no proof that cigarette smoking is one of the causes.
4. That statistics purporting to link cigarette smoking with the disease could apply with equal force to any one of many other aspects of modern life. Indeed the validity of the statistics themselves is questioned by numerous scientists.

We accept an interest in people's health as a basic responsibility, paramount to every other consideration in our business. We believe the products we make are not injurious to health.

We always have and always will cooperate closely with those whose task it is to safeguard the public health.

For more than 300 years tobacco has given solace, relaxation, and enjoyment to mankind. At one time or another during those years critics have held it responsible for practically every disease of the human body. One by one these charges have been abandoned for lack of evidence.

Regardless of the record of the past, the fact that cigarette smoking today should even be suspected as a cause of a serious disease is a matter of deep concern to us.

Many people have asked us what we are doing to meet the public's concern aroused by the recent reports. Here is the answer:

1. We are pledging aid and assistance to the research effort into all phases of tobacco use and health. This joint financial aid will of course be in addition to what is already being contributed by individual companies.
2. For this purpose we are establishing a joint industry group consisting initially of the undersigned. This group will be known as TOBACCO INDUSTRY RESEARCH COMMITTEE.
3. In charge of the research activities of the Committee will be a scientist of unimpeachable integrity and national repute. In addition there will be an Advisory Board of scientists disinterested in the cigarette industry. A group of distinguished men from medicine, science, and education will be invited to serve on this Board. These scientists will advise the Committee on its research activities.

This statement is being issued because we believe the people are entitled to know where we stand on this matter and what we intend to do about it.

TOBACCO INDUSTRY RESEARCH COMMITTEE

5400 EMPIRE

THE AMERICAN TOBACCO CO.
Paul M. Hahn, Pres.

BENSON & EDWARDS
Joseph F. Culbertson

BRIGHT BELL & CO.
F. S. R.

BROWN & WILLIAMS
Timothy F.

BURLEY AUCTION CO.
Albert C.

How can you
tell who is
telling the
truth?

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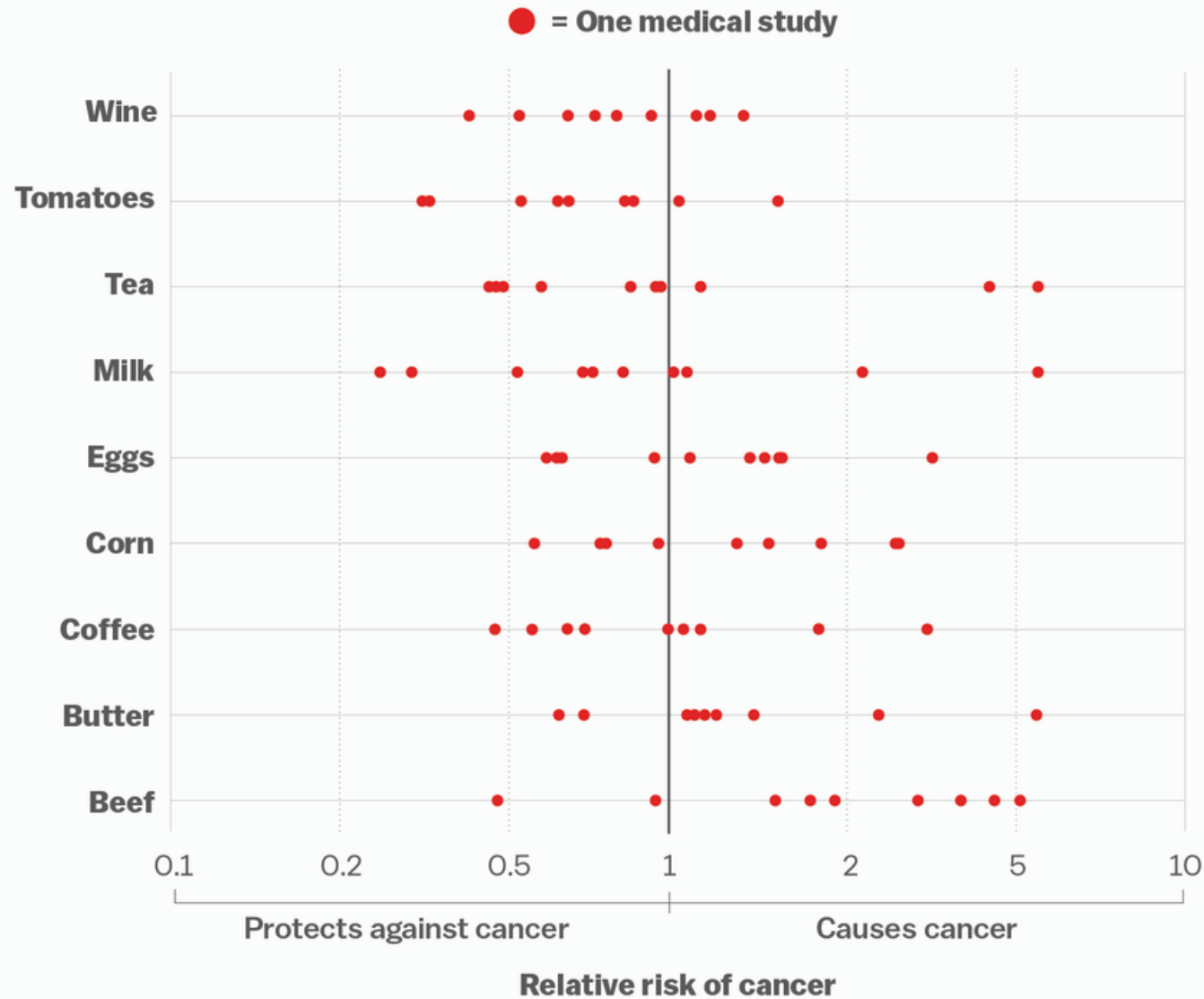
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2. That there is no agreement among the authorities regarding what the cause is.
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Studies have suggested that coffee may help reverse liver damage, help prevent colon cancer, decrease the risk of endometrial cancer, and increase the risk of miscarriage.



But does it really?

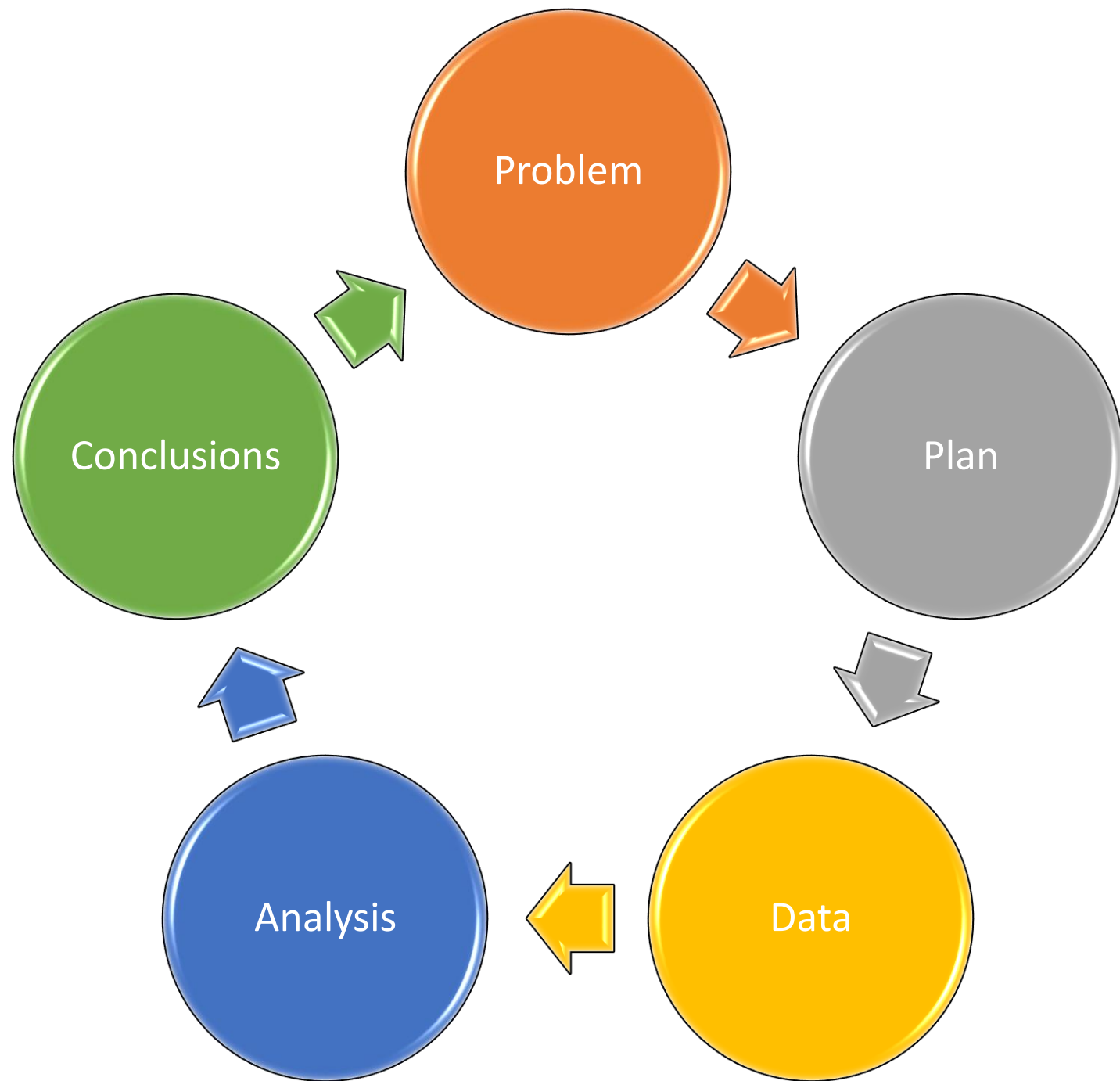
Everything we eat both causes and prevents cancer

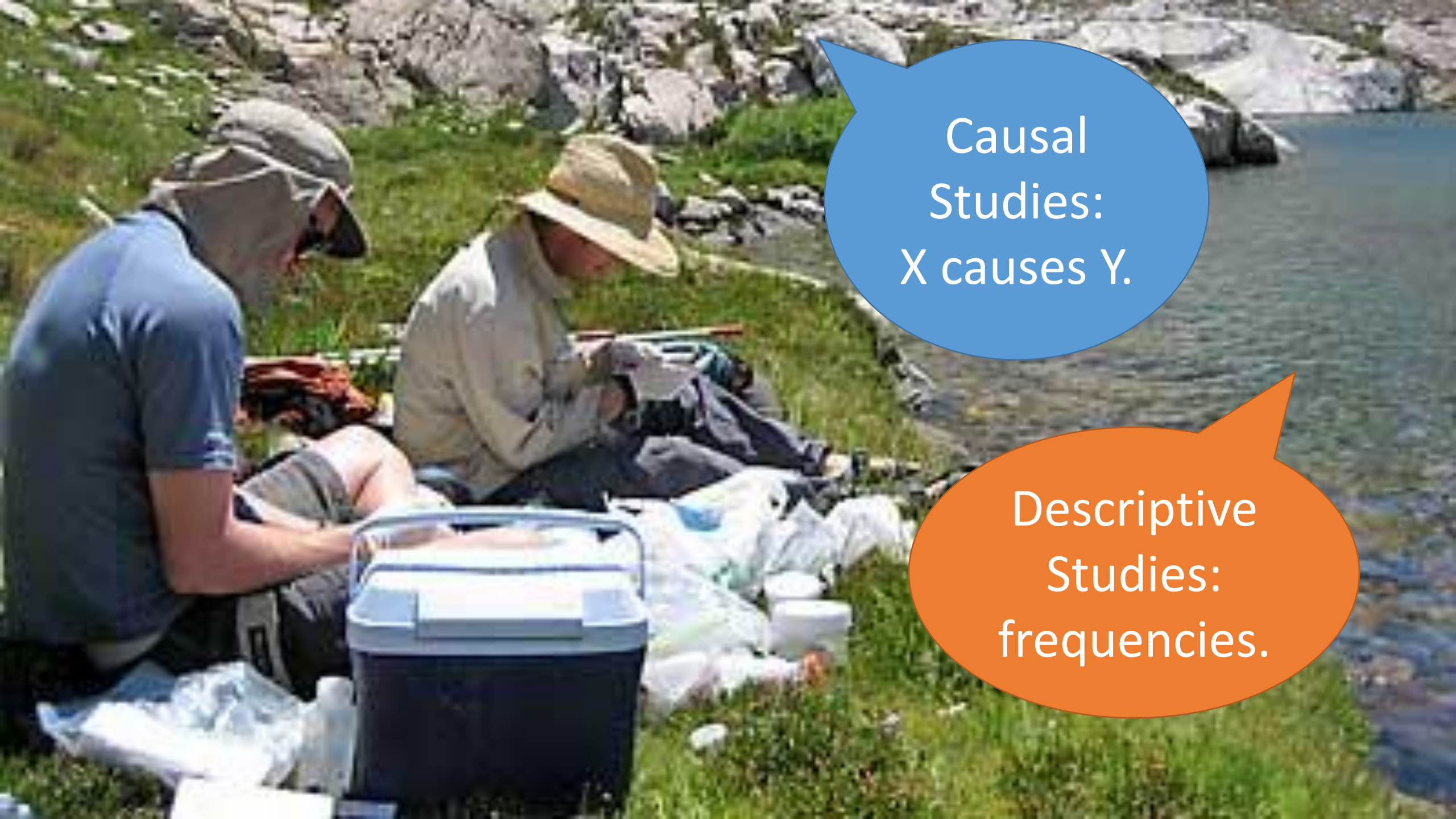


Well, that's a problem.
What's right?

SOURCE: Schoenfeld and Ioannidis, *American Journal of Clinical Nutrition*

Vox





Causal
Studies:
 X causes Y .

Descriptive
Studies:
frequencies.

Thesis – the
question we are
trying to
investigate



Variables:
things we are
measuring or
looking for.



In 1990, in Brampton, researchers wanted to find the effects of stress on sleep. They generated 150 random phone numbers, dialed them and asked people to come to a lab. The 50 subjects who came were offered \$10 for every minute they fell asleep faster than the night before: not a single person made money.

Thesis?


Can payment
cause people to
fall asleep more
easily?

Causal/
Descriptive?

Causal.
Payment causes
falling asleep.

Variables?

Time fell asleep
first night.
Time fell asleep on
second night.



Random Sampling
– using a non-
human method of
choosing your
subjects.

Diverse Sample
– variety in
subjects to get a
representative
sample

Random
Assignment –
Control,
Placebo



Replication

How many times was the
experiment run?



The Canadian Consumer Protection Agency wants to check the labelling of the weight of a new toothpaste named ToothyBest (2004). They made a list of the stores in the GTA that sold it and then used a computer to randomly choose 25 of them. The CCPA bought toothpaste from each store and weighed it. The average weight was 304g while the box stated that the toothpaste weighed 325g.

1. Causal/Descriptive? – Descriptive
2. Thesis – how accurate are the weights on the ToothyBest brand of toothpaste?
3. Problem Unit – a tube of new brand of toothpaste
4. Plan Unit - a tube of new brand of toothpaste in 2004 in GTA
5. Replication – 25 tubes.
6. Sampling Technique – simple random sampling
7. Diversity Limitations – only GTA
8. Random Assignment - none
9. Variable – weight of toothpaste in one tube
10. Calculation – average weight of toothpaste in one tube

Run
experiment.



Gather
data.



Remember
the law of
large
numbers!



Researchers wanted to find out the effects of chewing gum on exam writing. They randomly choose 100 students in a school in New York in 2000. When students arrived at their exam, they flipped a coin to determine if they would chew gum or not. The students who chewed gum scored 3 percent higher on their exams than the others.

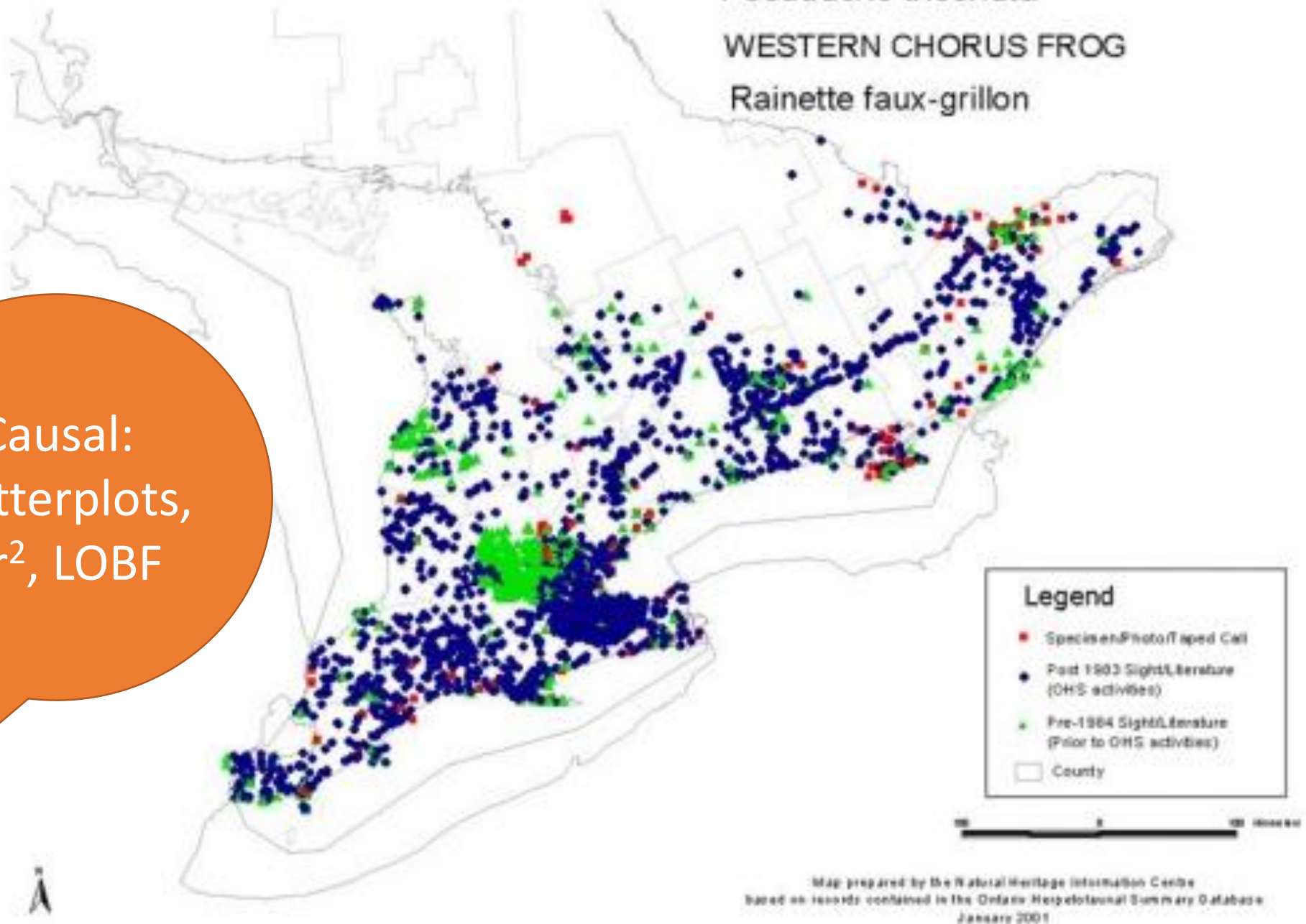
1. Causal/Descriptive? – Causal
2. Thesis – Does chewing gum improve your performance on exams?
3. Problem Unit – a student
4. Plan Unit – a student in New York in 2000
5. Replication – 100 students.
6. Sampling Technique – unclear; says “random” but not how
7. Diversity Limitations – only New York, only highschool?, only one exam
8. Random Assignment – flipped coin to chew gum or not
9. Variable – score on exam, chewed gum or not
10. Calculation – average score of exam for chewed gum and did not.

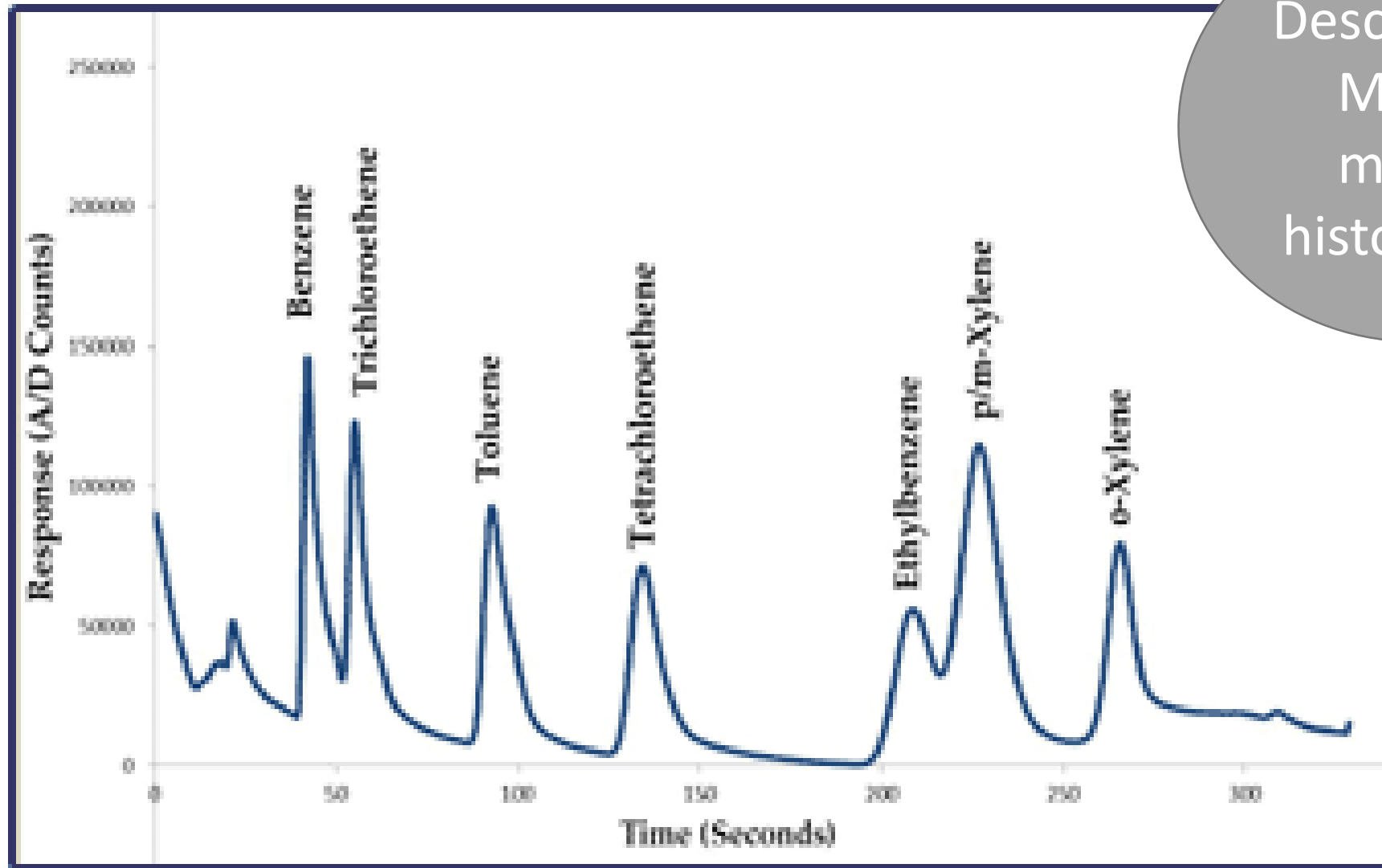
Pseudacris triseriata

WESTERN CHORUS FROG


Rainette faux-grillon

Causal:
Scatterplots,
 r , r^2 , LOBF





Descriptive:
Mean,
mode,
histograms

A close-up photograph showing a person's hand in a white nitrile glove holding a small, dark-colored frog. The frog is perched on the index finger. Another gloved hand is holding a syringe with a white plunger, positioned near the frog's head. A blue speech bubble is overlaid on the right side of the image.

Qualitative
results are also
gathered.

Conclusion Phase:
Write up the report,
draw conclusions,
make suggestions for
further study.

