

Scrambled Sentence Task

Data Management, Day 1, Task A

A2. [Mathematical Thinking and Making Connections] make connections between mathematics and various knowledge systems, their lived experiences, and various real-life applications of mathematics, including careers

D2.1 [Application of Mathematical Modelling] describe the value of mathematical modelling and how it is used in real life to inform decisions

Develop a system to prepare for D1.2, 1.3 [Representation and Analysis of Data] D2.1, 2.2 [Application of Mathematical Modelling] and D2.3, 2.4, 2.5 [Process of Mathematical Modelling]

After reading an ad for volunteers, you have signed up to be part of a psychology experiment at a local university.



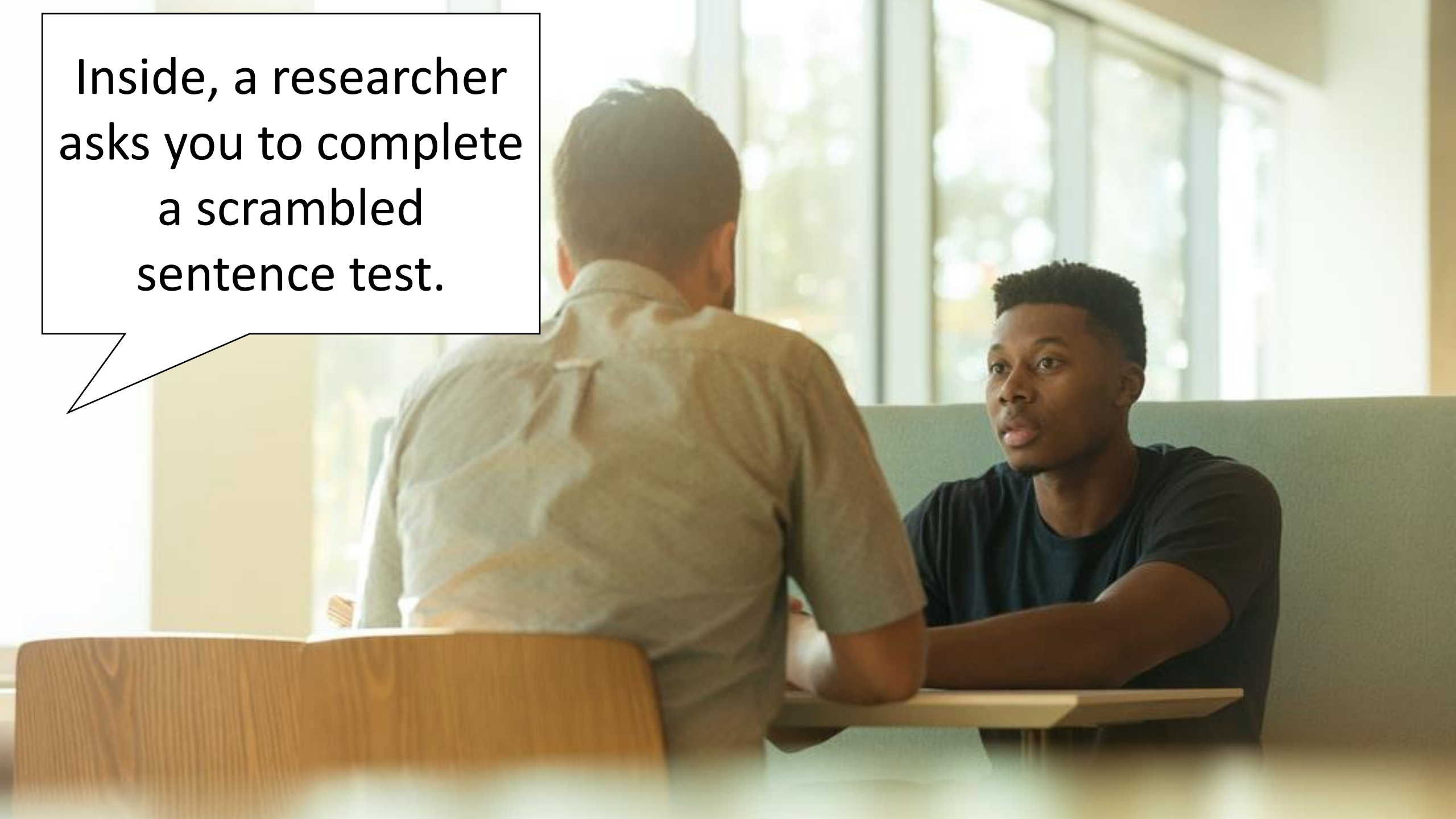
You arrive at the appointed time, and find your way to the correct room.



You take a seat in the waiting area, and when you are called you stand up and enter the room.



Inside, a researcher asks you to complete a scrambled sentence test.



breathe scales dragons fire can

In this task, you
will get a set of 5
words.

Make a grammatical 4 word
sentence as quickly as
possible from each set.

The researcher will
wait in the hall.
When you are done,
bring your
sentences to them.

breathe scales dragons fire can

What 4 word
sentence can you
make from these
words?

Dragons can
breathe fire.

Group Member 1

01 him was worried she always
02 from Florida oranges temperature
03 ball the throw toss silently
04 shoes give replace old the
05 he observes occasionally people watches
06 be will sweat lonely they
07 sky the seamless gray is
08 should now withdraw forgetful we
09 us bingo sing play let
10 sunlight makes temperature wrinkle raisins

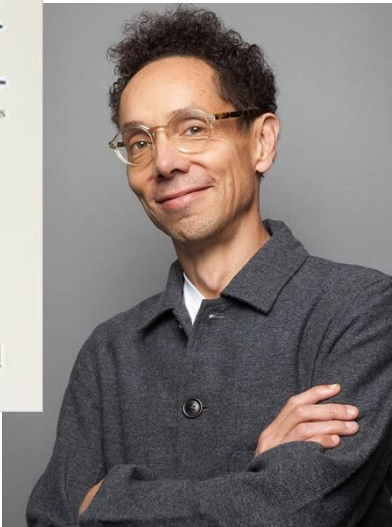
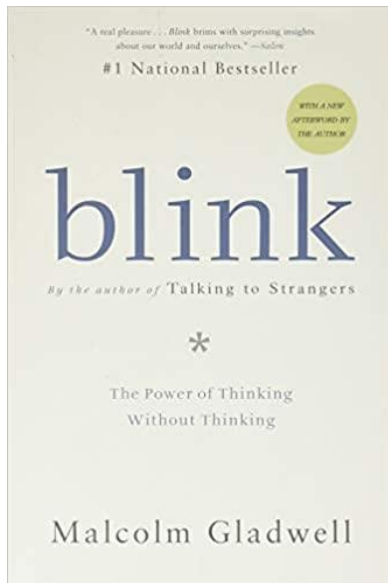
Figure out how to
time one of your
group members
completing this task.
Then do it.

- 01 circles silver in she twirled
- 02 door grandmother the sunlight opened
- 03 pictures they landscape thinner painted
- 04 shines hair gray brush her
- 05 lies nap dog my down
- 06 jam carefully jars white open
- 07 twice cake read recipes
- 08 mashed deliberate gluten-free potatoes are
- 09 dishes now dried slowly she
- 10 enjoy listen retired music people

- 01 steady me he for waited
- 02 late road detours make drivers
- 03 sleeps often dog bowl the
- 04 stairs the entrance museum had
- 05 wood old slightly houses lean
- 06 be smell can dusty antiques
- 07 past elephants the gentle remember
- 08 pages covers aged crack book
- 09 success numbers declining chart mean
- 10 kernels peck spring chickens corn

How did
you do?

“Seemed straightforward, right? Actually it wasn’t. After you finished that test – believe it or not – you would have walked out of my office and back down the hall more slowly that you walked in. With that test, I affected the way you behaved.” Gladwell, *Blink*, 53



Gladwell has a Jamaican mother, British father. He is mixed race. Grew up in Waterloo. Lives in New York, remains a Canadian citizen. In highschool, he was an OFSAA champion long-distance runner. He has a net worth of \$30 million which he made writing books like this one.

How? Look back
at the test.

01 him was worried she always
02 from Florida oranges temperature
03 ball the throw toss silently
04 shoes give replace old the
05 he observes occasionally people watches
06 be will sweat lonely they
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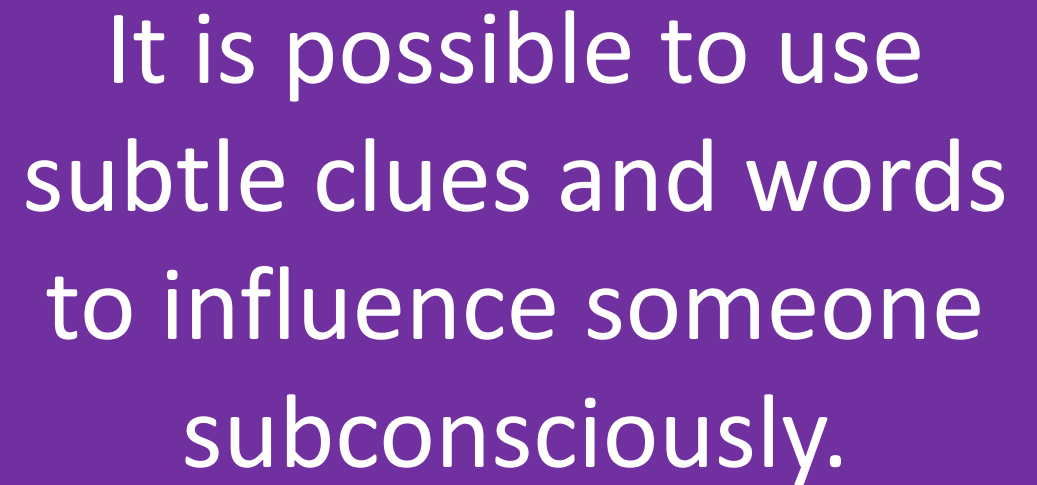
How? Look back
at the list.

01 him was **worried** she always
02 from **Florida** oranges temperature
03 ball the throw toss **silently**
04 shoes give replace **old** the
05 he observes occasionally people wa
06 be will sweat **lonely** they
07 sky the seamless **gray** is
08 should now withdraw **forgetful** we
09 us **bingo** sing play let
10 sunlight makes temperature **wrinkle** raisins

“Scattered throughout it are certain words such as “worried”, “Florida”, “old”, “lonely”, “gray”, “bingo”, and “wrinkle”. You thought that I was just making you take a language test. But, in fact, what I was doing was making the big computer in your brain – your adaptive unconscious – think about the state of being old. It didn’t inform the rest of your brain about its sudden obsession. But it took all this talk of old age so seriously that by the time you finished and walked down the corridor, you acted old. You walked slowly.”
Gladwell, Blink 53.



This effect is
called “Priming”



It is possible to use
subtle clues and words
to influence someone
subconsciously.

Priming is used all of the time in advertising and political speeches. Teachers, officials and others can use it too to influence people.

Helpfully, if you know about it and look for it, it doesn't work!

But how does this relate to math?

There are 5 phases to a math-based study like this one.

Look at Task 1A, Part 2.

The task names and the tasks themselves are out of order. Order and match them.

I hid this task later in the package.

If you finish early, try to find the variables in Task 1B

There are 5 phases to a math-based study like this one.

1 - Problem

2 - Plan

3 - Data

4 - Analysis

5 - Conclusion

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How does priming with words associated with old age affect the speed at which you walk?

There are 5 phases to a math-based study like this one.

1 - Problem

How does priming with words associated with old age affect the speed at which you walk?

Variables: Entrance speed, Exit speed
Primed with Old Age Words or Isn't

2 - Plan

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2 - Plan

Advertise to local people via social media ads. When people arrive, randomly assign them be primed with old age words or not. Time their entrance into the room and their exit from the room.

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For 52 participants, repeat the study and collect data.

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Divide the data into two groups: Primed with old age words or not. Calculate the difference between entry and exit speeds. Average the difference for both groups.

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5 - Conclusion

On average, the group who was primed with old age words walked more slowly down the hall than those who weren't.

Subconscious priming can impact walking speed.

Research Question,
Variable Choice

1 - Problem

How does priming with words associated with old age affect the speed at which you walk?

Variables: Entrance speed, Exit speed
Primed with Old Age Words or Isn't

Design experiment

2 - Plan

Advertise to local people via social media ads. When people arrive, randomly assign them to be primed with old age words or not. Time their entrance into the room and their exit from the room.

Run experiment,
replicated it.

3 - Data

For 52 participants, repeat the study and collect data.

Do math. Make charts.
Use spreadsheet.

4 - Analysis

Divide the data into two groups: Primed with old age words or not. Calculate the difference between entry and exit speeds. Average the difference for both groups.

Write report. Find
errors. Make
conclusions.

5 - Conclusion

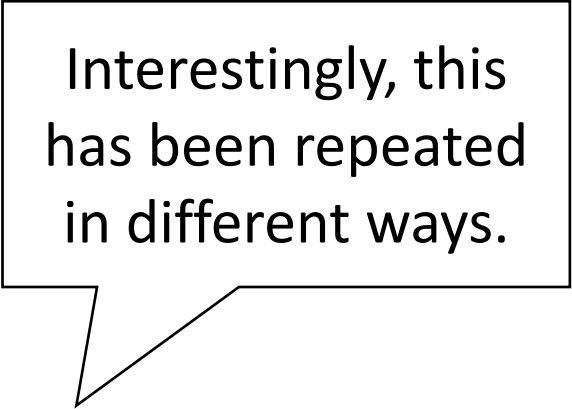
On average, the group who was primed with old age words walked more slowly down the hall than those who weren't.

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Just curious – but did any groups have the result where the times got slower and slower?

The priming to go slower might have impacted you depending on how you set up your timing.

If you were listening to the previous sentences instead of focusing on the clock, for instance.

A speech bubble with a rectangular body and a pointed tail pointing downwards and to the left. The text inside is centered and reads: "Interestingly, this has been repeated in different ways."

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Participants had to hand in their paper to the researcher who was “just happened” to be talking to someone in the hall.

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In one study, the two groups were primed with either “politeness” or “aggressive” words

Participants had to hand in their paper to the researcher who was “just happened” to be talking to someone in the hall.

The experiment was to see how long it took for the participants to interrupt the conversation and to hand in their paper.

The five phrases in this study look like this.

1 - Problem

How does priming with “rudeness” or “politeness” affect the time it takes you to interrupt?

Variables: Time it takes to interrupt conversation
Primed with Rudeness or Politeness

2 - Plan

Advertise to local people via social media ads. When people arrive, randomly assign them to be primed with rudeness or politeness words. Time how long it takes them to interrupt a fake conversation between two researchers. Cut off experiment at 10 minutes.

3 - Data

For 100 participants, repeat the study and collect data.

4 - Analysis

Divide the data into two groups: Primed with rudeness or politeness. Average the interruption time for each group.

5 - Conclusion

What do you think the results were?

1 - Problem

How does priming with “rudeness” or “politeness” affect the time it takes you to interrupt?

Variables: Time it takes to interrupt conversation
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2 - Plan

Advertise to local people via social media ads.
When people arrive, randomly assign them to be primed with rudeness or politeness words.
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Cut off experiment at 10 minutes.

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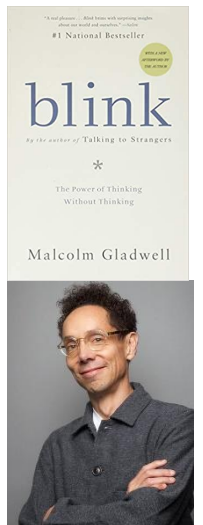
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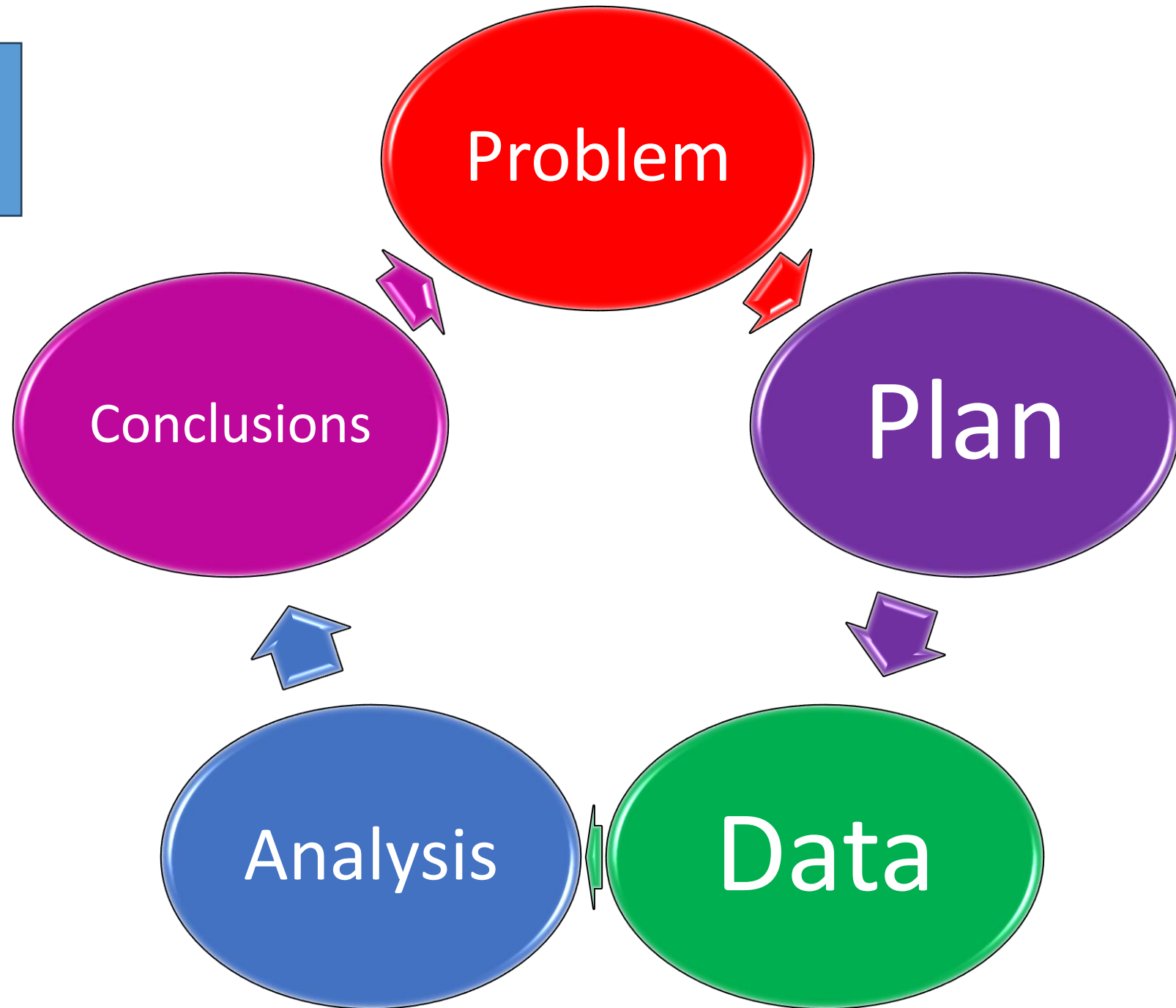
5 - Conclusion

On average, those primed to be rude interrupted after about 5 minutes. Of the people primed to be polite, 82% never interrupted at all.

“The experiment was right down the hall from my office,” John Bargh from NYU remembers. “I had to listen to the same conversation over and over again. Every hour, whenever there was a new subject. It was boring, *boring*. The people would come down the hallway, and they would see the confederate who the experimenter was talking to through the doorway. And the confederate would be going on and on about how she didn’t understand what she was supposed to do. She kept asking and asking, for ten minutes, ‘Where do I mark this? I don’t get it.’ ” Bargh winced at the memory and the strangeness of it all. “For the whole semester this was going on. And the people who had done the polite test *just stood there.*” If the experiment hadn’t ended after ten minutes, who knows how long they would have stood in the hallway, a polite and patient smile on their faces?



A well-designed study goes through phases.



But does it work?

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.

TOBACCO INDUSTRY RESEARCH COMMITTEE

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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.

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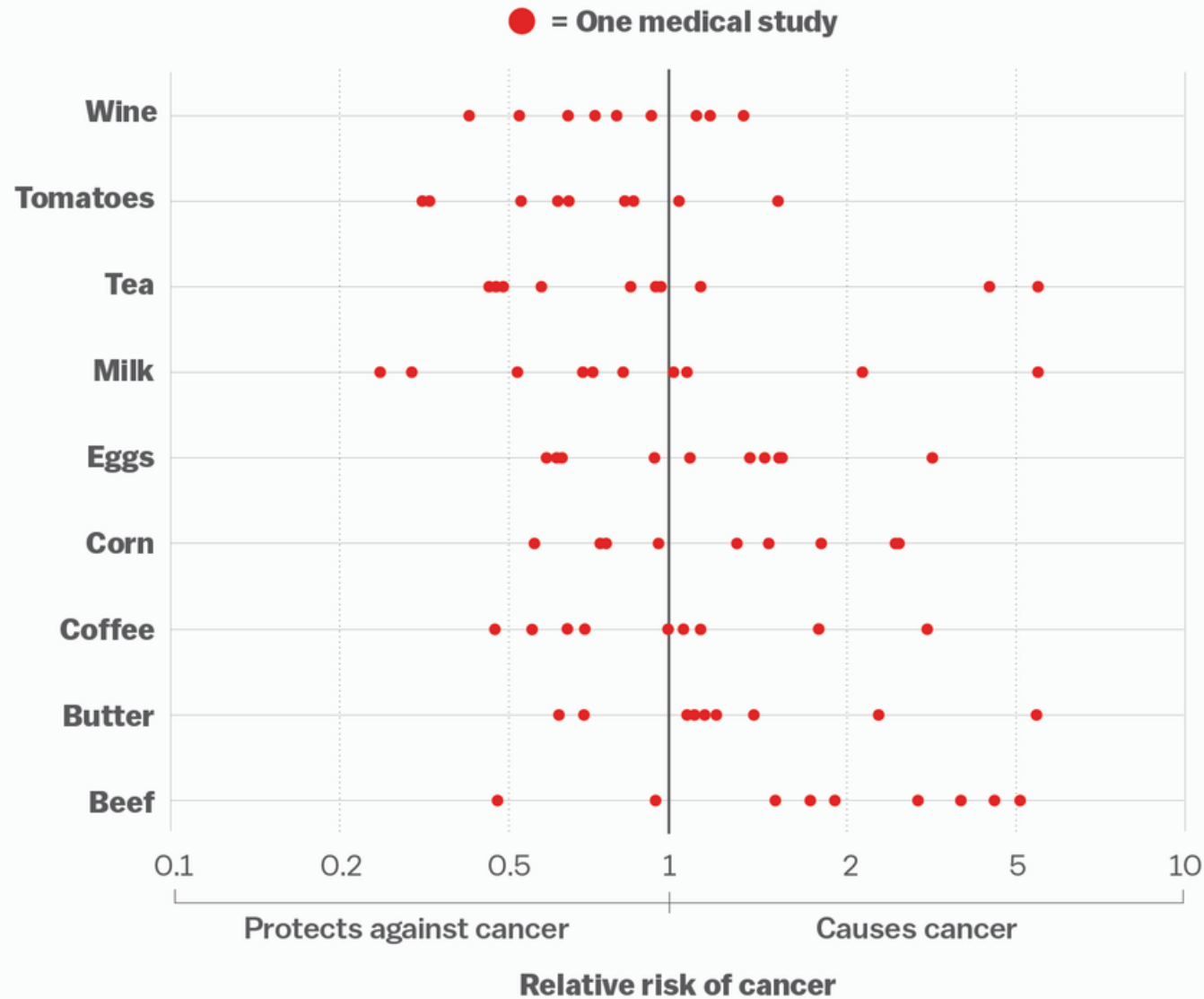
How can you
tell who is
telling the
truth?

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*



To prove causation you need:

PPDAC works only if you carefully plan these three things.

1. **Replication**: A large sample size
2. **Random assignment**: Control groups, double blinding, Placebos
3. **Effective sampling**: Choosing subjects well.
Random sampling. Un-biased sampling.

Also:

- A logical link between the variables.