WORK IN PROGRESS

Are researchers better at reasoning than the general public?


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OSCS Open Science Community Sweden

METASCIENCE 2019 SYMPOSIUM The Emerging Field of Research on the Scientific Process.

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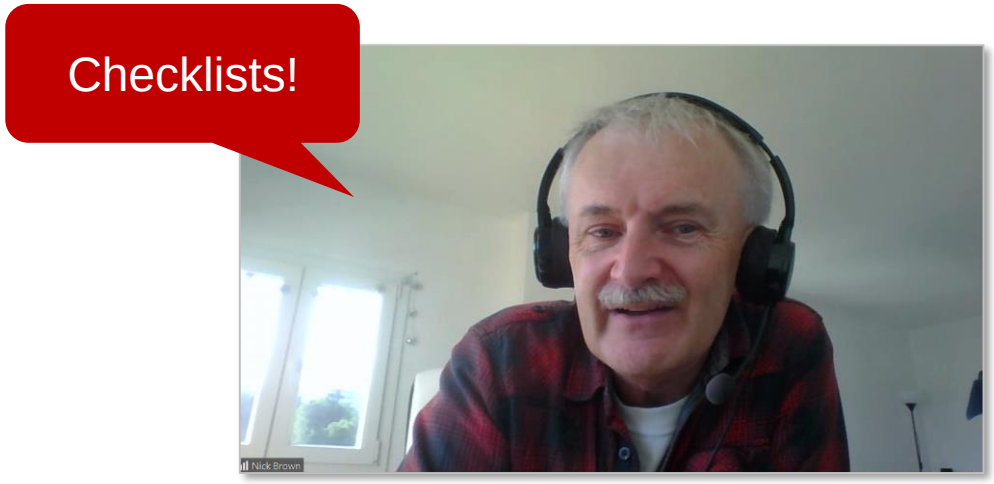

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Background

Open science has focused on:

- Understanding of statitistics p-values, confidence intervals
- Philosophy of statistics Bayes vs. Neyman/Pearson vs. Fisher
- Questionable research practices drop hypotheses, hide data etc.

Reasoning

So, what about…

Researchers reasoning ability during controversy?

Quiz

Rules

- Assume **everything is true**

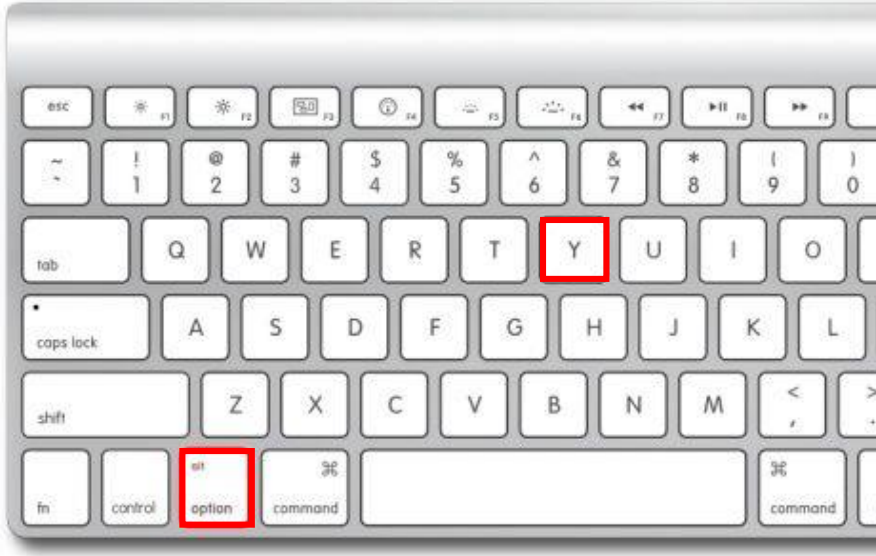
- Check if the argument is **valid**

If the conclusion necessarily follows from the claims

Raise/lower your Zoom hand

Alt-Y

Option-Y



1. All things that are made of plants are good for the health
2. Cigarettes are things that are made of plants
3. Cigarettes are good for the health

Raise your hand if you think the argument is valid!

Alt-Y  Option-Y

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1. If the null hypothesis is true, then you're not likely to get $p < .05$
2. You did get $p < .05$
3. Therefore, the null hypothesis is not likely to be true

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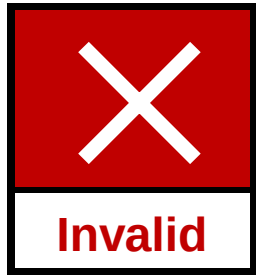

Raise your hand if you think the argument is valid!

Alt-Y  Option-Y

1. If women are equally intelligent as men, there should be as many women as men who are presidents
2. There are less women who are presidents
3. Therefore, women are not as intelligent as men

Raise your hand if you think the argument is valid!

Alt-Y  Option-Y

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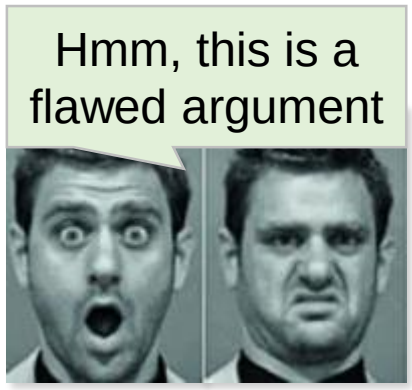
Main idea

Argument

Agree with conclusion

”Logic is valid!” ✓

Disagree with conclusion



”Logic is invalid!” ✗

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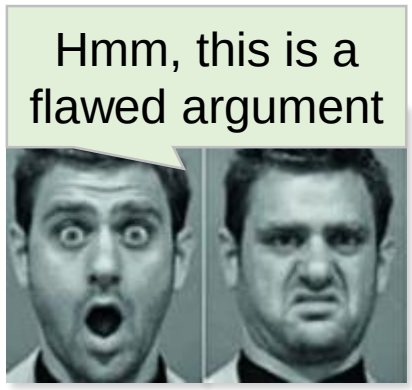

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Main idea

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Agree with conclusion

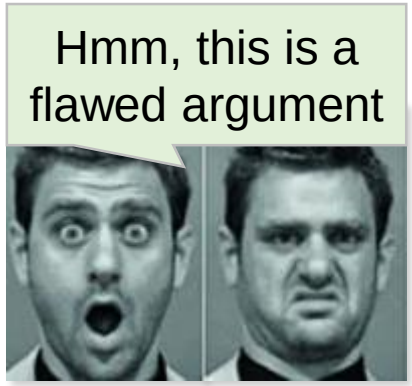
This is a decent argument

”Logic is valid!”

✓

Disagree with conclusion

Hmm, this is a flawed argument



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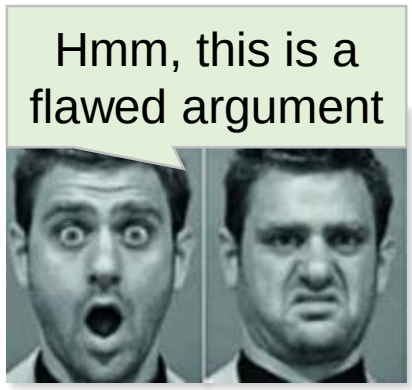

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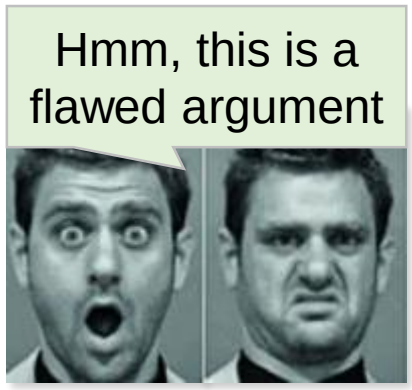

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Belief bias

Belief bias

> tendency to accept or reject an argument on the basis of whether you agree with its conclusions

Evans (2020, p. 20)

Types of arguments

- **Abductive**
  conclusion very uncertain, based on inference to best explanation

- **Inductive**
  conclusion uncertain, based on probability

- **Deductive**
  conclusion certain, based on logical necessity

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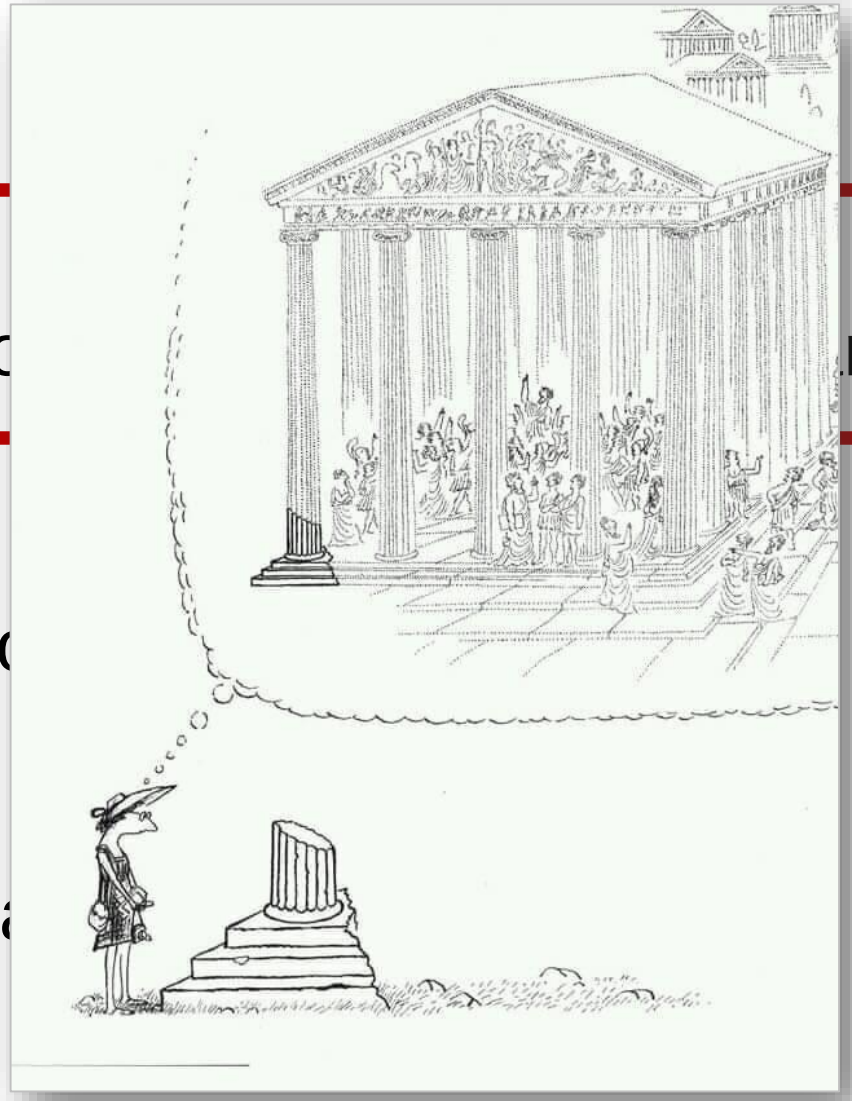

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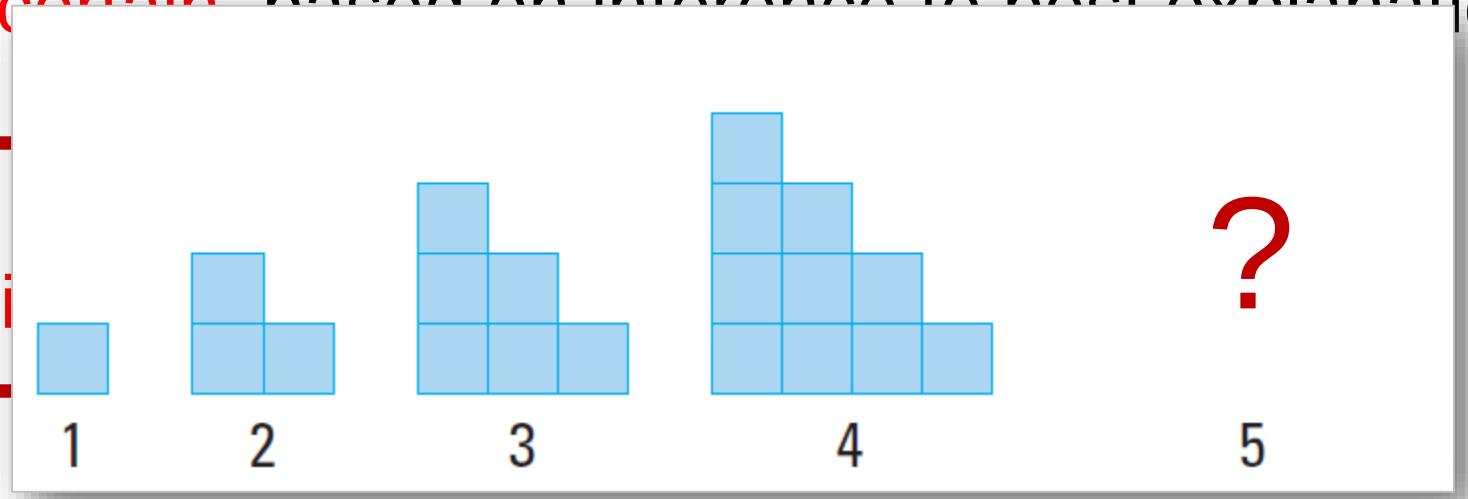

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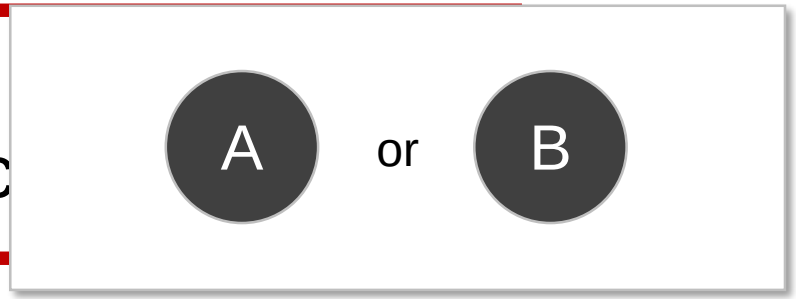

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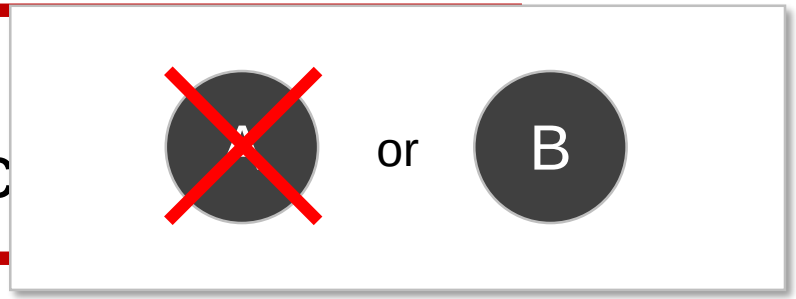

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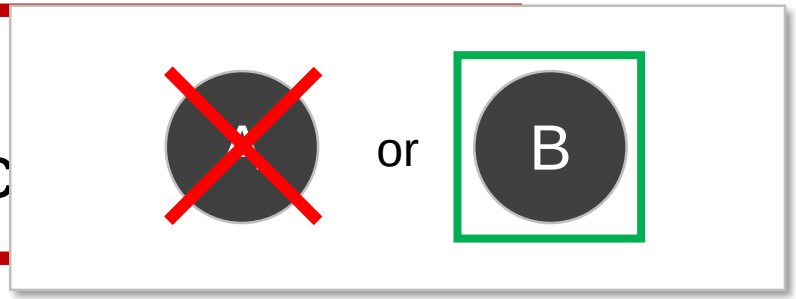

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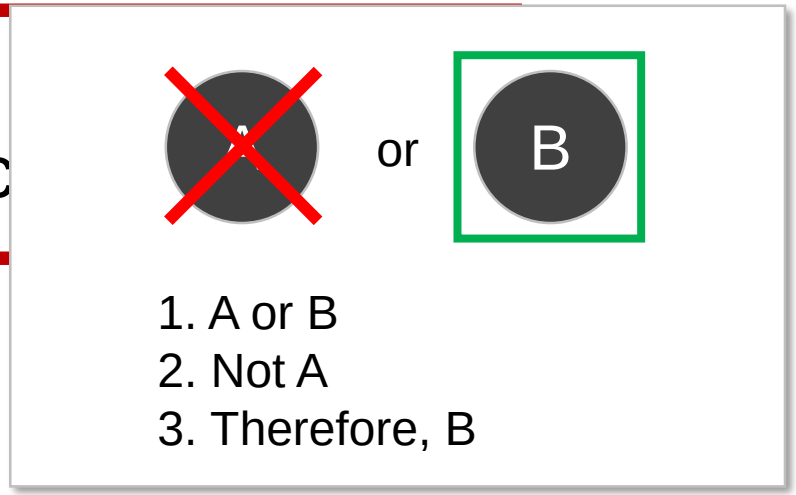

Syllogism

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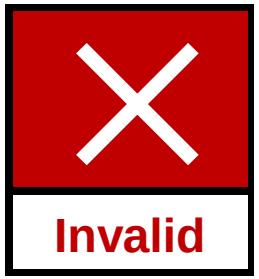

Counterargument (reductio ad absurdum)

1. If a person is Swedish, then that person is not very likely to be prime minister

2. Stefan Löfven is a prime minister

3. Therefore, Stefan Löfven is not very likely to be Swedish

Nickerson (2004, p. 426-7)

Argument acceptance

	Valid	Invalid
Believable	89%	71%
Unbelievable	56%	10%

From three experiments in Evans (1983)

Our questions

RQ1 To what extent do researchers exhibit belief bias compared to the general public?

RQ2 Can a checklist help them reach the correct conclusion?

Two likely outcomes

(1) Researchers know how to avoid bias.

Therefore, researchers may have less belief bias than the general public.

Since researchers are experts with domain knowledge

(2) Researchers have higher ability to reach desired conclusion.
Therefore, researchers may have more belief bias than the general public.

Two likely outcomes

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Based on motivated reasoning

Method

Web survey experiment: evaluate a series of arguments

2 x 2 mixed design (within + between subjects)

Controversy
Controversial or
neutral conclusion

Checklist
Checklist or
no checklist

Sample

Researchers	General public
Representative of all Swedish universities	Representative of all Swedes (18+ years)
n = 1,400	n = 1,400
Random sample from total population by web scraping emails	Random sample from Laboratory of Opinion Research (LORE)

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Measures

Dependent

- Persuasiveness of argument
- Valid/invalid argument

7-point Likert

Also

- Political ideology (left—right)
- Logic experience

Demography

- Education
- Age
- Sex

Only scientists

- Area natural science, social science, humanities
- Subject e.g. economy, anthropology

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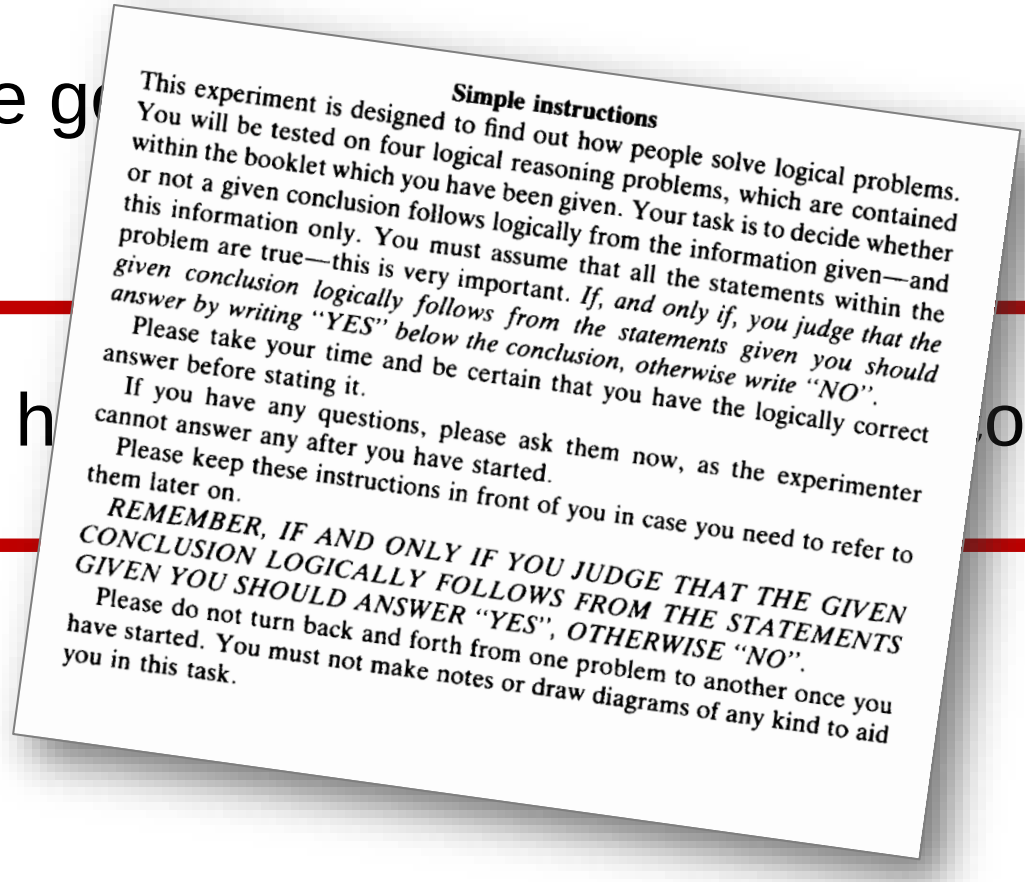


Simple instructions

This experiment is designed to find out how people solve logical problems. You will be tested on four logical reasoning problems, which are contained within the booklet which you have been given. Your task is to decide whether or not a given conclusion follows logically from the information given—and this information only. You must assume that all the statements within the problem are true—this is very important. *If, and only if, you judge that the given conclusion logically follows from the statements given you should answer by writing "YES" below the conclusion, otherwise write "NO".*

Please take your time and be certain that you have the logically correct answer before stating it.

If you have any questions, please ask them now, as the experimenter cannot answer any after you have started.

Please keep these instructions in front of you in case you need to refer to them later on.

REMEMBER, IF AND ONLY IF YOU JUDGE THAT THE GIVEN CONCLUSION LOGICALLY FOLLOWS FROM THE STATEMENTS GIVEN YOU SHOULD ANSWER "YES", OTHERWISE "NO".

Please do not turn back and forth from one problem to another once you have started. You must not make notes or draw diagrams of any kind to aid you in this task.

Evans, Newstead, Allen, & Pollard (1994)

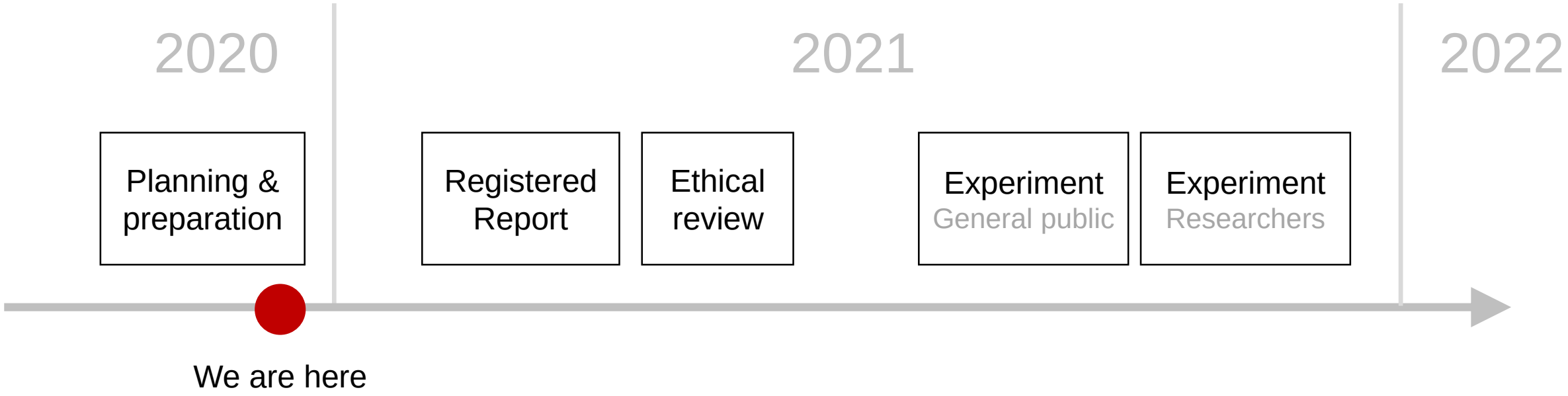
Results

What do you think will happen?

Help us predict!
Answer 6 questions:

tiny.cc/beliefbias

Timeline



What do you think will happen?

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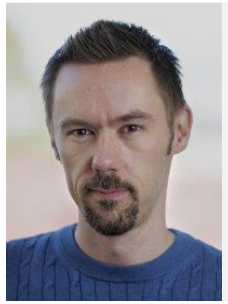

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What do you think will happen?

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& Time for questions

”actually, it’s more of a comment”

What do you think will happen?

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