

# Logical Reasoning and Fallacies

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Snt

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What is Logical Reasoning?

Why we need logical reasoning in  
Cybersecurity?

# Argument

Premise

Conclusion

## *Step-by-Step Outline of Analysis of Competing Hypotheses*

- 1. Identify the possible hypotheses to be considered. Use a group of analysts with different perspectives to brainstorm the possibilities.*
- 2. Make a list of significant evidence and arguments for and against each hypothesis.*
- 3. Prepare a matrix with hypotheses across the top and evidence down the side. Analyze the “diagnosticity” of the evidence and arguments—that is, identify which items are most helpful in judging the relative likelihood of the hypotheses.*

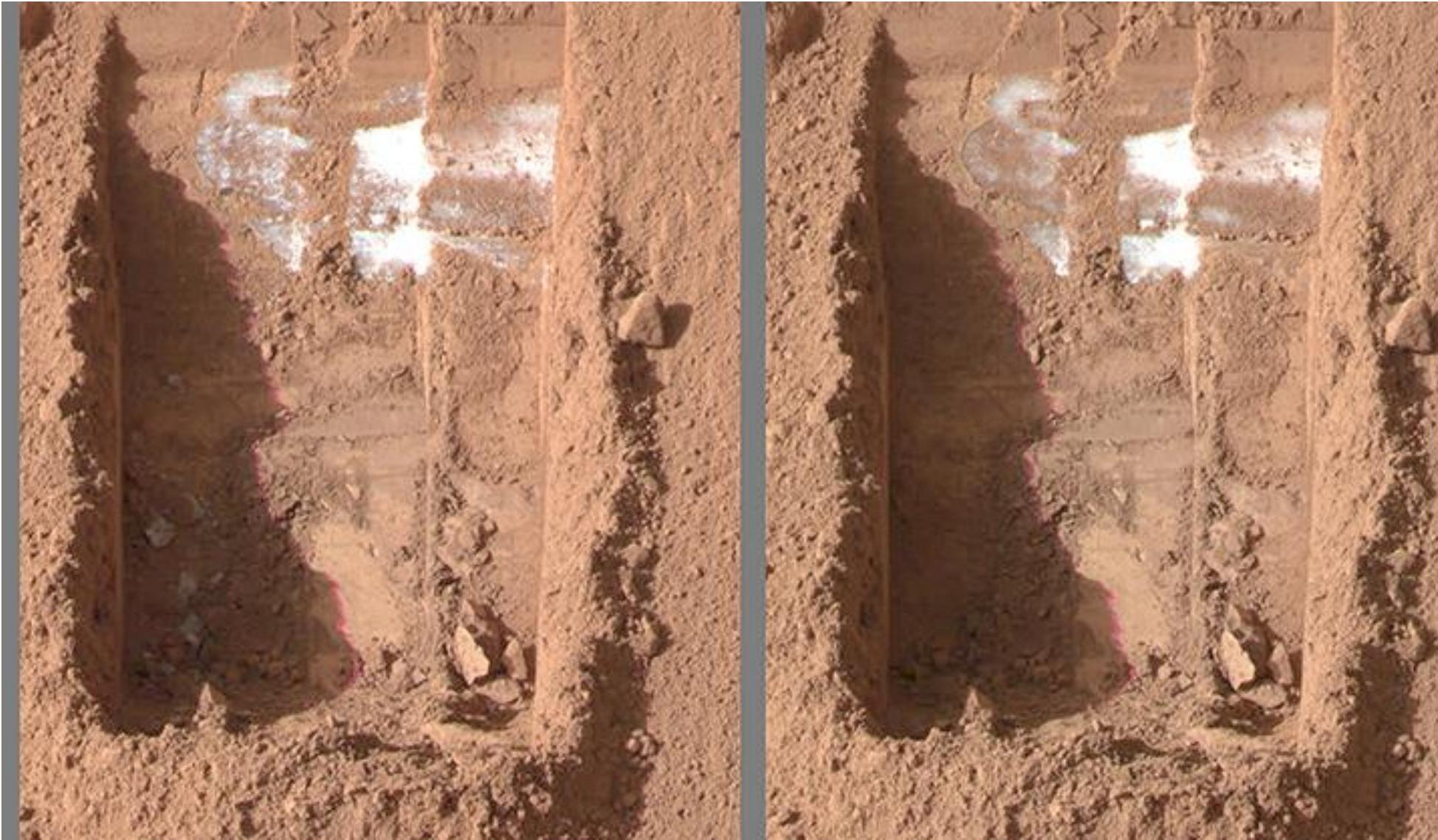
Arguments

Hypotheses

# **Psychology of Intelligence Analysis**

by  
Richards J. Heuer, Jr.

The two photographs taken by NASA Mars rover Phoenix to show there is water in Mars



Argument from Sign

Does disappearing of crust a sign of water in Mars?

Argument from Example

How much generally phonix observation support exist of water in Mars and other planets?

Argument from Cause to Effect

Does existing crust correlated with existing water?

Argument from Expert Opinion

Is NASA a reliable source about space discoveries?

Argument From Popular Opinion

Why people thinking Mars as the second planet for humans to live?

Argument from Authority

Does NASA have authority in space discovery?

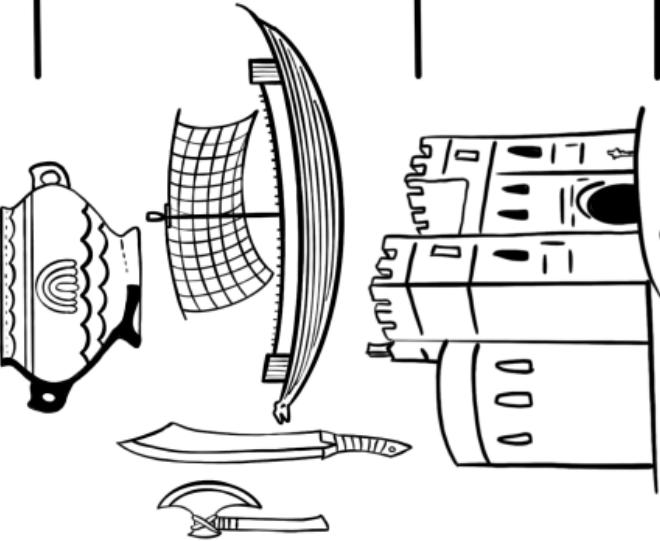
Argument from Practical Reasoning

Is finding water an enough means for living in Mars?

Beginning of time

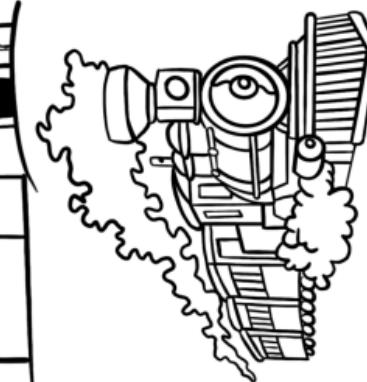


Stone Age



Bronze Age

Iron Age

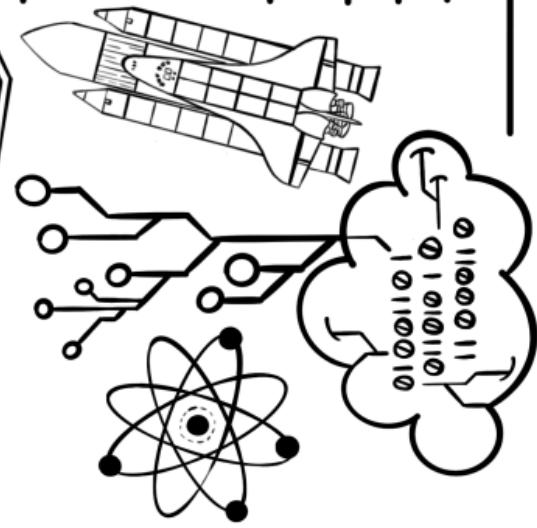


Start of Common Era

Middle Ages



Industrial Revolution



Machine Age

Atomic Age

Space Age

Digital Age

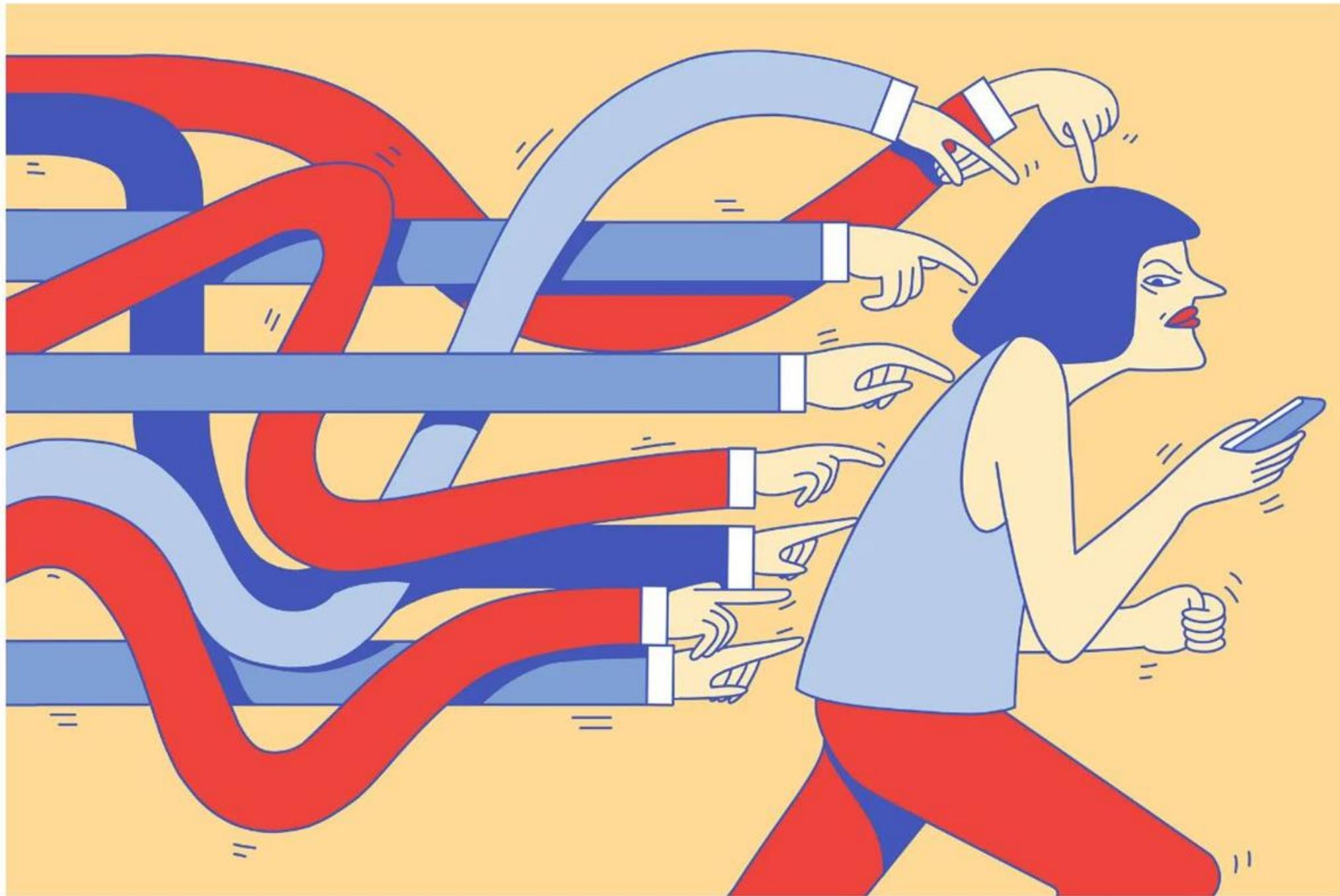
Information Age

Present time

# Information

# Argument





Elena Xausa

In argumentation theory, reasoning serves a **dual** purpose: it is not only a means for **constructing valid arguments** but also a strategic tool for launching attacks against opposing viewpoints. This **perspective** emphasizes that reasoning can be employed to **defend one's own position** while simultaneously **undermining** the credibility of an **opponent**.



Elena Xausa

Despite the extraordinary volume  
of evidence

(including 382kg of moon rock  
collected across six missions;

corroboration from Russia, Japan  
and China;

and images from the Nasa Lunar  
Reconnaissance Orbiter showing  
the tracks made by the  
astronauts in the moondust),

belief in the moon-hoax conspiracy  
has blossomed since 1969.

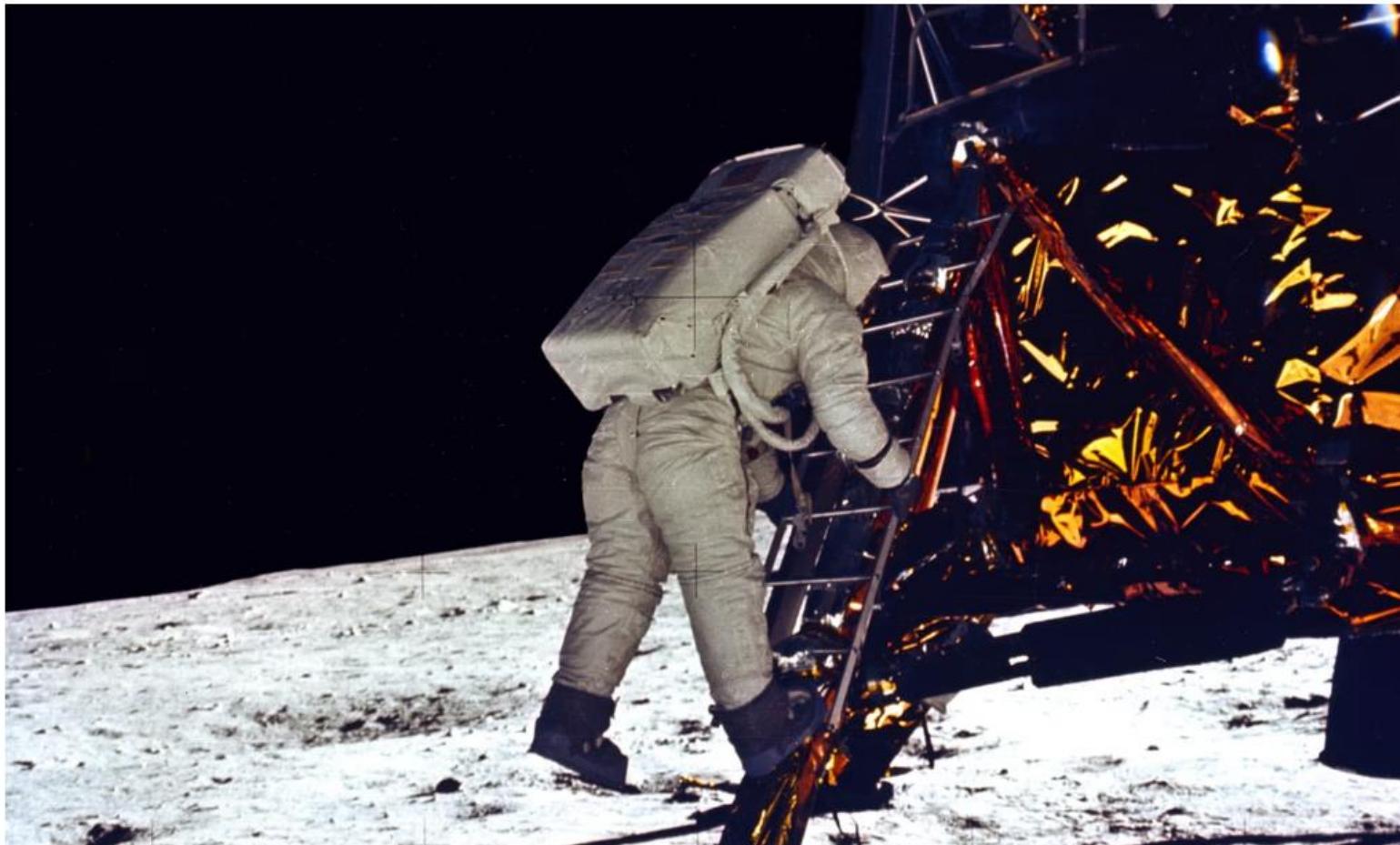
[Sport](#)[Culture](#)[Lifestyle](#)

# The Guardian

Crisis Ukraine Environment Science Global development Football Tech Business Obituaries

This article is more than 5 years old

## One giant ... lie? Why so many people still think the moon landings were faked



Buzz Aldrin descends from the lunar module. Photograph: Allstar Picture Library

Arguments

Hypotheses

We are not "free" to make  
the hypothesis (**Biases**)

We are not "free" to evaluate  
our hypothesis (**Fallacies**)

Psychology  
of  
Intelligence  
Analysis

by  
Richards J. Heuer, Jr.

# Argument

# Information

# Logical Fallacy

# Some Crucial concepts

**Standpoint:**

what is at issue in argumentative discourse

**Argument schemes:**

an abstract characterization of the way in which a reason is used to support the standpoint

**Enthymemes** (missing premises), e.g.

Socrates is mortal because he's human  
(missing premise: all humans are mortal)

# Fallacies:

contaminators of  
the argumentative  
discourse that can  
be undetected



# Argumentum ad hominem

Instead of really attacking  
an argument, you attack  
the person making  
(or related to) the  
argument



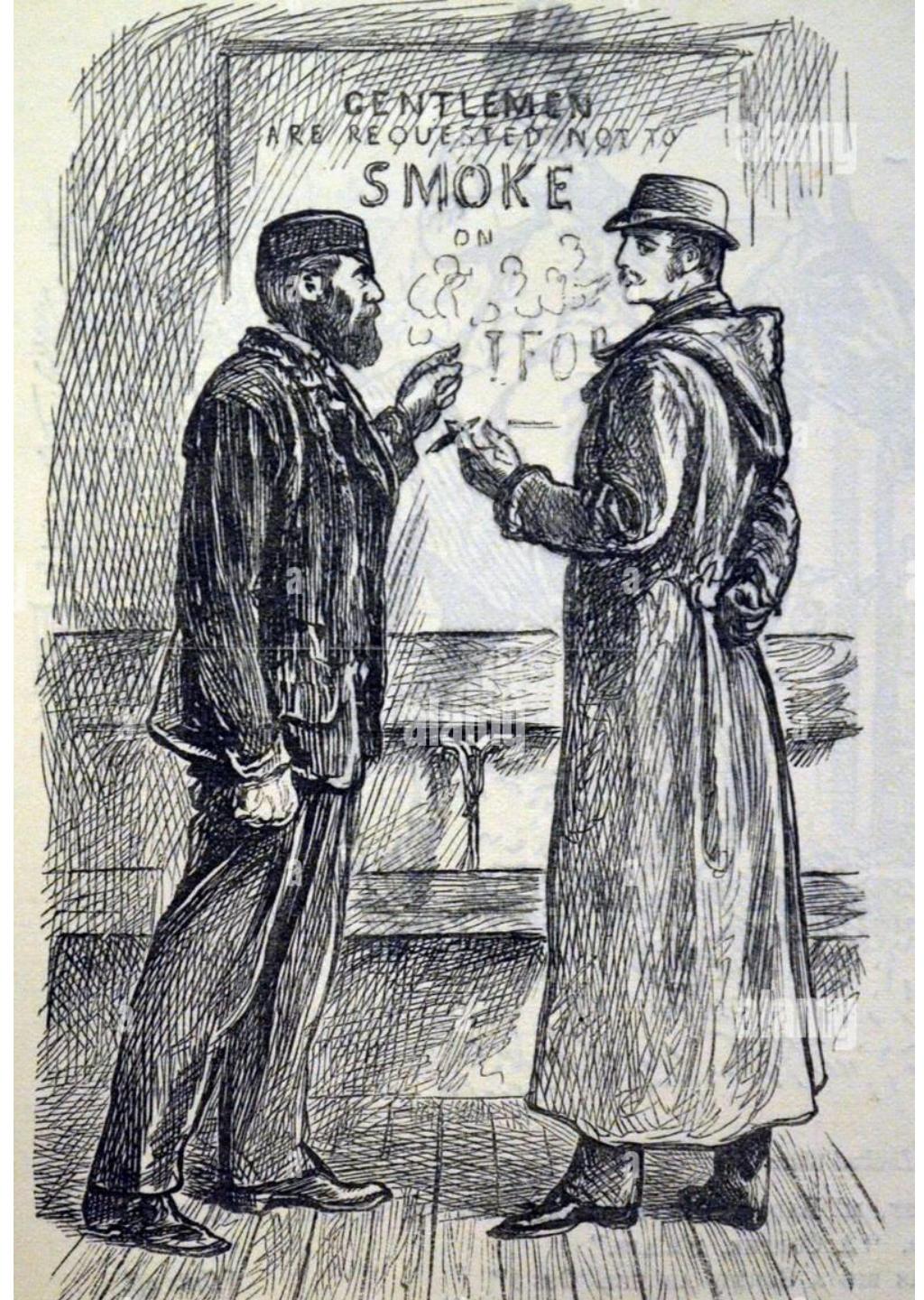
# Trump on Childcare Costs: Topic #9 of the Presidential Debate of June 27th, 2024



## Trump:

"He is the worst president. He just said it about me because I said it. But look, he's the worst president in the history of our country."

GENTELMEN  
ARE REQUESTED  
NOT TO SMOKE



# Reasoning as Attacking



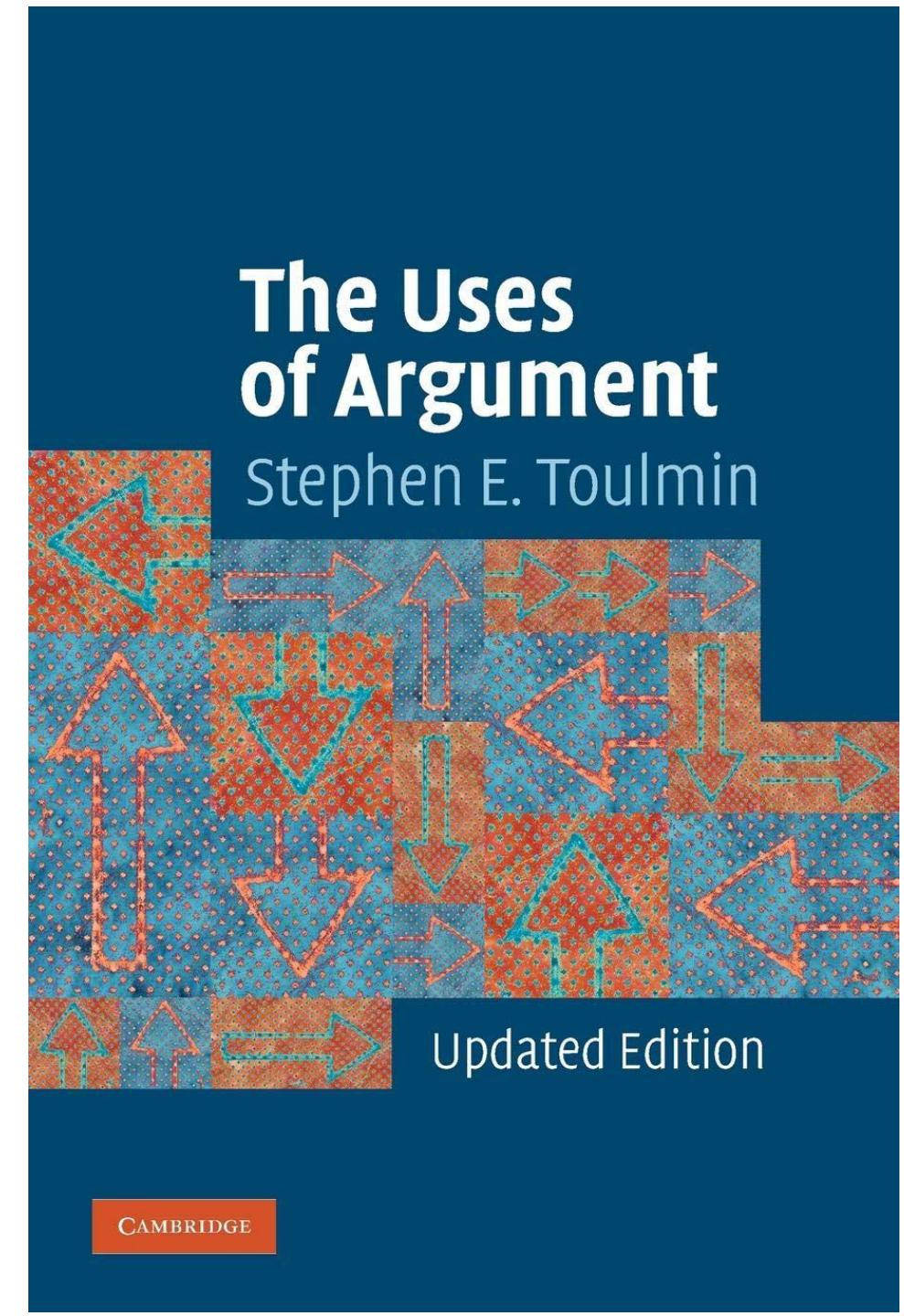
# Implicit Labeling: Darcus Howe and Joan Rivers

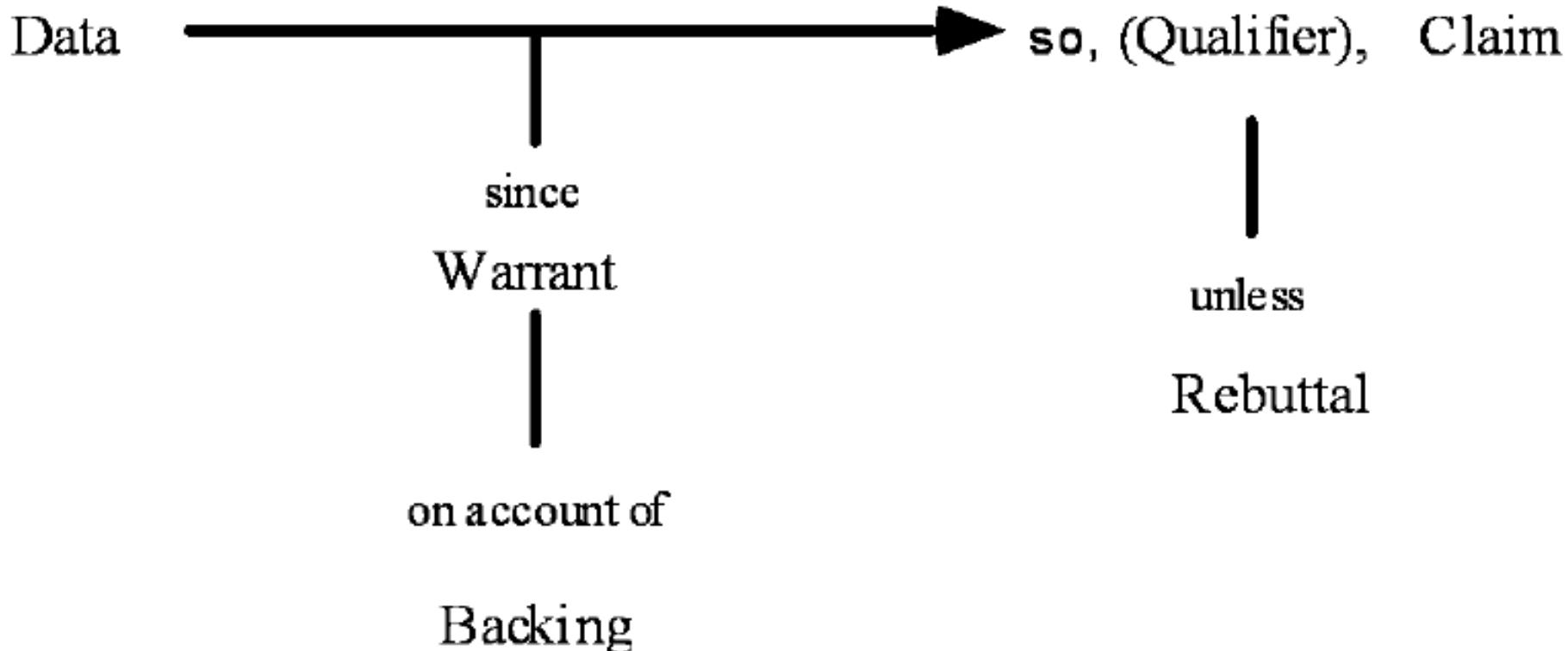


words  
as  
Attacks



Argument validity is **procedural**, i.e. it emerges as the capability of defending it in a dispute, where the criteria of properly conducted disputes are field-dependent



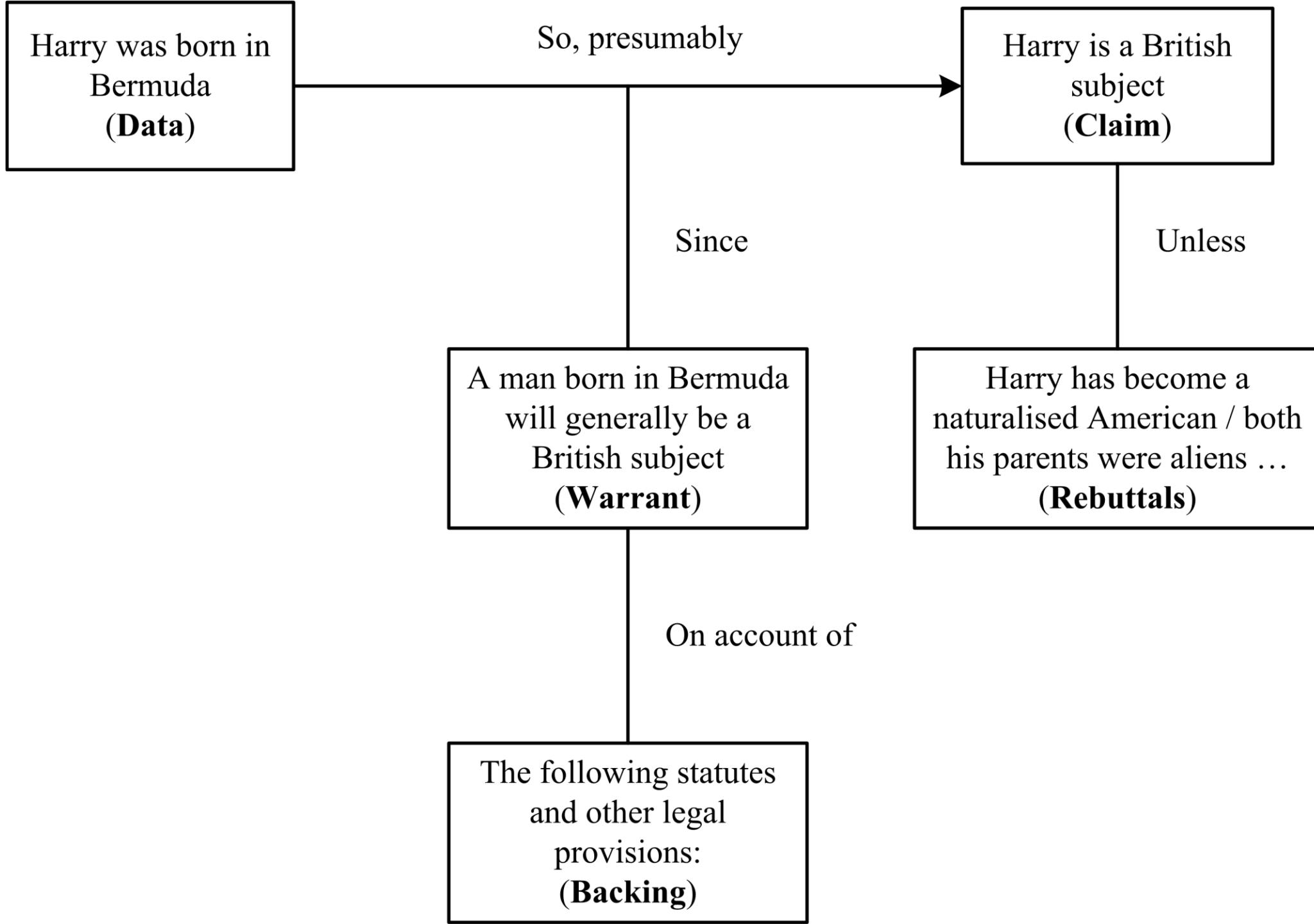


### Warrant:

Background knowledge justifying the 'transfer of acceptance' from the ground (data) to the claim. Typically implicit (unstated).

### Backing:

Additional justification to the statement expressed in the warrant (to be used when the warrant does not convince the reader or listener)



Fact → (probably) Conclusion

Rick has fair skin, red hair and freckles, and he sunbathed all day yesterday.

Rick will probably get seriously sunburnt.

Warrant

People with fair skin, red hair and freckles usually get sunburnt easily.

Rebuttal

Rick's parents both have fair skin, red hair and freckles, and they never seem to get sunburnt however much they sit outside.

Backing

Those people have little melanin in their skin.  
Melanin protects against sunburn.

General idea

- correspond to recurring

**patterns** of reasoning

- have associated

**"critical questions"**

# Argumentation Schemes for Presumptive Reasoning

Douglas N. Walton

Argument  
from Sign

## Brown Grizzly Bear



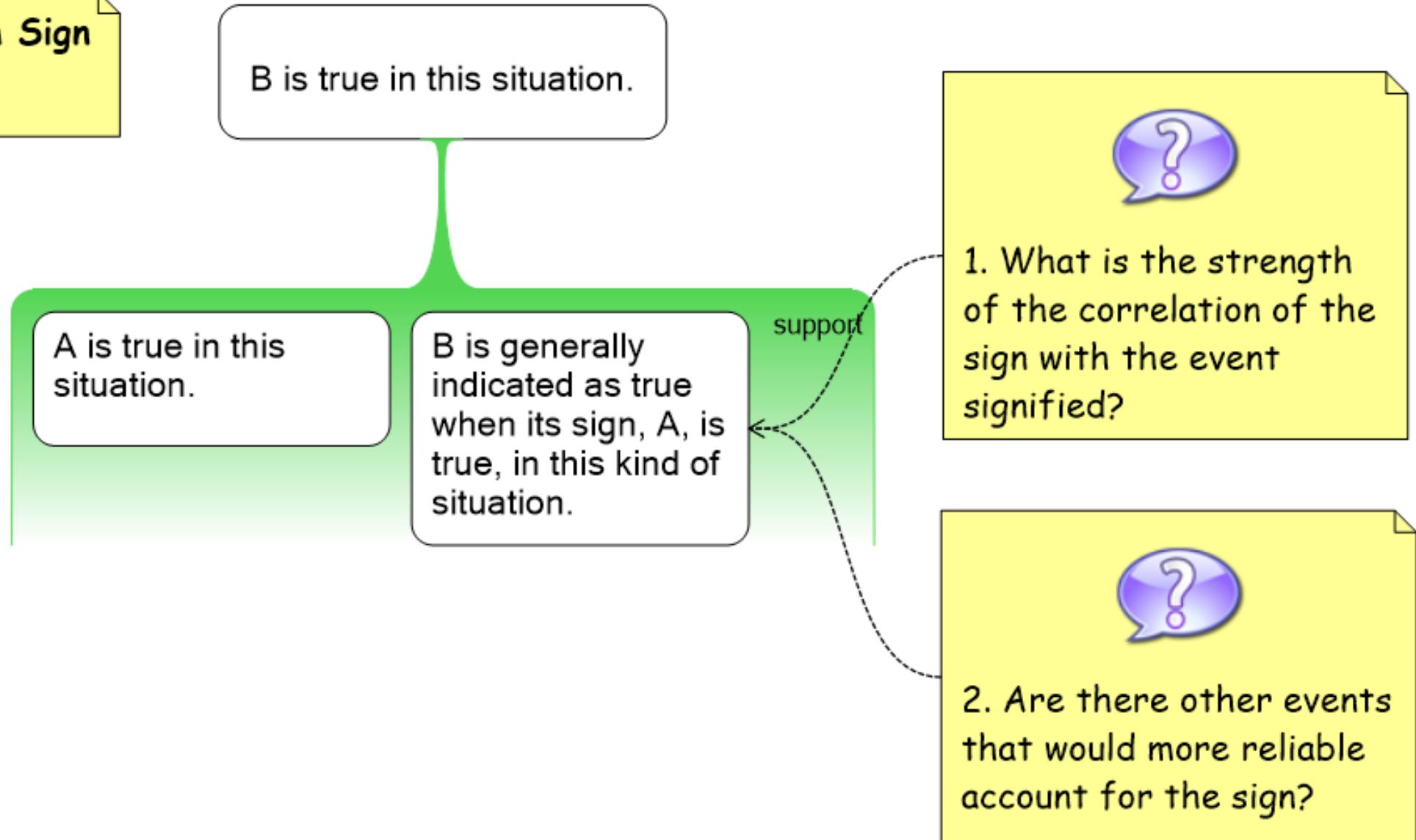
front paw



hind paw



## Argument from Sign



Argument  
from Example

**Claim:**  
Implementing a  
four-day  
workweek  
increases  
employee  
productivity.

## Four-day week: trial finds lower stress and increased productivity

Study of pilot at New Zealand firm finds staff were happier and 20% more productive



Employees taking part in the trial reported significantly lower job stress and burnout.  
Photograph: Alamy

## Argument from Example

Is the proposition presented by the example in fact true?

Were there special circumstances present in the example that would impair its generalizability?

Generally, if  $x$  has property F, then  $x$  also has property G.

In this particular case, the individual  $a$  has property F and also property G.

$a$  is typical of things that have F and may or may not also have G.

How strong is the generalization?

Does the example support the general claim it is supposed to be an instance of?

Is the example typical of the kinds of cases that the generalization ranges over?

support

# Daylight saving time

## Iran Considers Abolishing DST

By Anne Buckle and Mathew Gundersen. Published 17-Mar-2022. Changed 11-May-2022 

Iran is considering removing Daylight Saving Time (DST).

### Confirmed: Iran Removes DST

From 2023, Iran will not set their clocks forward for Daylight Saving Time (DST) but remain on standard time permanently.



*Iran is considering a permanent move to standard time. The skyline of Tehran, Iran.*

©iStockphoto.com/jacquesvandinteren

Argument from  
Cause to Effect

In economics, the implementation of a minimum wage is often argued to increase workers' income. This observation leads to the inference that raising the minimum wage will improve the standard of living for low-income workers.

## National living wage increase of 6.7% confirmed

by Rob Moss | 29 Oct 2024



The national living wage in 2025 will be £12.21 per hour. Image: Stopped Clock/Shutterstock

The national living wage rate from 1 April 2025 will be £12.21, a 6.7% rise, while the national minimum wage for 18 to 20-year-olds increases by a record 16.3% to £10.00 per hour, the government has announced ahead of the Budget.

Chancellor Rachel Reeves said: "This government promised a genuine living wage for working people. This pay boost for millions of workers is a significant step towards delivering on that promise."

## Argument from Cause to Effect

1. How strong is the causal generalization (if it is true at all)?

Generally, if A occurs, then B will (or might) occur.

In this case, A occurs (or might occur).

support

In this case, B will occur (or might occur).

2. Is the evidence cited (if there is any) strong enough to warrant the generalization as stated?



3. Are there other factors that would or will interfere with or counteract the production of the effect in this case?

# Does increasing the minimum wage lead to higher prices?

Many business leaders fear that any increase in the minimum wage will be passed on to consumers through price increases thereby slowing spending and economic growth, but that may not be the case. New research shows that the pass-through effect on prices is fleeting and much smaller than previously thought.

In a new Upjohn Institute working paper, Daniel MacDonald and Eric Nilsson, of California State University, Bernardino, advance the literature on price effects of minimum wage increases.

Historically, minimum wage increases were large, one-shot changes imposed with little advance notice for businesses. But many recent state and city-level minimum wage increases have been scheduled to be implemented over time and often are indexed to some measure of price inflation. These small, scheduled minimum wage hikes seem to have smaller effects on prices than large, one-time increases.

## Related Information

[The Effects of Increasing the Minimum Wage on Prices, by Daniel MacDonald and E...](#)

[What Does the Minimum Wage Do? by Dale Belman and Paul Wolfson](#)

[More research and experts on wages, health insurance, and other benefits](#)

[View All Highlights](#)

## Contact Information

 [Justin Carinci](#)

# General form

Premise 1

Premise 2

...

Therefore (presumably) Claim

Critical questions:

....

Argument from  
Expert Opinion

# Expert Testimony

E is **expert** on D

E **says** P

P is in D

Therefore, P is the case

Critical questions:

Is E **really expert** on E?

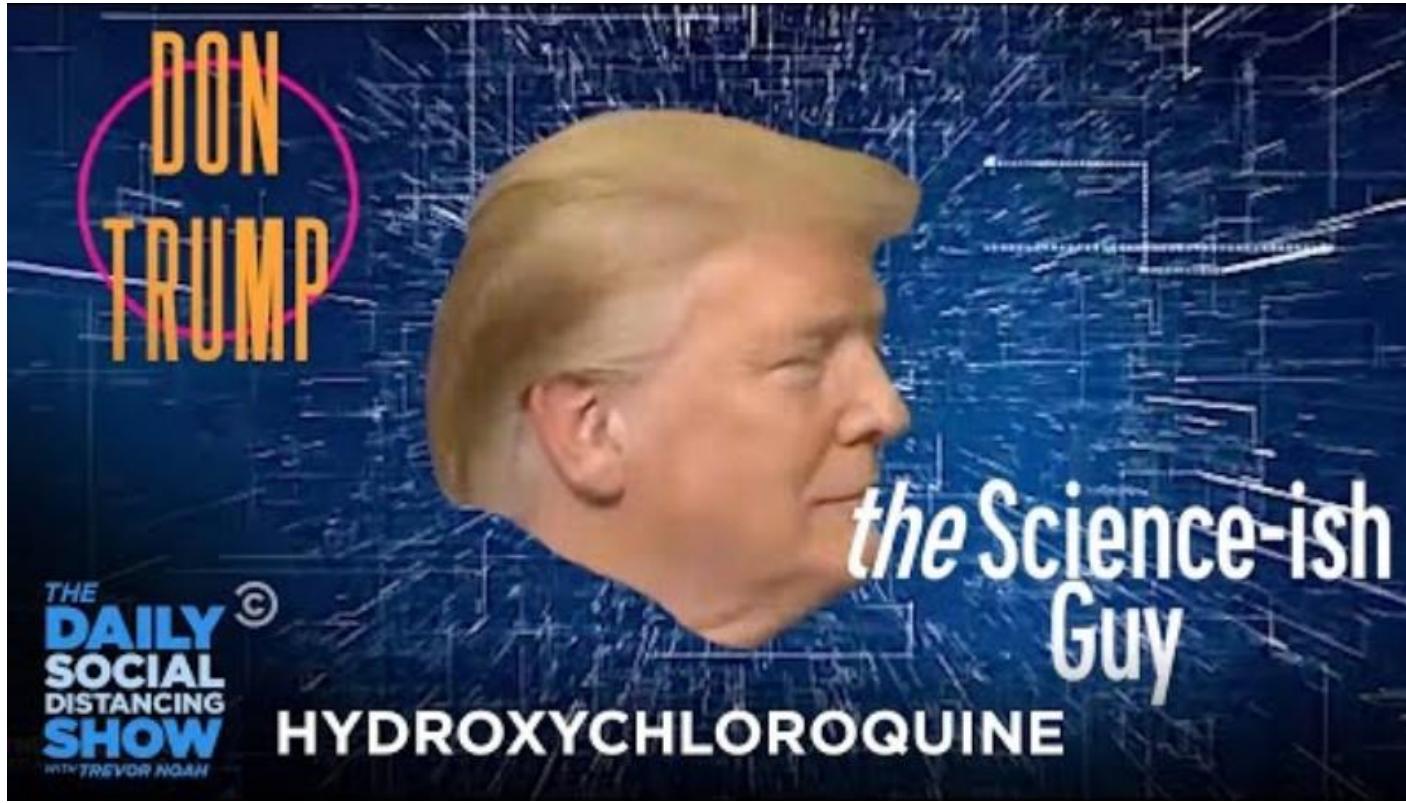
Did E really say P?

Is P really within D?

Is E biased?

Is P consistent with what other experts say?

Is P consistent with known evidence?



NBC NEWS

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CORONAVIRUS

## Trump says he's taking hydroxychloroquine to prevent COVID-19

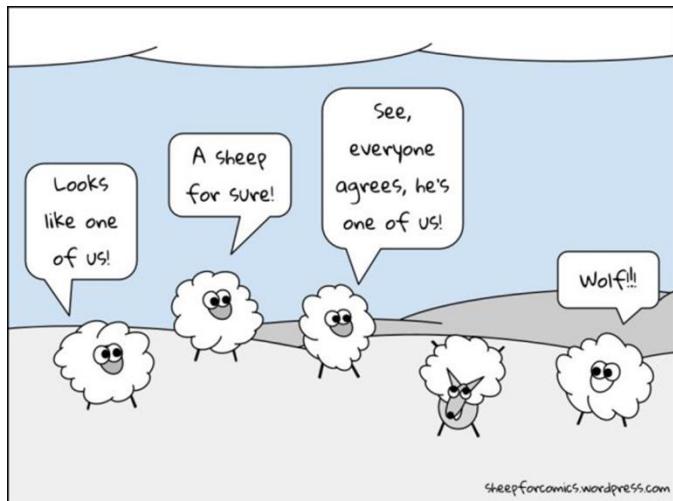
The antimalarial drug is unproven as a treatment for the coronavirus, and the FDA has warned against its use outside hospital settings.

Argument From  
Popular Opinion

# Argument From Popular Opinion

S1: Everybody (in a particular reference group) **accepts** that A  
Therefore, A is **true** ( or you should **accept** A).

S2: Everybody (in a particular reference group ) **reject** A.  
Therefore, A is **false** (or you should **reject** A ).



CQ1: Does a large majority of the cited reference group accept A as true?

CQ2: Is there other relevant evidence available that would support the assumption that A is not true?

CQ3: What reason is there for thinking that the view of this large majority is likely to be right?

what is  
wrong  
here?

# 50,000,000 ELVIS FANS CAN'T BE WRONG

ELVIS' GOLD RECORDS - Volume 2

A FOOL SUCH AS I  
I NEED YOUR LOVE TONIGHT  
WEAR MY RING AROUND YOUR NECK  
DONCHA THINK IT'S TIME  
I BEG OF YOU  
A BIG HUNK O' LOVE  
DON'T  
MY WISH CAME TRUE  
ONE NIGHT  
I GOT STUNG



# Donald Trump claims he has 'overwhelming support' from Muslims in Michigan

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# Best Hashtags



# #Trendvideo

## #Attention\_Seeker



## YouTube

Argument  
from Authority

# Argument from Authority

Major Premise:  is an administrative authority in institution .

Minor Premise: According to , I should (or I should not) do **A**.

Conclusion: I should (or I should not) do **A**.

CQ1: Do I come under the authority of institution ?

CQ2: Does what  says apply to my present circumstances C?

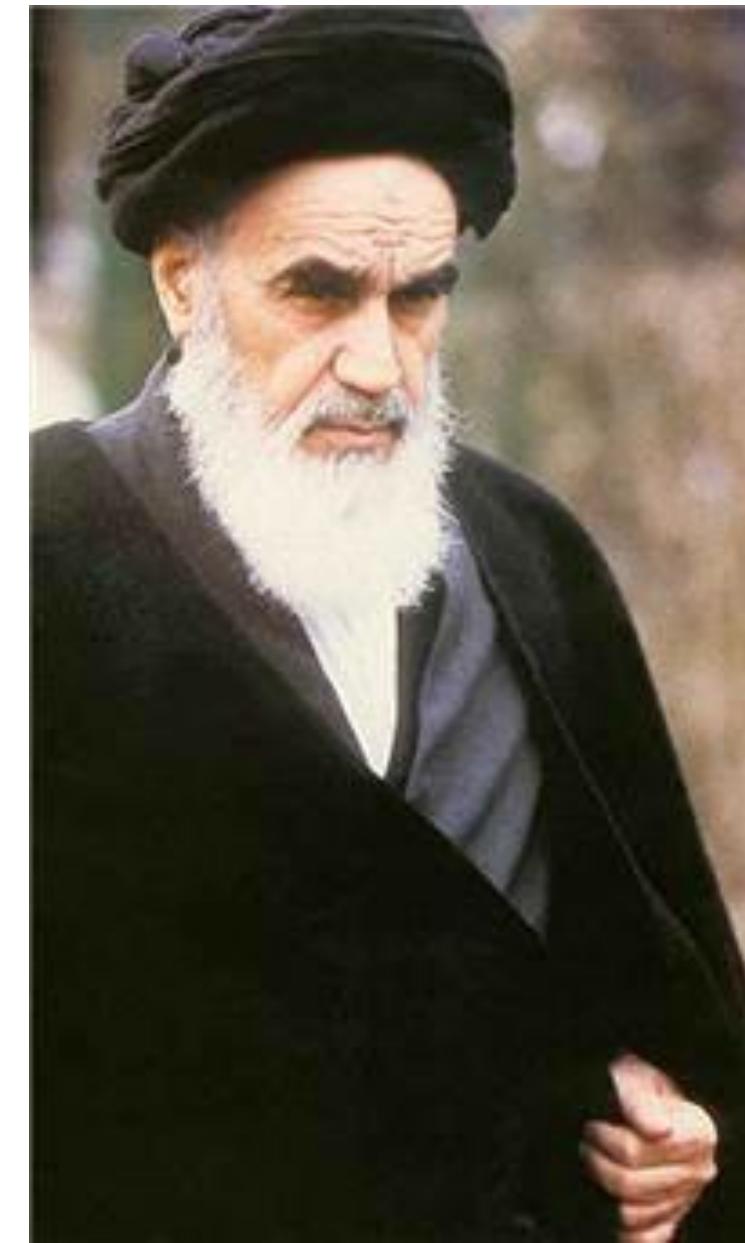
CQ3: Has what  says been interpreted correctly?

CQ4: Is  genuinely in a position of authority?

# Code of Hammurabi

If a man breaks  
into a house, they  
shall kill him and  
hang him(?) in  
front of that very  
breach.





Does Google Search, as an information search engine, have authority about accessing information?



"[T]he argumentum ad verecundiam ... consists in making an appeal to authority rather than reason, and in using such an authority as may suit the degree of knowledge possessed by your opponent. ... The more **limited** his capacity and **knowledge**, the **greater** is the number of the **authorities** who weigh with him."



*Arthur Schopenhauer.*

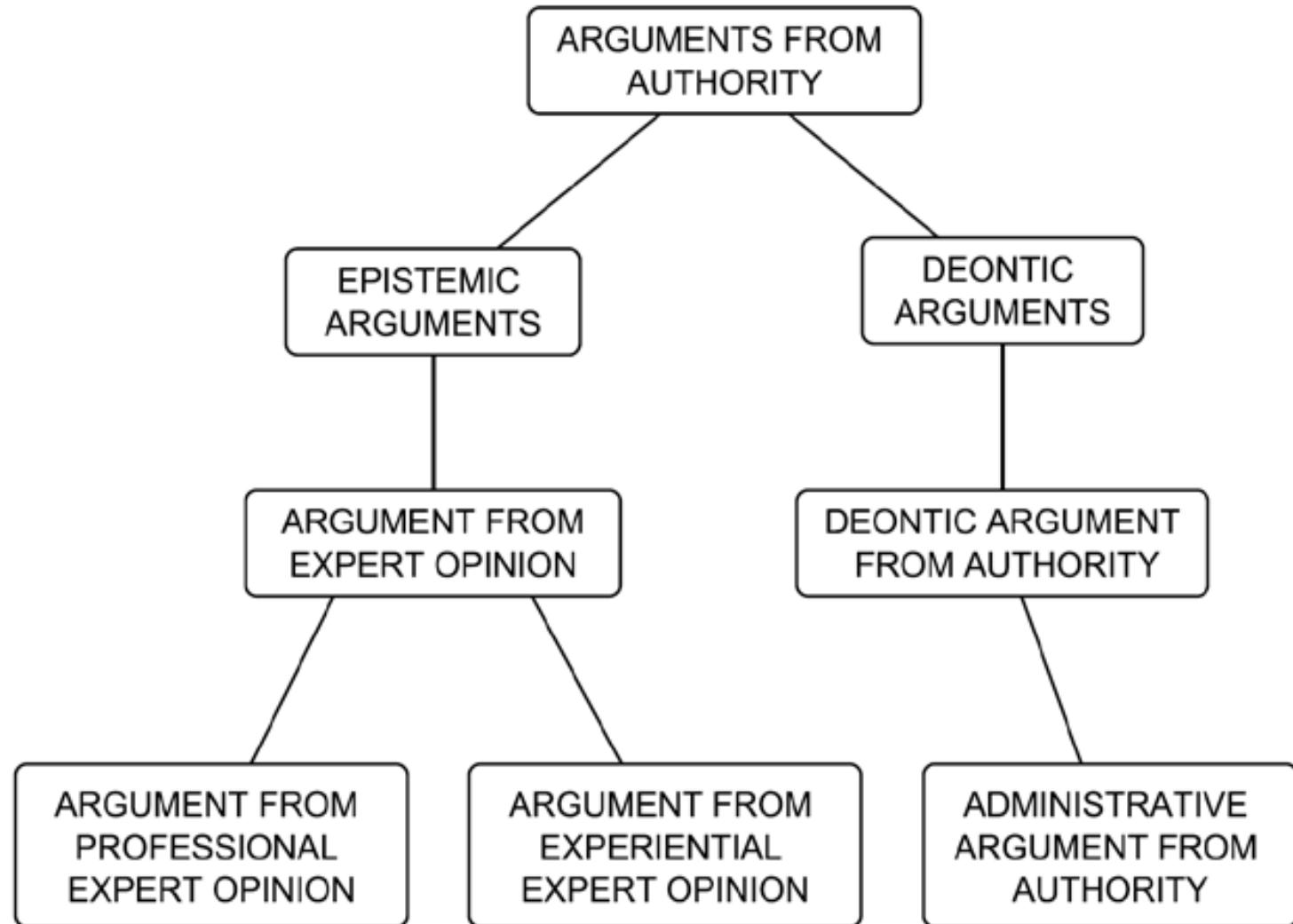
The Art of Controversy and Other Posthumous Papers trans.

Do AI  
Agents  
have  
authority?





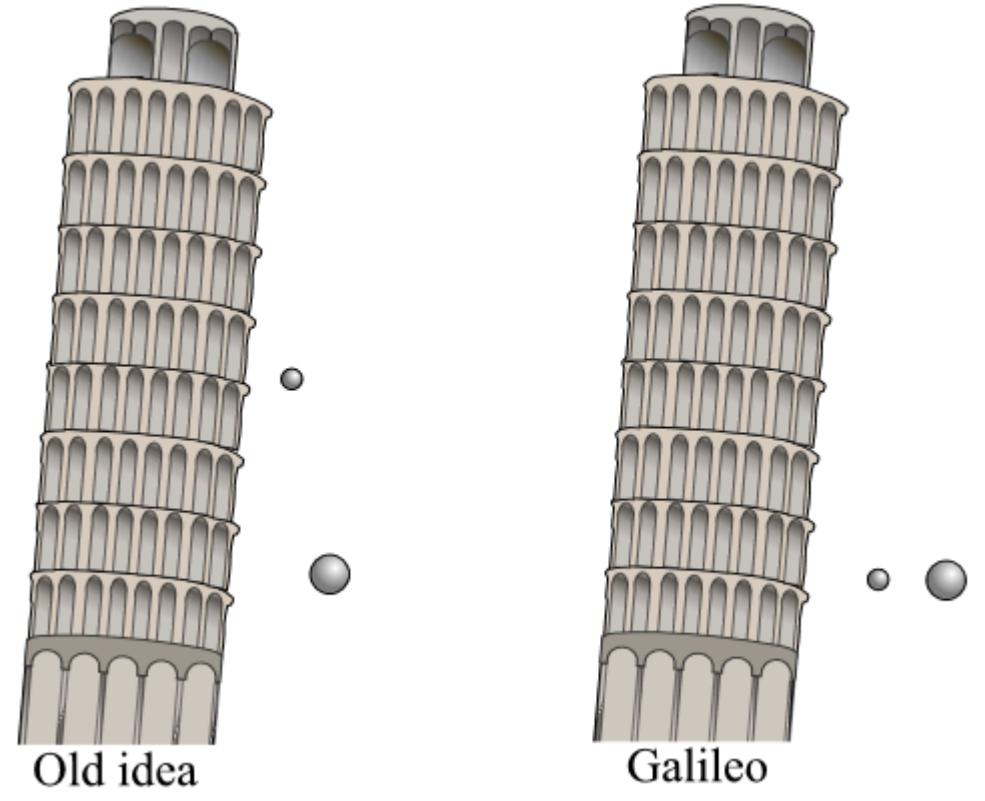
Ben Clarkson



# Expert Opinion Ad Populum Argument

Everybody in this group G accepts A.  
G is a group of expert in a domain of  
knowledge.  
Therefore, A is true.

So many people accept that heavier  
things fall faster to the ground  
[therefore it is plausible that ]  
heavier things fall faster to the  
ground.



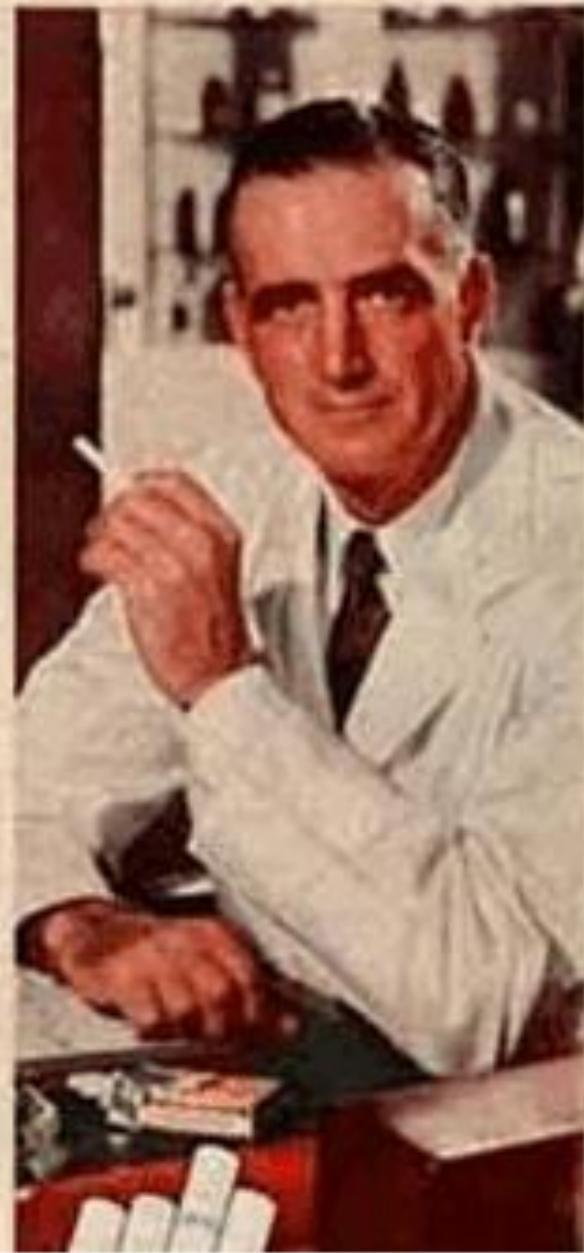
*According to repeated nationwide surveys,*

# More Doctors Smoke **CAMELS** than any other cigarette!

Doctors in every  
branch of medicine  
were asked, "What  
cigarette do you smoke?"

You'll know Camel for the same reasons  
so many doctors smoke them. Camels have  
real, real malation, pack after pack, and  
a flavor unmatched by any other cigarette.

Makes this smoothest road. Smoke only  
Camels for 34 days and see how well Camel



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## **Debate: Will AI replace clinicians?**



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17 June 2024



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*As part of the ongoing conversation of artificial intelligence in healthcare, two GPs debate whether or not AI is a threat to the workforce*

**YES: 'AI will replace clinicians and reduce the workforce to 10% of what it currently is'**

Argument from  
Practical Reasoning

# Practical reasoning

I have a **goal** G.

Carrying out this action A is a **means** to achieve G.

Therefore, I ought to **carry out** A.

Critical questions:

What other goals do I have that might conflict with G?

Does A also have bad consequences?

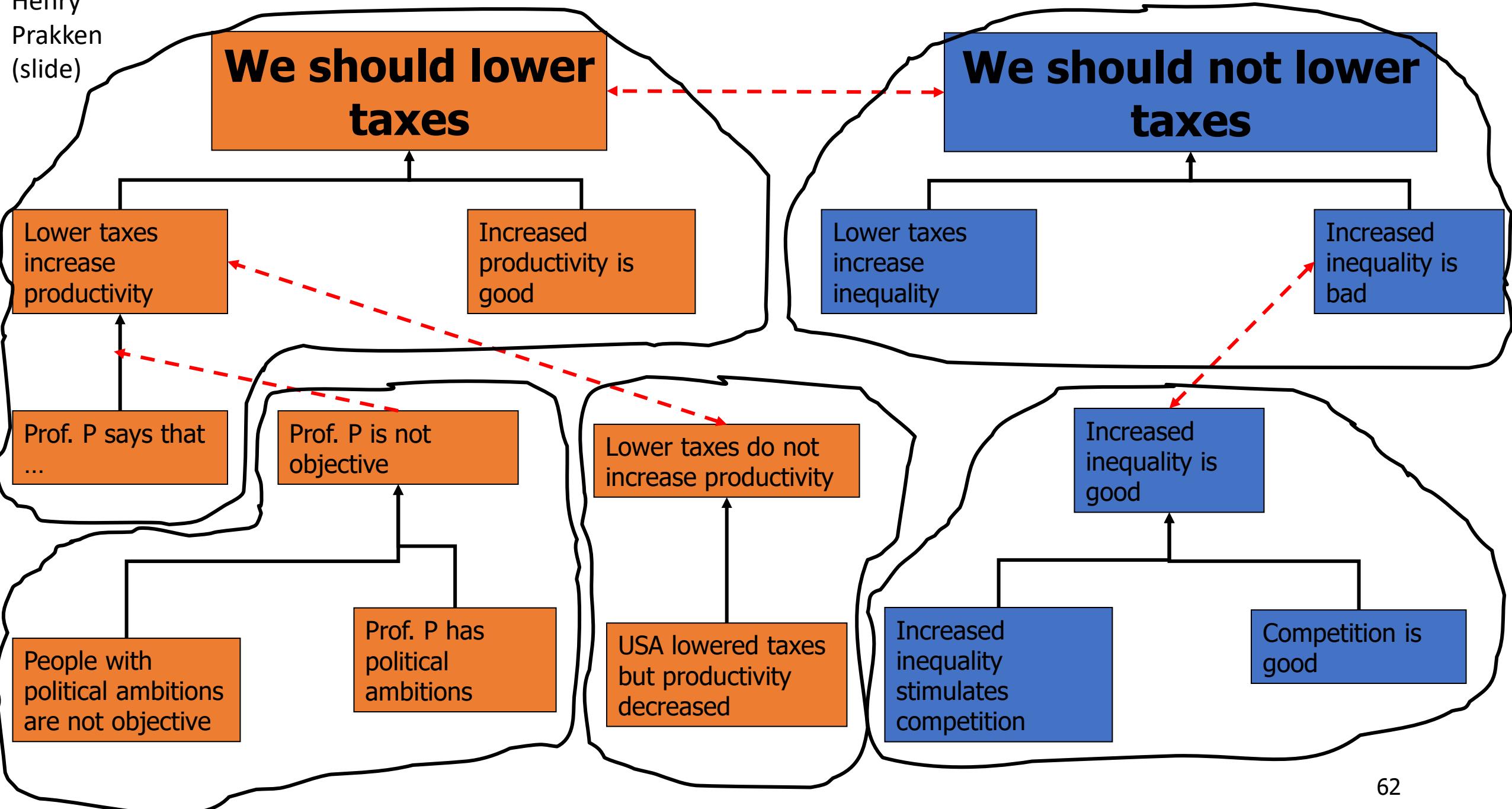
Are there other (possibly more efficient) actions to bring about G?

Is A practically possible?

Suppose I am deliberating with my spouse on what to do with our pension investment fund - whether to buy stocks, bonds, or some other type of investment. We consult with a financial adviser, an expert source of information who Gill tell us what is happening in + he stock market. and so forth, at the present time.  
( Walton , 1997· p. 113 )



"According to the latest statistics, an early retirement is any time before death."



## Walton's Argumentation Schemes

› Classic Patterns of Argument

› Syllogisms – Categorical

› Simple Deductive Schemas

› Simple Inductive Schemas

› Classic arguments

› Classic Fallacies

› Argumentation Schemes

Katzav and Reed's

› Argumentation Schemes

Pollock's Argumentation

Schemes

Walton's Argumentation

Schemes

## Walton's Argumentation Schemes

The Argumentation Schemes below are taken from [Douglas Walton's book \*Argumentation Schemes for Presumptive Reasoning\*](#). If you are interested in using these schemes I would suggest that you read Walton's book, as their utility may not be apparent without the background theory concerning presumptive reasoning.

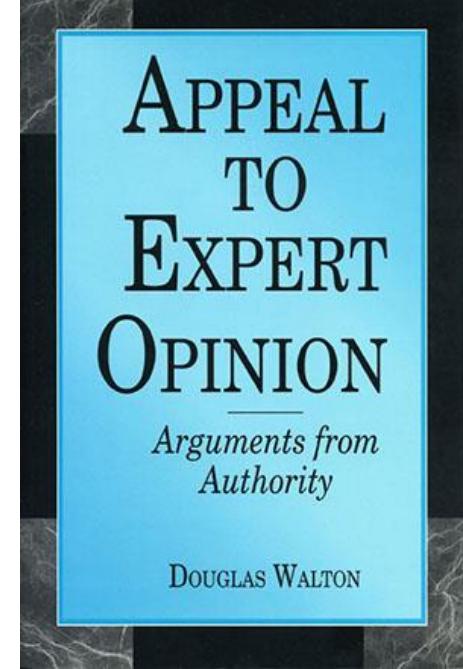
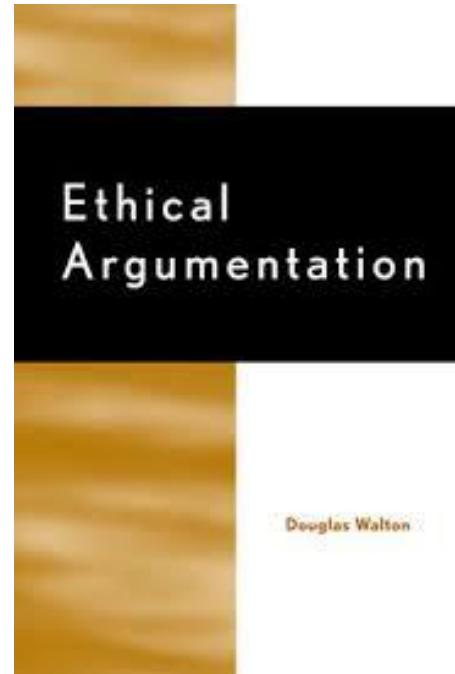
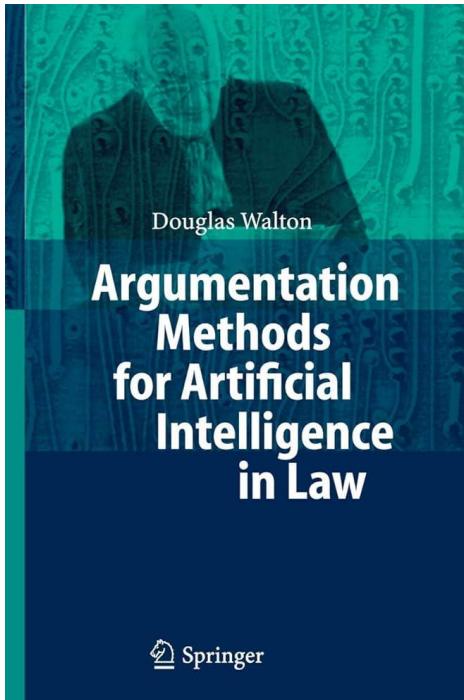
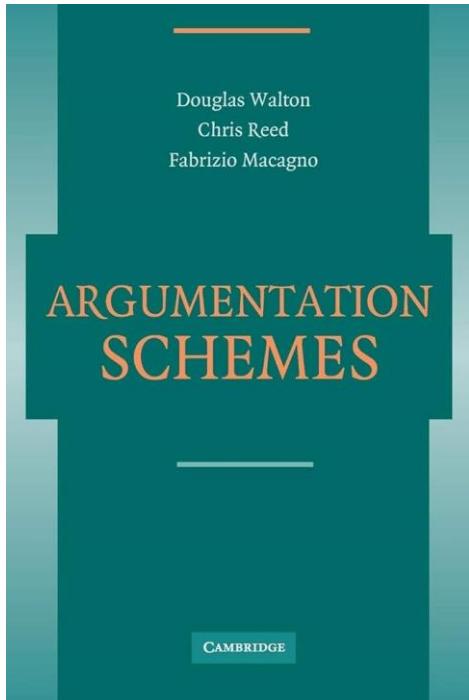
Critical Questions appear in note boxes, and are labeled with the question mark icon pictured below.

The critical questions are numbered as they appear in *Argumentation Schemes for Presumptive Reasoning*, for easy reference.

### Argumentation Schemes

- [Argument from Sign](#)
- [Argument from an Exceptional Case](#)
- [Argument from Analogy](#)
- [Argument from Bias](#)

argument from commitment, argument from precedent, argument from position to know, argument from (positive or negative) consequences, argument from lack of knowledge, practical reasoning (argument from goal to action), argument from cause to effect, inference to the best explanation, argument from analogy, several types of *ad hominem* argument, the slippery slope argument, ...



Logic ≠  
Formal  
Method

Logic ≠  
Psychology

Logic have its own faculty

# References and More to Read:

Sinnott-Armstrong, Walter. "Understanding arguments: An introduction to informal logic." (2015).

Douglas Walton, Chris Reed & Fabrizio Macagno.  
Argumentation schemes. Cambridge University Press. (2008)

Walton's Argumentation Schemes : [www.reasoninglab.com](http://www.reasoninglab.com)

Informal Fallacies: Lecture Notes and Fallacy Examples :  
[www.philosophy.lander.edu](http://www.philosophy.lander.edu)