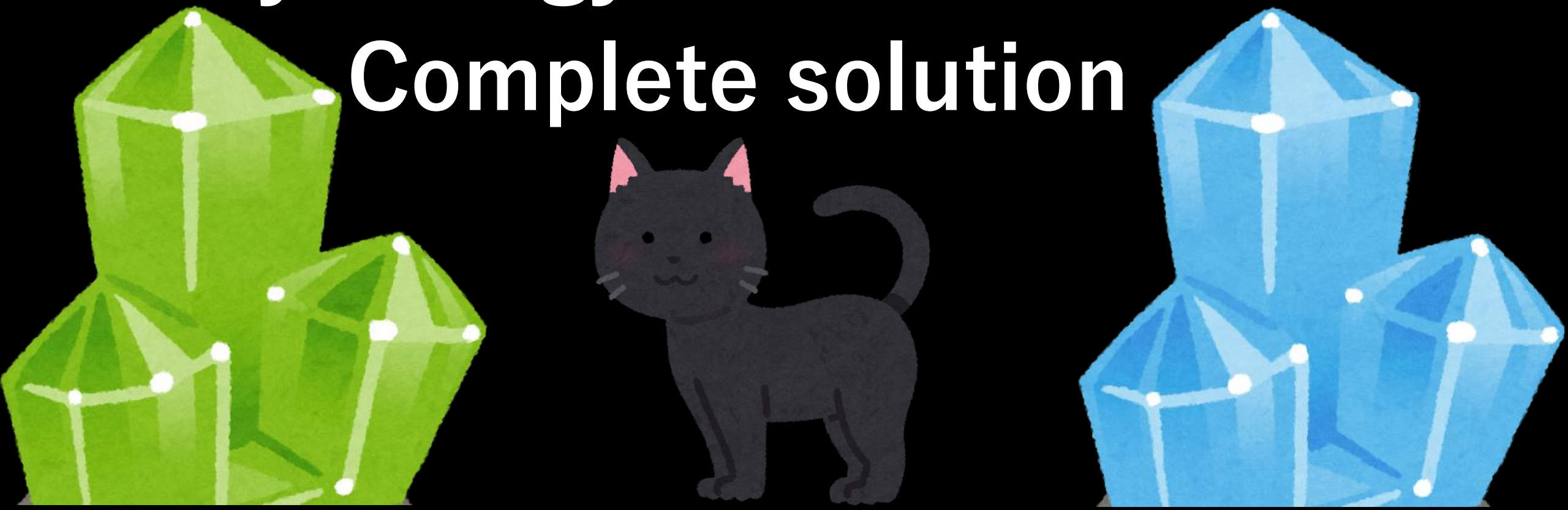
Grue paradox

(New riddle of induction)

Psychology of misunderstand

Complete solution



Grue paradox (New riddle of induction)

Problem

Grue is the color that is green before 2049 and blue after 2050.

Before 2049, we repeatedly confirmed that the color of emeralds was glue.

Can we say that the stone will still be glue after 2050?

This is incorrect because without physical color change,
emeralds would remain green.

This paradox leads to strange inductive reasoning.

A common explanation is that there are predicates
that can be used in inductive reasoning, and predicates that should not be used.

A great detective fully solves the glue paradox (New riddle of induction).
He explains not only what is correct, but also the psychology behind why we get it wrong.
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Can we say that the stone will still be glue after 2050?
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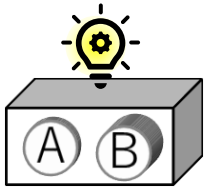
Simplified example



hypothesis: "IF (A OR B) THEN C"

We have confirmed multiple times that pressing A lights up C,
and the hypothesis is verified.

Without ever pressing B, we have inferred that pressing B will light up C.

hypothesis:
- "IF A THEN C" This is the only one that has been verified
- "IF B THEN C"

When expressed as logical OR, it is clear that separate verification is required.

Let's simplify the problem.
We have a device with button A, button B, and lamp C.
We are verifying the hypothesis "IF (A OR B) THEN C".
We have confirmed multiple times that pressing A lights up C, and the hypothesis is verified.
Without ever pressing B, we have inferred that pressing B will light up C.
This hypothesis can be expressed separately as "IF A THEN C" and "IF B THEN C".
We should consider that only the fact that pressing A lights up C has been verified.
When expressed as logical OR, it is clear that separate verification is required.
At the very least, we have learned that we should not include logical OR in the hypothesis.

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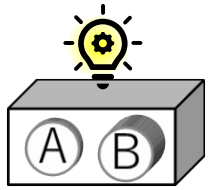
Example without using logical sum (OR)



hypothesis: "IF button X THEN C"

We press button X, which is randomly selected using a random number.

We try this multiple times and the hypothesis is verified.

What we want to know: If I press button B, will the light come on?

It's possible that only button A was selected randomly by chance.

"IF button X THEN C" has been verified,
but "IF button B THEN C" has not.

If there is a discrepancy between what is verified and
what we want to know, we cannot make an inference.

Let's create a hypothesis that doesn't use logical sum (OR).
"IF button X THEN C"
We press button X, which is randomly selected using a random number.
We try this multiple times and the hypothesis is verified.
If we press button B, will the light turn on?
However, it's possible that only button A was selected randomly by chance.
"IF button X THEN C" has been verified, but "IF button B THEN C" has not.
If there is a discrepancy between what is verified and what we want to know, we cannot make an inference.

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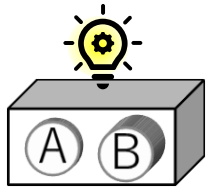
Random selection



hypothesis: "IF button X THEN C"

What we want to know : If I press random button X, will the light come on?

"IF button X THEN C"

Since what we want to know is the same as the tested hypothesis,
it seems possible to guess.

However, if you choose randomly, buttons A and B each have a 50% chance.

The past probabilities were just biased by chance,
and the next time they will be chosen fairly.

There is a 50% chance that you will press button B,
which you have never pressed before.

Even in this example, we cannot infer that the lamp will light up.

So, if you press a button chosen at random, will the lamp light up?
Since this is the same as the tested hypothesis, it seems possible to guess.
However, if you choose randomly, buttons A and B each have a 50% chance.
The past probabilities were just biased by chance, and the next time they will be chosen fairly.
There is a 50% chance that you will press button B, which you have never pressed before.
Even in this example, we cannot infer that the lamp will light up.

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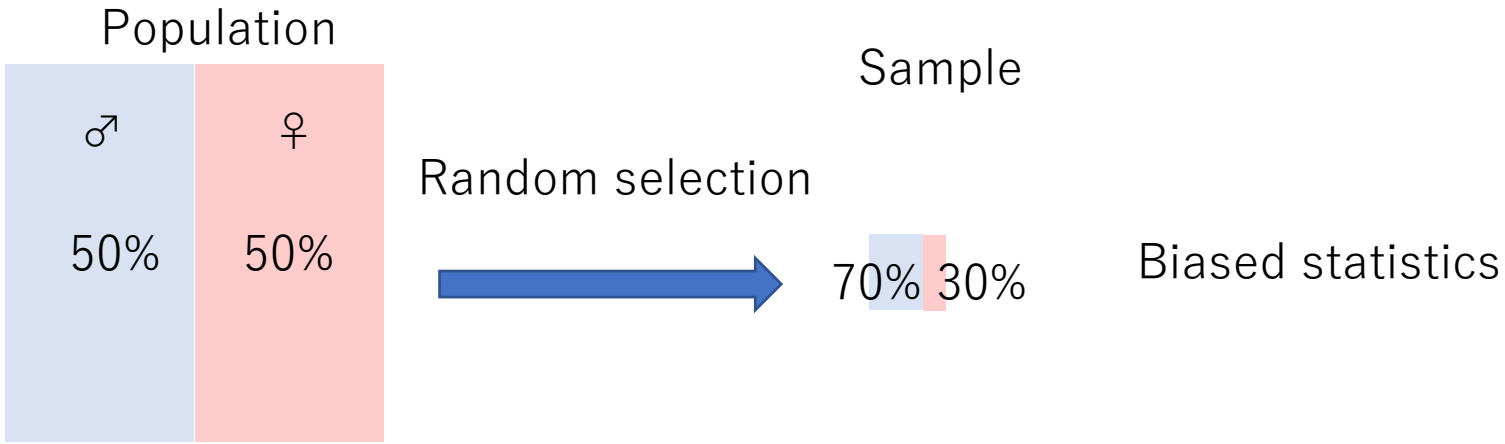
Statistical Example

The aim is to obtain gender-neutral statistics



The sample should have been taken so that the number of men and women was equal.

The same thing happens in statistics.
Suppose the aim is to obtain statistics that are unbiased between men and women.
So, a random sample is taken from a population with a 50% male to female ratio.
Can we say that statistics obtained in this way are unbiased between men and women?
If, by chance, a man was selected with a 70% probability, then the statistics obtained will be biased.
The sample should have been taken so that the number of men and women was equal.

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Causes of misunderstanding

A "hypothesis" is formulated.

A sample is drawn from the population
and tested to see if it matches the "hypothesis“.

It doesn't matter whether the sample is random or not.

It is a mistake to assume that this testing makes the original "hypothesis" correct.

All we know is the truth of the sample we drew.

Let's consider the source of these misunderstandings in inductive reasoning.
First, a "hypothesis" is formulated.
A sample is drawn from the population and tested to see if it matches the "hypothesis“.
It doesn't matter whether the sample is random or not.
It is a mistake to assume that this testing makes the original "hypothesis" correct.
All we know is the truth of the sample we drew.

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Precondition

If we could only assert correctness for the extracted sample,
we would not be able to make predictions.

While we can extract the results of pressing a button in the past,
we cannot extract the results of pressing a button in the future.

We impose the precondition that time is not distinguished.

Past samples become valid samples for inferring the future.

We are also free to impose the precondition that buttons are not distinguished.

Inductive inference will produce a variety of different results
depending on the preconditions.

If we could only assert correctness for the extracted sample, we would not be able to make predictions.
This is because, while we can extract the results of pressing a button in the past, we cannot extract the results of pressing a button in the future.
Therefore, we impose the precondition that time is not distinguished.
This way, past samples become valid samples for inferring the future.
We are also free to impose the precondition that buttons are not distinguished.
Inductive inference will produce a variety of different results depending on the preconditions.
Unlike deduction, the same result will not be obtained regardless of who makes the inference.

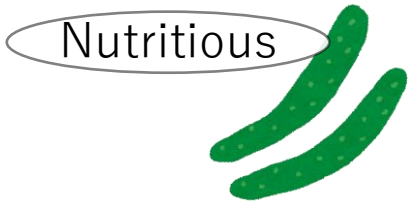
Grue paradox (New riddle of induction)

Vegetables

According to statistics from the Ministry of Health, Labor and Welfare, you need to eat 350g of vegetables a day to be healthy.

Strawberries, melons, and watermelons are vegetables, so eat lots of them.

Eating 350g of nutritious cucumbers is also good.



Raw spinach 350g/day

It seems that people think that as long as the vegetables are the same weight, they will have exactly the same effect on health.

By exploiting paradoxes, you can create convenient statistics.

People at the Ministry of Health, Labor and Welfare are obligated to show that you can eat 350g of raw spinach every day and still be healthy.

By the way, according to statistics from the Ministry of Health, Labor and Welfare, you need to eat 350g of vegetables a day to be healthy.
Strawberries, melons, and watermelons are vegetables, so eat lots of them.
Eating 350g of nutritious cucumbers is also good.
It seems that people think that as long as the vegetables are the same weight, they will have exactly the same effect on health.
By exploiting paradoxes, you can create convenient statistics.
People at the Ministry of Health, Labor and Welfare are obligated to show that you can eat 350g of raw spinach every day and still be healthy.
That's all.

Contact Information

For inquiries,

please contact us here.

https://ultagi.org/