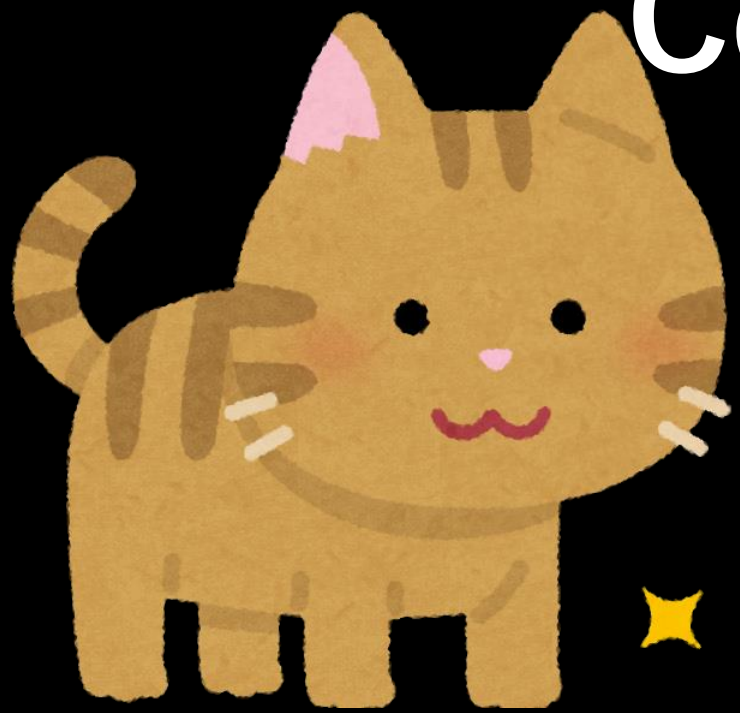
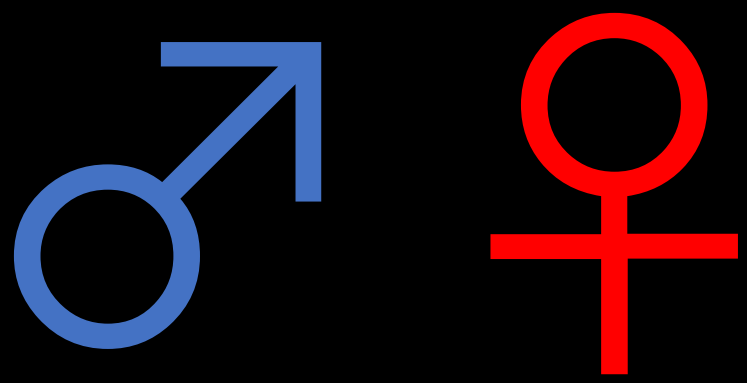
Boy or Girl paradox

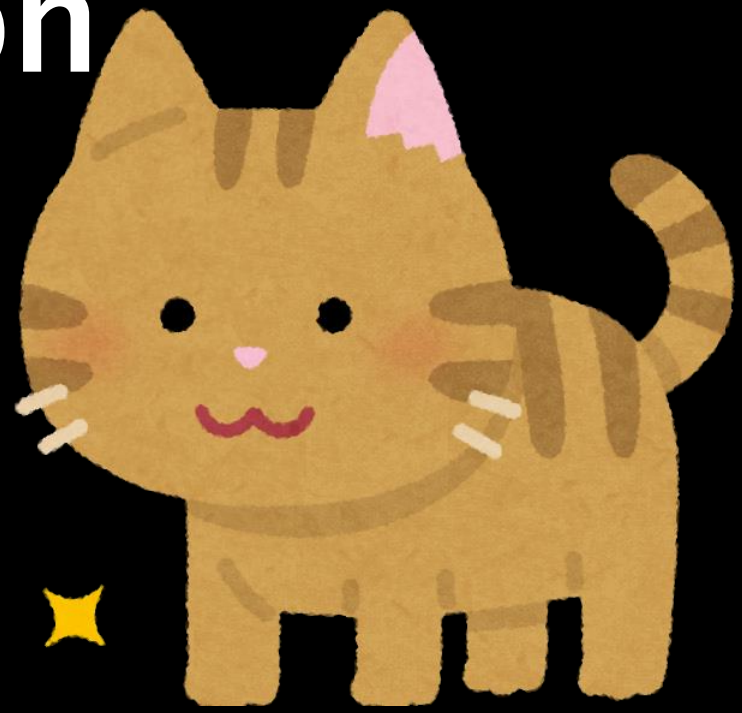
(The Two Children Problem)

Psychology of misunderstand

Complete solution







Boy or Girl paradox

Question

Mr. Jones has two children. The older child is a girl.
What is the probability that both children are girls?

➡ 1/2 (Correct answer)

Mr. Smith has two children. At least one of them is a boy.
What is the probability that both children are boys?

➡ 1/2 …Many people answer this way. (Paradox)

1/3 (Correct answer)

A great detective completely solves The Two Children Problem (Boy or Girl paradox).
Not only does it explain what is correct, but it also explains the psychology of why it is wrong.
Mr. Jones has two children. The older child is a girl. What is the probability that both children are girls?
Mr. Smith has two children. At least one of them is a boy. What is the probability that both children are boys?
The correct answer to the first question is 1/2.
The correct answer to the second question is 1/3, but the paradox is that most people would answer 1/2.

Boy or Girl paradox

Valid Combinations

Jones

Older	♂	♂	♀	♀
Younger	♂	♀	♂	♀

Older is a girl →

♂	♂	♀	♀
♂	♀	♂	♀

Smith

♂	♂	♀	♀
♂	♀	♂	♀

At least one boy →

♂	♂	♀	♀
♂	♀	♂	♀

Valid

two boys : 1/3

To explain the correct answer, we have illustrated all combinations.
For each child, there were initially four possible combinations.
Using the information in the question, we can narrow it down to only the valid combinations.
Looking at Mr. Smith.
At least one child is a boy, so the number of valid combinations is reduced to three.
Of the three valid combinations, the probability that both children are boys is 1/3.

Boy or Girl paradox

Psychology of misunderstand

(1) Interpreting the problem in a way that makes it as easy to calculate as possible

(2) Turning a means into an end

Let's explain the psychology behind answering that the probability of two boys is 1/2.
The most common explanation is that the wording was ambiguous and people misunderstood.
However, there's a reason why more people make this mistake.
The following two psychological factors are at work:
(1) Interpreting the problem in a way that makes it as easy to calculate as possible
(2) Turning a means into an end

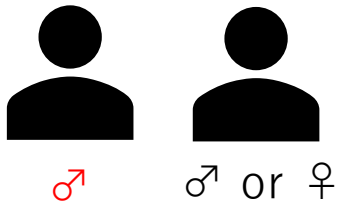
Boy or Girl paradox

(1) Interpret the problem to make it easier to calculate

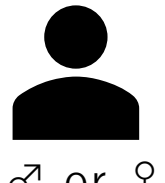
Number of combinations
- 2 people: 4
- 1 people: 2

←If you can interpret it like this, the calculation becomes easier.

At least one boy



Exclude one boy



If the remaining child is a boy, then both will be boys.

Since you are only being asked whether one child is a boy or a girl, the answer is 1/2.

The first psychological factor is interpreting the problem in a way that makes it as easy to calculate as possible.
The respondent will first try to interpret the problem, which is stated in words, mathematically.
The number of combinations is four if there are two children, and two if there is one.
If they can interpret it as a question asking about combinations of one child, it is easier to calculate.
Since at least one child is a boy, they will exclude that person from their analysis.
If the remaining child is a boy, then both will be boys.
Since they are only asking whether one child is a boy or a girl, they will conclude that the answer is 1/2.

Boy or Girl paradox

(2) Turning a means into an end

End
"the gender of two”

Mean ➡ Become the end
"the gender of remining one”

When the means become the end,
we no longer give deep consideration to the original purpose.

♂	♂	♀	♀
♂	♀	♂	♀

Forget to consider that this is three of four patterns.

At this point, the second psychological phenomenon of "turning means into ends" occurs.
In order to achieve the goal of "the gender of two children“, the means of "the gender of the remaining child" are defined.
At this point, the means are replaced by the end.
You could also say that a different goal has been set in order to achieve one goal.
When this happens, you no longer give deep consideration to the original goal.
In the question about the original goal, you were informed that there were 3 options out of 4, but you forget to take this into consideration.
You simply think that the probability that one of the children will be a boy is 1/2.

Boy or Girl paradox

(2) Turning a means into an end

End	Mean ➡ Become the end
"Increase profits"	"Increase sales"
Tedious to calculate	Easy to calculate

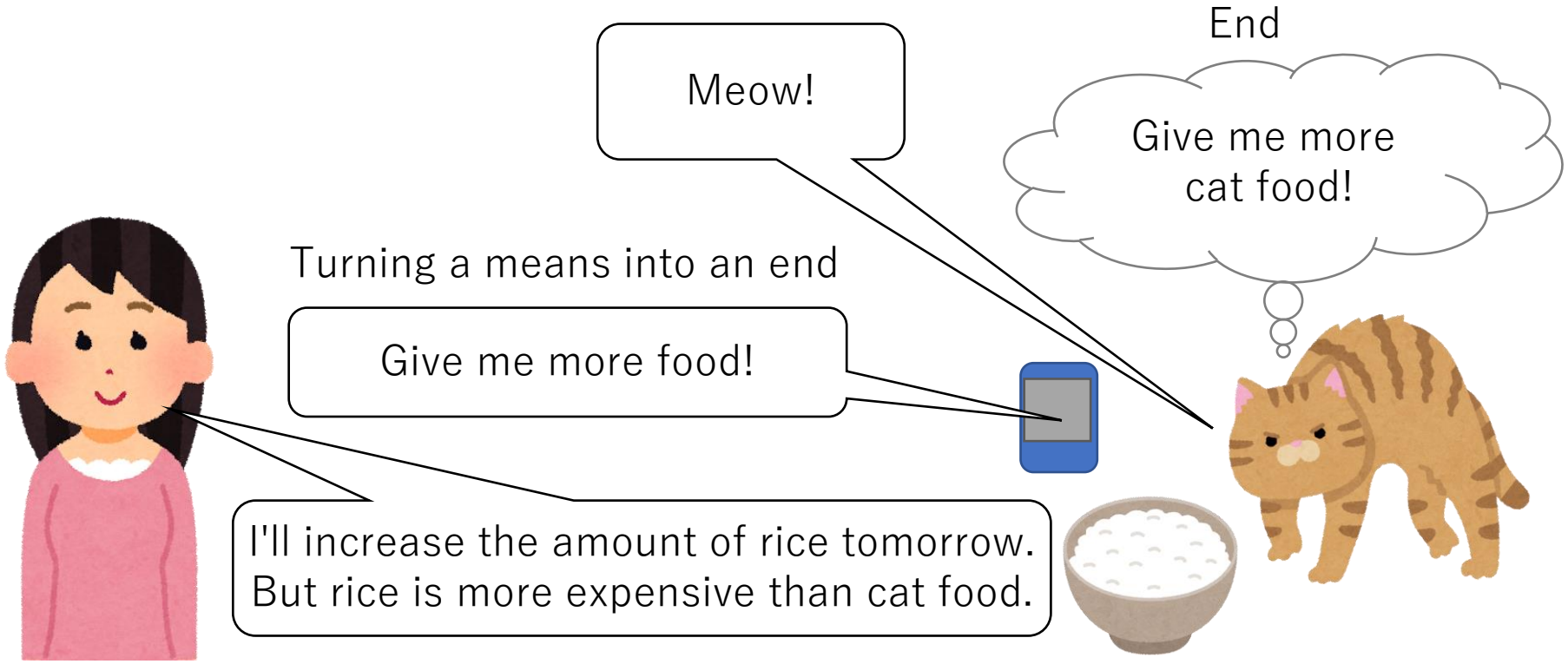
We've reduced the prices on all our products by 10%,
and our total sales have doubled!

When the means are easier than the end, the means tend to become the end.

This is a common example of turning a means into an end.
When the goal is to increase profits, before you know it, the means, increasing sales, becomes the goal.
You reduced the prices of all products by 10% and total sales doubled.
Profits may actually have decreased.
Profit margins vary from product to product, making calculations tedious.
It's tempting to think in terms of sales, which are easy to calculate.
Please be aware that when the means are easier than the end, the means can easily become the end.

Boy or Girl paradox

Cat Language Translator



By the way, do you know of a machine that can translate cat language?
Sometimes it can be frustrating not knowing what your cat is thinking.
With a translator, you'll never be confused again.
It's easier to trust a translator than to try to read a cat's mind.
But the real purpose is to read a cat's mind.
Even if you can tell the emotion from the voice, you won't know the target of that emotion.
The meaning might be the exact opposite.
That's all.

Contact Information

For inquiries,

please contact us here.

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