

A BIT OF

CS4FN

Computer Science for Fun

Special Issue

Ergo's adventures in thinking



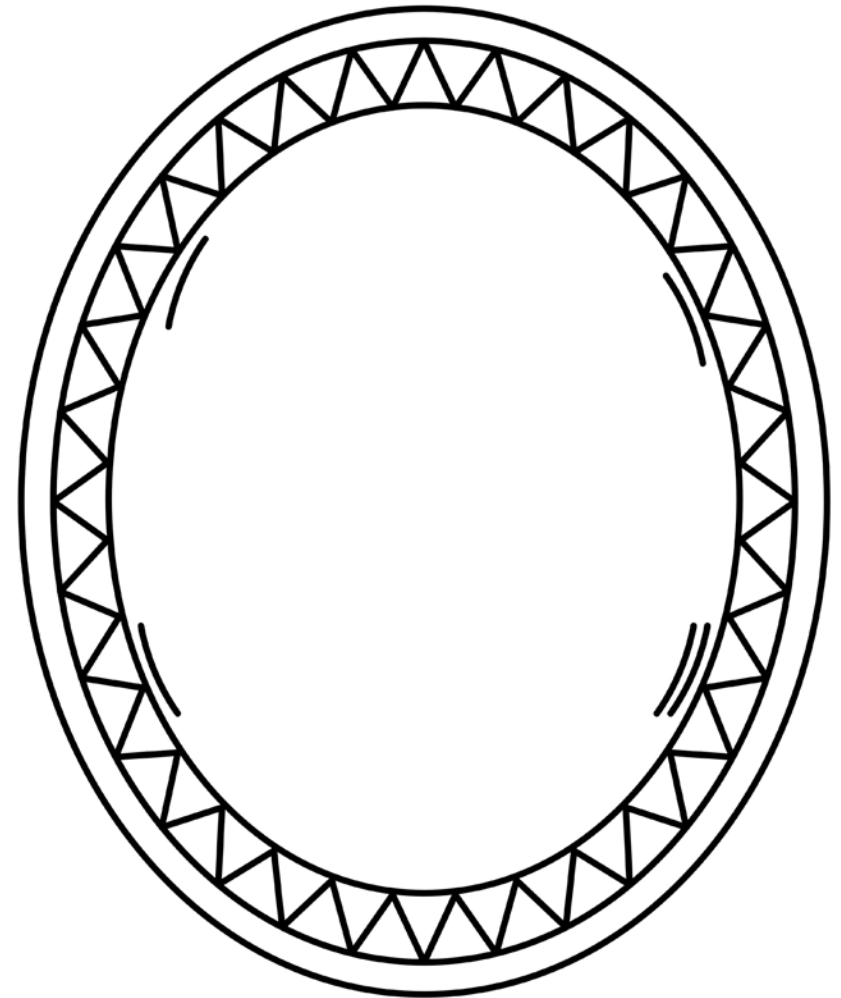
Words by Peter W. McOwan,
Paul Curzon and Jane Waite
Pictures by you

Teach your children
(and yourself) to think logically

www.abitofcs4fn.org/ergo/
teachinglondoncomputing.org/ergo/

 Queen Mary
University of London

Draw Ergo in the mirror.



Here are seven poems about Ergo.

In each poem Ergo is in a muddle.

Can you explain why Ergo has made
a thinking mistake each time?

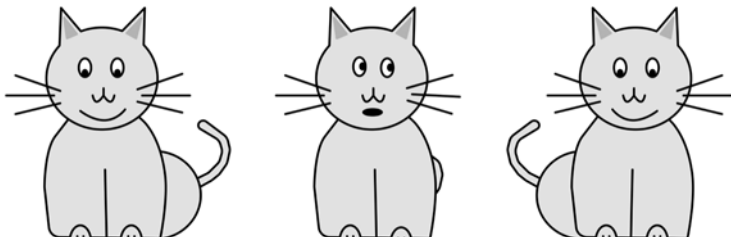
Draw a fun picture to go with each poem.

**The help of a grown-up may be needed
to work through Ergo's muddled thinking.
Find notes for grown-ups at the end.**

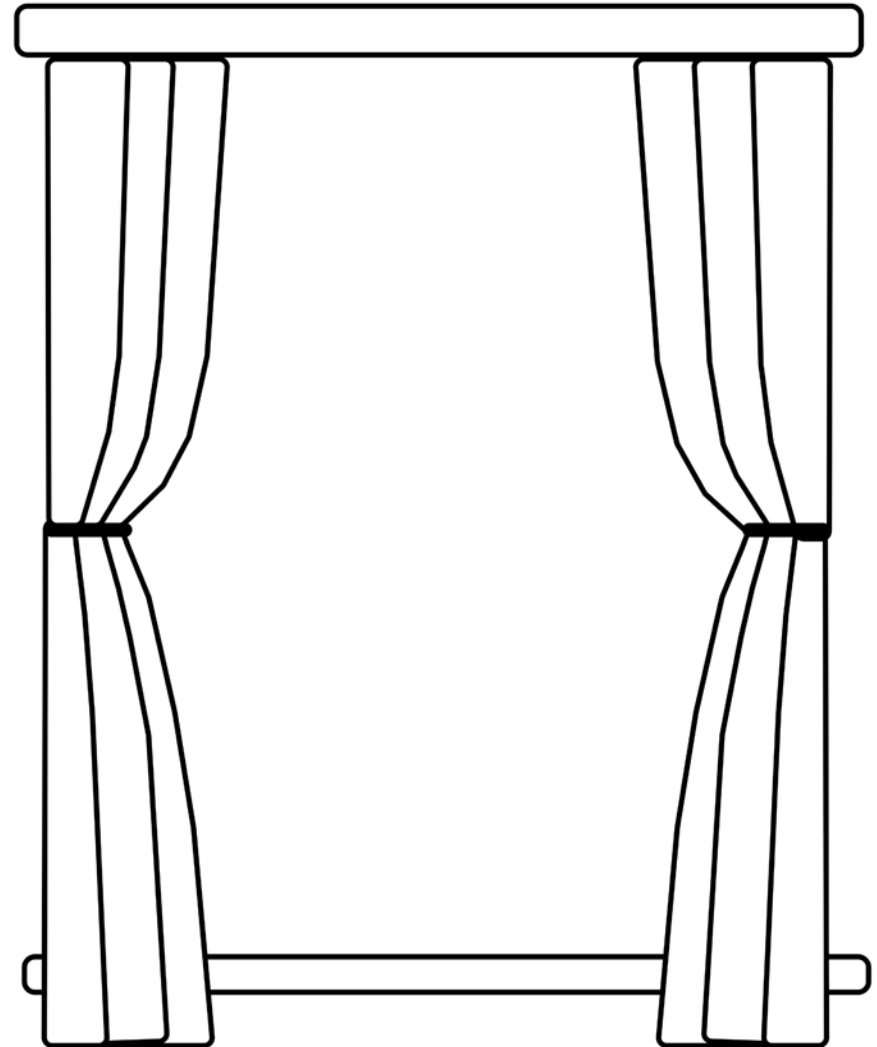
You decide if Ergo is a person, robot,
alien or something else all together.

All cats are grey

Ergo thinks all cats are grey.
Ergo's thought it all today.
But Ergo's wrong as we will see.
There is a black cat up that tree.



Draw Ergo outside being surprised
by the black cat up a tree.

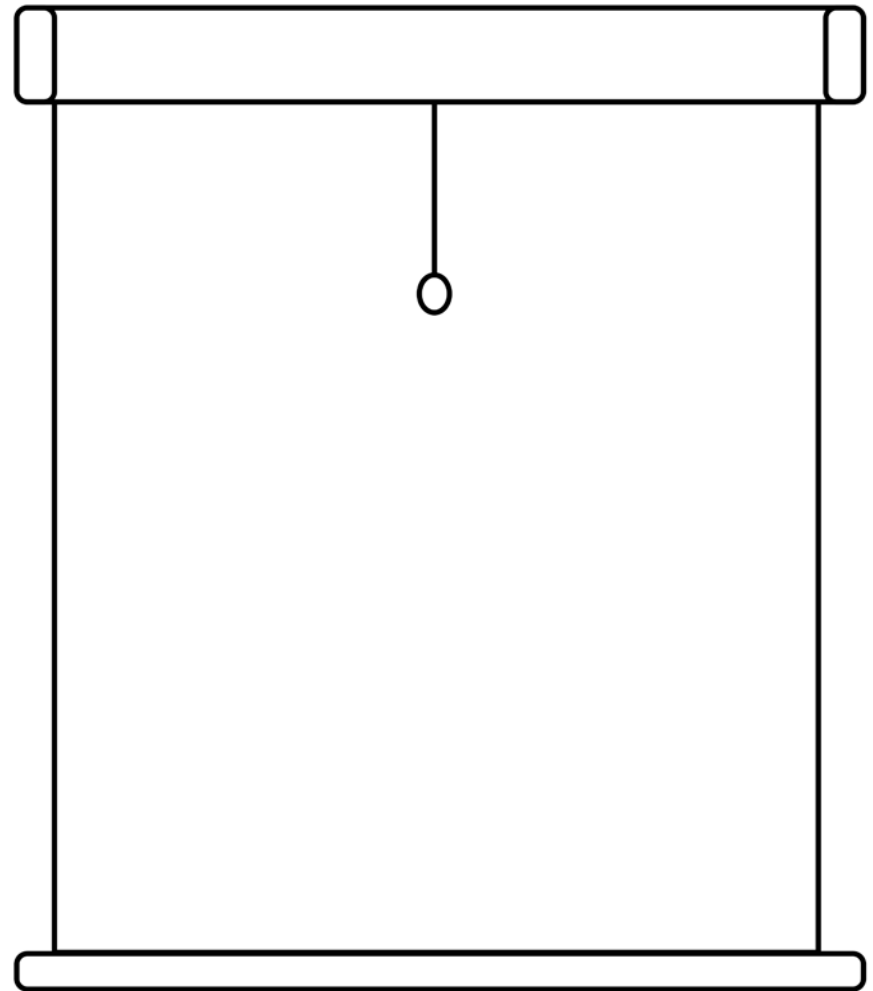


Heads and Tails

Ergo tossed a coin to see
How many heads could ever be.
One dozen heads came down in turn,
So heads again Ergo did spurn.
But coins don't worry about their past,
And heads again it dropped like last.

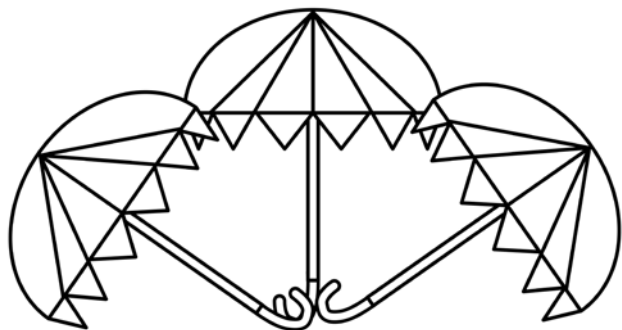


Draw Ergo tossing a coin and being shocked at getting another heads.

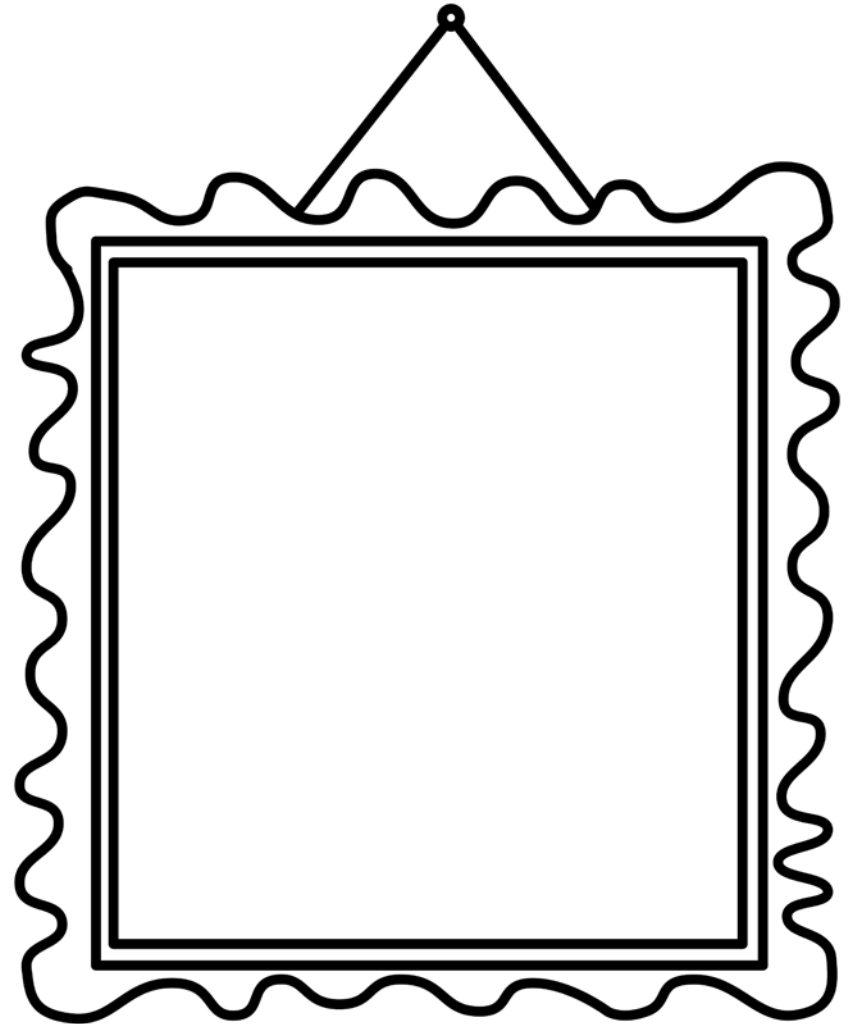


Rainy day

Ergo was most sure to say
"Umbrellas cause the rain to stay.
Each time I see them in the street,
It's wet, with dark clouds and no heat."
But sunny days showed it's not the case,
As parasols the streets did grace.
It's not umbrellas that cause the rain.
Poor Ergo had to think again.



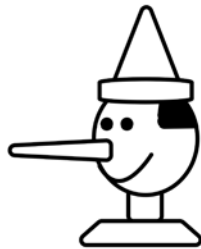
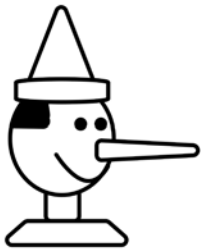
Draw a picture of Ergo
on a rainy day.
Did Ergo remember an umbrella?



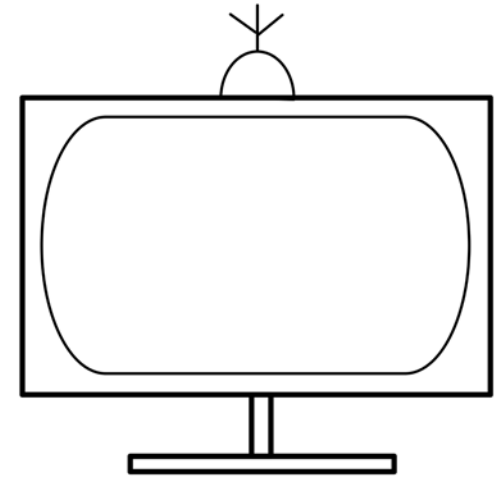
Two wrongs

Ergo says "It's fine to lie.
It's true because that older guy
Tells tall tales almost every day."

But two wrongs don't make right,
folks say.



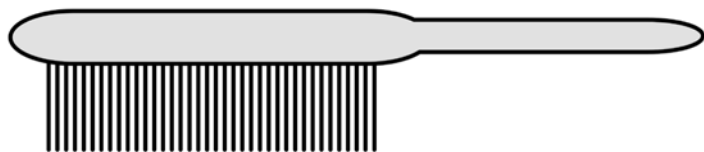
Draw Ergo looking sad because
of someone lying on the TV.



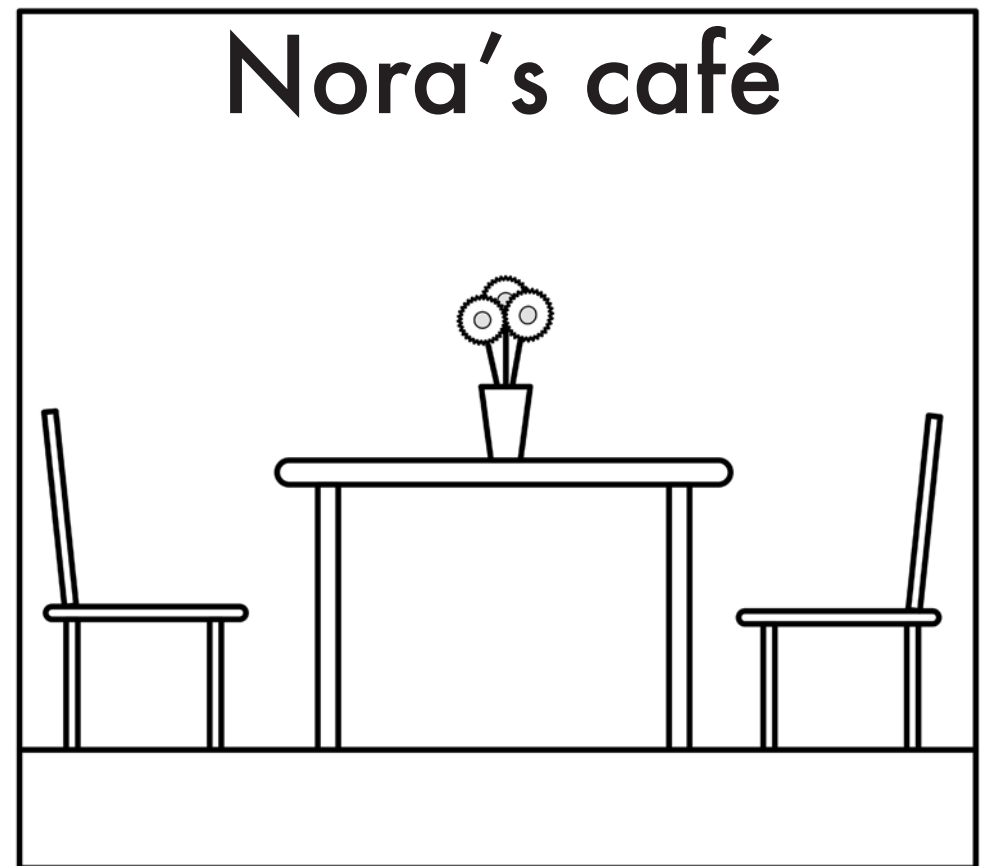
Messy hair

Ergo says "That woman is wrong.
Her hair is messy, I bet year long".

But we know folk can still be right,
Even if their hair's a sight.



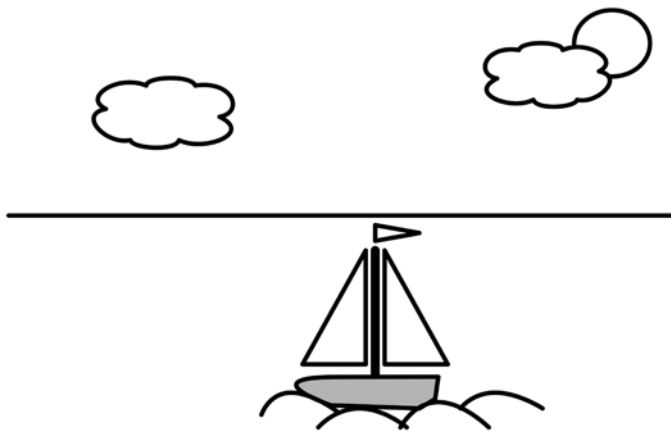
Draw the woman with messy hair in the café, with Ergo listening to what she says.



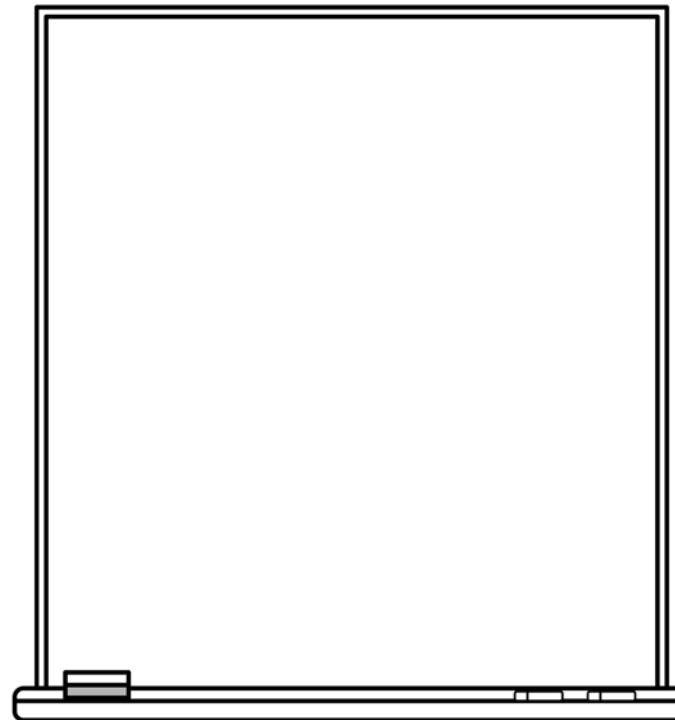
The Earth is flat!

They all chant that the Earth is flat
And Ergo wants to go with that.

But just because that's what they sing,
That doesn't make it the right thing.



Draw a flat Earth on the
whiteboard, then a round earth
with Ergo pointing to it.

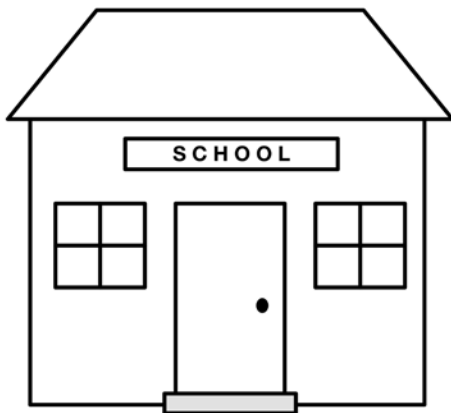


Forgotten friends

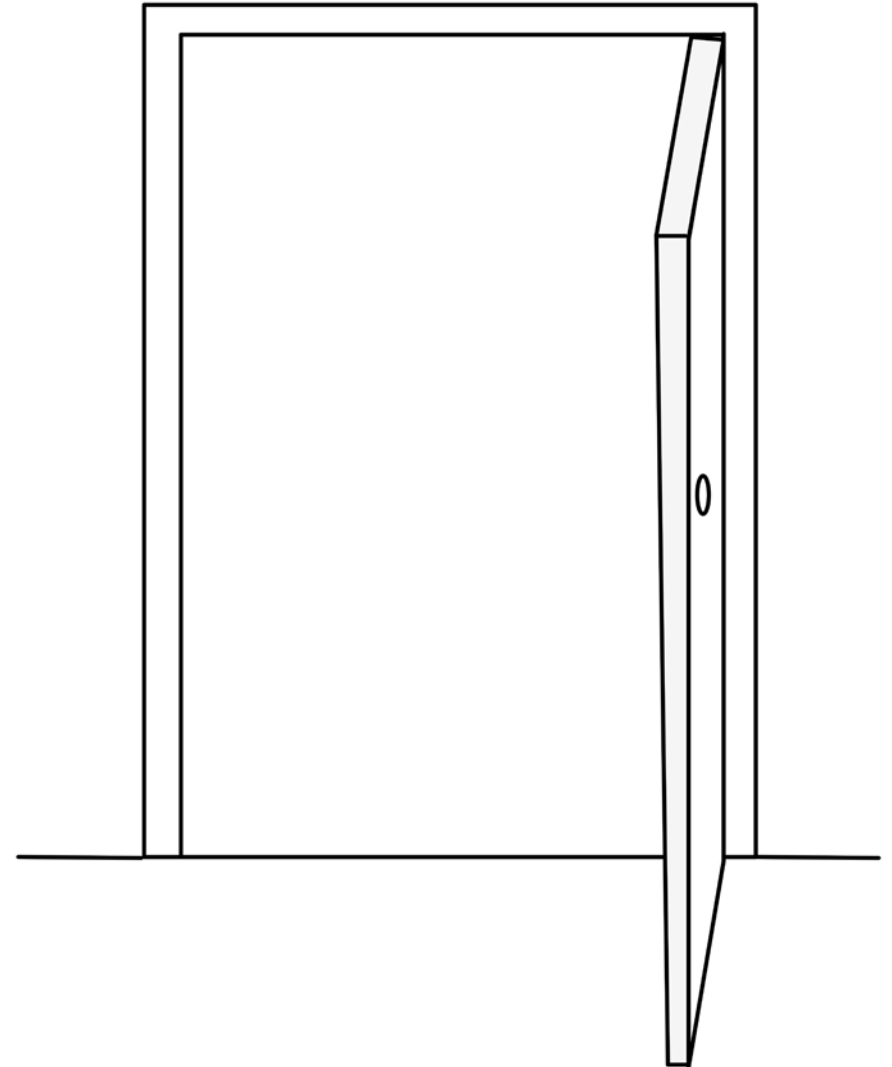
I've forgotten all my friends from school.

Each one and every, it's not cool.

Then Ergo asks "Remember me?
Classmate, yes? So, no, you see?"



Draw Ergo at school with books and pencils.



Short Notes for grown ups

This beginner's book, explores how to avoid muddled thinking. Computer Scientists use logic to help understand the world. This is a part of 'computational thinking' and it is all about thinking clearly. It will prepare your child to solve problems by helping them think in a clear, logical way and draw correct conclusions from the information available.

The seven poems, one a day for a week, will give your child an easy and fun introduction to common logical thinking mistakes or 'fallacies'. Each poem and related drawing activity shows, by example, one of the following common logical errors.

Contradiction

There are two statements about cats that do not make sense together as they contradict each other. Ergo has up to that point only seen grey cats so believes that all cats are grey. The second example shows that at least one black cat exists. The black cat means that Ergo's original belief about all cats cannot be true. Just because you have not seen an example of something does not mean it does not exist.

The Gambler's fallacy

Throwing a fair coin, which has not been tampered with, should always be 50/50 heads or tails. What happened before cannot affect the next toss. This is called being 'statistically independent'. Ergo should have known that the next toss was just as likely to be a head as a tail.

The Causal fallacy

A common mistake is to think there is a link between two things, when either there is actually no link at all, or the link works the other way round. Just because Ergo sees that umbrellas and rain happen together does not show which causes the other, if at all. Getting your umbrella out will not make it rain. It is the other way round: rain may make you get an umbrella out.

Two wrongs do not make a right

Ergo thinks that because some people do bad things, it means it is ok for everyone to do bad things. Grown-ups often use the proverb "Two wrongs don't make a right" to counter this. It does not make things better to do another wrong. This is called a 'fallacy of relevance'.

The Ad hominem fallacy

Ergo has decided to attack the woman rather than showing that her argument is wrong, but facts about what a speaker looks like have nothing to do with whether they are right or not. This is called the Ad hominem fallacy. Facts about a speaker might be used to understand a moral issue, but only if there is a direct link between the person's morals and what they are saying. If someone is known to lie then that might be used to help decide if they are lying now, for example.

Bandwagon fallacy

Ergo thinks that just because most people believe something, then that alone makes it true. This is also known as the 'Bandwagon fallacy' or Argumentum ad populum (Latin for "appeal to the people"). Sometimes the one lone voice claiming something else is true is actually right. You should ask for evidence rather than rely on what other people think.

Syllogisms

Syllogisms are classical logical statements that allow two facts to be joined to prove a third. Here, the person thinks he has, sadly, forgotten all those he went to school with. This is called the 'major premise'. Ergo then says he was a classmate at school. This is the 'minor premise'. If you combine these two premises then you can

correctly logically conclude from them using a Syllogism that the person does not know Ergo. However, the conclusion only follows if the statements are actually true. If they weren't actually at school together, or the person is mistaken and has not forgotten everyone, then the conclusion may not be true either. It is important to make sure basic facts are true before drawing conclusions from them.

Shakespeare used fallacies based on Syllogisms to make jokes:

Flavius: Have you forgot me, sir?

Timon: Why dost ask that? I have forgot all men;

Then, if thou grant'st thou'rt a man,
I have forgot thee.

(William Shakespeare, *Timon of Athens*, Act Four, scene 3)

Find lots more support and ideas for teaching computing at:

<http://teachinglondoncomputing.org/>



There is lots more Computing fun at
www.abitofcs4fn.org

... and lots more for teachers at
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