In group- Out group thinking

- In group favouritism
- Out group derogation
- Within group social influence
- Out group homogenisation
- Group polarisation

-Reduces insecurity and fear of the unknown

Henri Tajfel
Science

Boffins

Superhumanly clever

Sub-humanly robotic

Everything else

People

Normal
The Scientist In Group

- Reducing insecurity and fear of the unknown

• Nice to think you are superhumanly clever
• Many benefits to thinking you are entirely logical and rational
  - Science is the inexorable march to The Truth
  - Walk in a straight line to The Answer

• The unwashed masses will not understand
  - They are not superhumanly clever
  - They are totally irrational
Confusion between out-puts and process

This is a scientist

This is not science

\[ E = mc^2 \]
Science is a method of finding things out

- Make some observations
- Become curious/want to solve a problem
- Formulate a hypothesis
- Test the hypothesis
- Reject or fail to reject the hypothesis
- Come up with a new hypothesis and/or a new test.....
Science is a method of finding things out

• It is codified thought-marshalling

• Anyone can do it

• You do not have to be superhuman

You also don’t have to be a robot.....
Science requires creativity and imagination

- To come up with the best hypotheses and the best tests for them you need creativity and imagination
- Progress depends on being repeatedly wrong
- Success involves models of the world with ever-increasing explanatory and predictive power
- It does not involve “The Truth”
The Science-In-Group security blanket

- I am superhumanly clever
- I am on an inexorable march to The Truth
- I will definitely get to The Answer
- I am using pure rational logic
- No one else will understand my genius

What good science is really about

- I will be consistently and repeatedly wrong
- I am building models with explanatory and predictive power
- Anything could happen
- I am making stuff up which will then be proved wrong
- Discussions with all kinds of people will be useful, especially if they disagree with me
In group- Out group thinking

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BUT this is fundamentally anti-scientific...
-Engenders bias and closed mindedness
-It locks out challenge and creativity
The Scientist All Group

- I don’t need to be superhumanly clever
  - I am allowed, even supposed, to be wrong

- I don’t need to fight against my humanity
  - Creativity and imagination are essential
  - The models that emerge will have explanatory and predictive power

- Discussions with all kinds of people will help
Science

Boffins

Super-humanly clever

Sub-humanly robotic

Everything else

People

Normal
The Everyone else In Group
- Reducing insecurity and fear of the unknown

• I am not Einstein so I don’t have to engage with science
• Boffins are changing the world too fast and they seem to be wrong half the time
• I have no agency to make my life better
• I prefer to believe this nice person who thinks I am right
Anyone can do this....... 

- Make some observations
- Become curious/want to solve a problem
- Formulate a hypothesis
- Test the hypothesis
- Reject or refine the hypothesis
- Test the new hypothesis........
The Everything-else-In-Group security blanket

- I am not Einstein so I don’t have to engage with science
- Unreliable Boffins are changing the world too fast
- I have no agency to make my life better
- I prefer to believe this nice person who agrees with me

What’s possible

- Science is a method I use all the time
- Scientists are people too
- I have effective tools to tackle problems
- I will vote for Hilary Clinton

This is how science will save the world
The ABCs of Flower Development

An ideal flower has a typical structure. You can see it nicely in Arabidopsis thaliana (thale cress). The flower has 4 whorls, each with one set of a specific organ.

What organ appears in what whorl is controlled by the activity of specific gene families—called the A, B, and C genes. Their activity alone or in combination leads to specific organs being made.

If you imagine these gene activities in a spatial way— you can see how they give rise to the typical flower!

But most flowers look very different from this ideal flower: nature has amazing variety to accommodate many pollination strategies.

Build a standard ABC model out of legos. Build a flower that matches that pattern. Now take one of the genes away. What would your flower look like then?