

# Emotional Engineering

## The story of Robots vs Animals

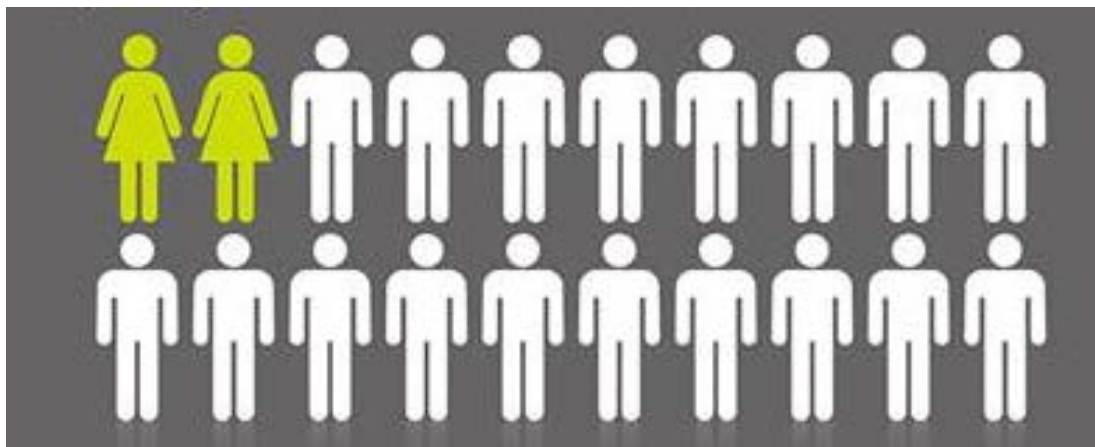
***Laura Fogg-Rogers @laurafoggroggers***

***Corra Boushel and Margarida Sardo***

<http://robotsvsanimals.net>



**6-8% of engineers in the UK are female  
(Engineering UK)**

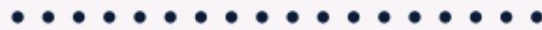


- Images:
- Eureka Magazine
  - WSP Group



# Britain is great at engineering

Engineering turnover has grown **2.2%** over the past four years to



Which of all



people are employed in engineering enterprises

Image:

- Engineering UK

## ...but we need many more engineers

Engineering companies are projected to need

**1.86 million people**

likely to need engineering skills from **2010-2020.**

That means we need to **double** the numbers of engineering related apprentices and graduates coming out of colleges and universities.



Why girls think being an engineer or a scientist isn't for them:

# Tomorrow's Engineers

62% of girls regard engineering as being 'more for men'

#TEweek13

To see what we're doing to make a difference, visit [bit.ly/GirlguidingTEW13](http://bit.ly/GirlguidingTEW13)

they would be put off by the working environment

22%

not enough female role models in the industry

60%

lack of knowledge of such jobs

43%

not many girls or women do these kinds of jobs

47%

sexism in the workplace

30%

Source: Girls' Attitudes Survey Statistics 2011 & 2012



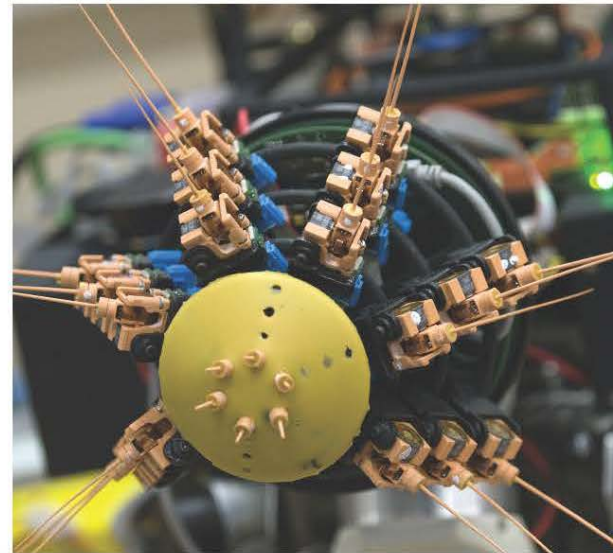
WE DISCOVER, WE GROW

Girlguiding

Registered charity number 306016



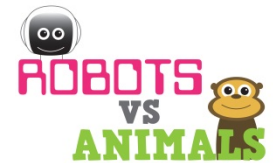
Over millennia of evolution, animals have developed senses way beyond human capabilities to adapt to their environment.



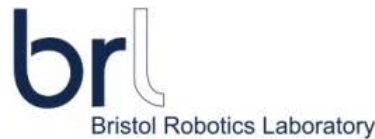
Now in the age of high-tech robotic engineering, the science of biomimetics seeks to copy and improve these skills to develop futuristic robots.

**But which are better, robots or animals?  
You decide!**

<http://robotsvsanimals.net>



<http://robotsvsanimals.net>



**Robots vs Animals is a creative collaboration between engineers and zoologists, exploring the ingenuity of both nature and humankind.**





# Biomimetic stories

Five stories about the special skills of animals, and the engineering design process taken to mimic them.



# Project aims



## Opportunities for engineers

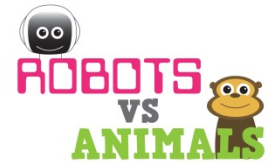
- Training
- Experience

- Opportunities for the public
  - Face-to-face encounters
  - Online materials



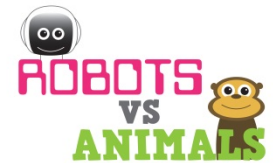


# Project methods



- Ten early career engineers
  - Contributing throughout year long project
- Training and support
  - Provided by a project coordinator and mentors – senior engineers with experience in public engagement
- Culture of public engagement
  - Opportunities presented throughout the year to generate a shared theme
  - Four further MSc students, and ten doctoral students also participating





# Opportunities

- **Co-leading Zoo sessions**
- **Plus optional: public events**

- ◆ Zoo family events
- ◆ Bristol Bright Night
- ◆ At Bristol “Meet the Experts”
- ◆ Festival of Nature 2014/2015
- ◆ Café Scientifique
- ◆ Pint of Science



- **Media + resources**

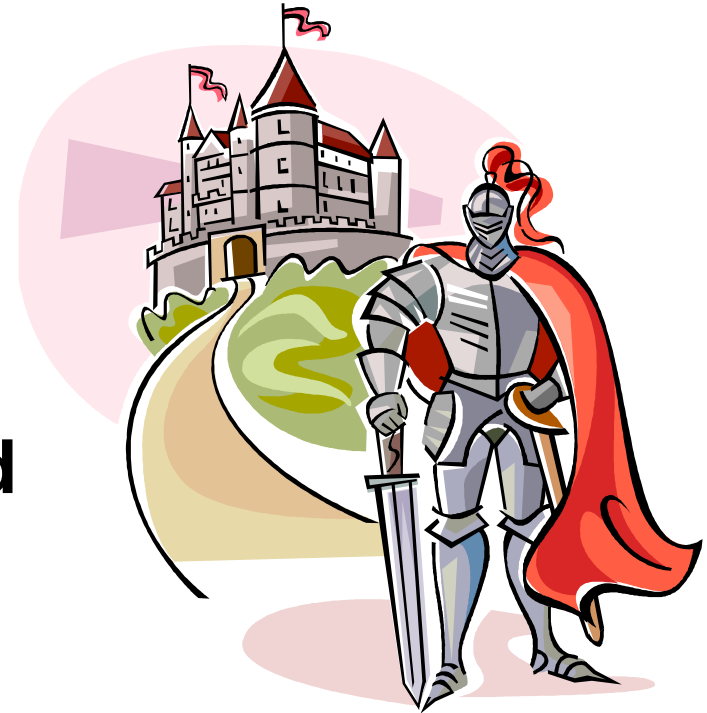
- ◆ SciComms MSc interviews
- ◆ At-Bristol Youtube videos
- ◆ Blog



# Storytelling training



Stories provide **relevance** and **context** to give us meaning



= Memory

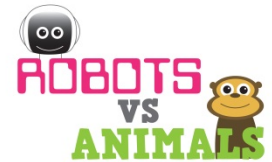


# Science Communication

**“The most contemporary view of learning is that people construct new knowledge and understanding within the *context* of they *already know* and *believe* and do it only when they can see how the new information is *relevant* to them.” Haven, 2007**



# Storytelling training



## Hook people in to research

### Emotions

Make people care about your research – surprise or conflict

### Characters

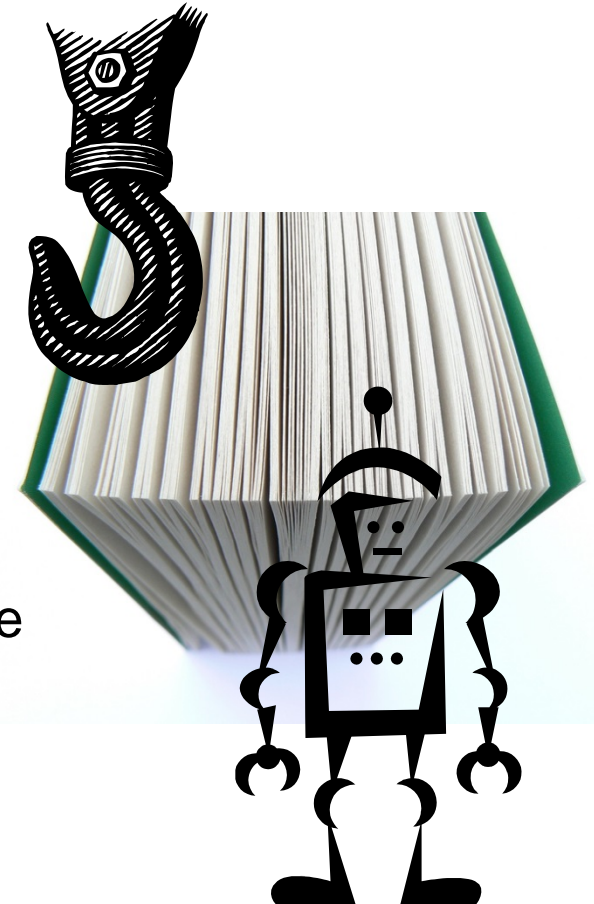
Relatable and relevant science and engineering

### Blending

Provide a bridge between what you know and what they know using a story structure or well-known topic

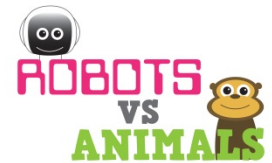
### Narrative

Keep it engaging and make ideas 'sticky'





# Results

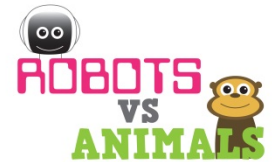


## Audiences





# Results



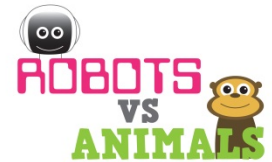
## Engineers – Communication skills

*I always struggle to really say what I want to say because of the extremely technical language that's been used among engineers. Having this training, it helped me to formulate what I want to say, it helped me to be able to formulate a sentence that has the wow factor. Female, 28 years old.*

*We had to present it in a way that it's easily accessible. So there had to be a narrative story, why is it done and what we're inspired by and things like that. It's quite difficult for engineers to communicate about their work but throughout the activities like that we learn how to do it. Female, 34 years old.*



# Results



## Engineers - Storytelling

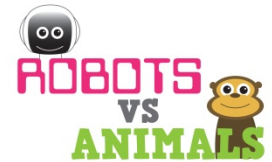
*I think it was very interesting [creating stories]. It might be easier for the public to grasp the concepts if it is told as a story. Female, 30 years old.*

*I think that's very good [narratives and storytelling]. It's essential to have a good picture, and storytelling's an excellent way of showing that, to show where motives have come from and maybe where they're going to, and how that can be of interest to the participants. Male, 34 years old.*





# Results



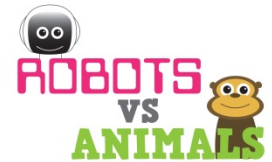
## Engineers – Women in Engineering

*They have probably changed the way they think [because women were delivering the activities]. Not just for children, but for everybody else doing it; they will see males talking about robots and now they think women talking about robots is normal; it's not gender specific. Female, 28 years old.*

*So in real life... we have both [men and women]. Not [to] be seen only as a woman that's something special, but just for them to see that it's also possible and there's no big deal about having a woman in research. Female, 30 years old.*



# Results



## Engineers – Women in Engineering

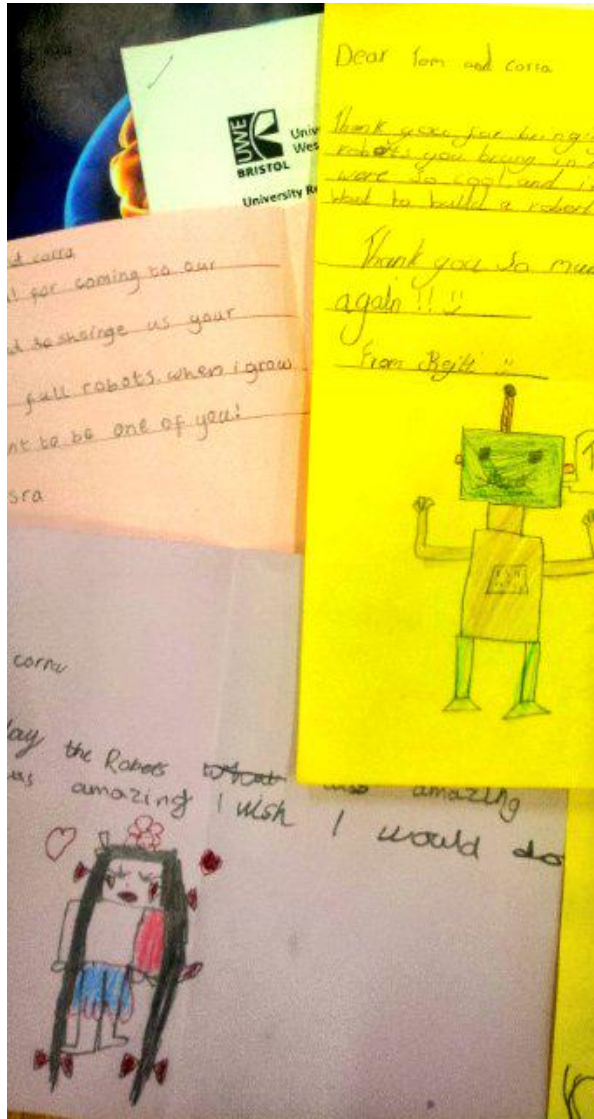
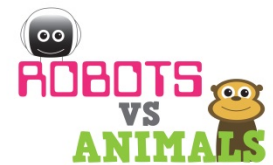
*We do need more women role models. Female, 28 years old.*

*I think it's just as important as for males. I think it's important everyone should do it [engagement]. It's a difficult question because when you have a small percentage of women taking engineering, it's not really fair to put the pressure on them and say, "Because you're a woman in engineering you should do this." That in itself is discrimination. Male, 34 years old.*

*I think equal distribution of outreach activities between women and men would be really nice. So if for example an outreach activity involves ten people the ideal would be like five woman and five men not nine men and one woman. Female, 22 years old.*




# Conclusion



## Competition winners announced

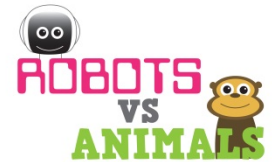
 MAY 29, 2015

 ROBOTSVSANIMALS

 LEAVE A COMMENT

We are delighted to announce the winners of our national schools competition. We set young people aged 6-18 the challenge: "What amazing animal ability would you use to design a robot?"

**Success = half the entries were from girls!**



# References

Braun, V. and Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3 (2). pp. 77-101. ISSN 1478-0887

Cunningham, C. M., Lachapelle, C. P., & Hertel, J. (2012). *Research and evaluation results for the Engineering is Elementary project: An executive summary of the first eight years*. Boston, MA: Museum of Science

France, B., Bray, B. & Fogg-Rogers, L. (Submitted). Organisational culture and its role in establishing a sustainable science communication platform. *International Journal of Science Education Part B*.

Haven, K. (2007). *Story Proof: The science behind the startling power of story*. Libraries Unlimited.

High Level Group on Science Education (2007) *Science Education Now. A renewed pedagogy for the future of Europe*. Brussels: EC.