

COGNITIVE SCIENCE

With Professor Andrew Perfors

Talking points

KNOWLEDGE & COMPREHENSION

1. What is cognitive science?
2. Why is a totally rational decision impossible?
3. Why are emotions typically useful for decision making? Why are they sometimes not useful?
4. Why does Andy use a mix of experimentation and modelling in his research?

APPLICATION

5. Think of a real-world example where you fell for misinformation. (We all have!) Why do you think you believed it? What made you stop believing it? Now think of a real-world example where misinformation has led to emotional responses in other people. How do you think this misinformation can be best addressed?
6. The article mentions one way that the advertising industry uses insights from cognitive science. Can you think of other ways that advertisements exploit our cognitive and emotional processes?

ANALYSIS

7. Why do machines not think like us? How do you think research such as Andy's will be used to make machines that think more like us?
8. In cognitive terms, why do you think that changing our mind about a held belief is often a difficult process? It is also commonly thought that we are less likely to change our beliefs as we grow older – what do you think could be the cognitive science explanation for this?

EVALUATION

9. Andy says that most psychological experiments have been undertaken on a small specific subset of the human population. Why do you think this is the case? To what extent are people from different backgrounds likely to have significantly different cognitive processes? What aspects of cognition do you think are most different across people: language, goals, attention, reasoning, emotions, values?
10. The philosophical principle of Occam's Razor states that when presented with opposing theories, when all else is equal, the one that needs the fewest assumptions is preferable. What do you think are the advantages and disadvantages of this approach when applied to the field of cognitive science?

Activity

Design a cognitive science experiment to address one of the following theories:

- When presented with two statements that are equally likely to be true, people are more likely to believe the simpler explanation.
- People are more likely to pass on information designed to provoke a fear response than an emotionally neutral statement.
- When presented with two opposing views, people are more likely to believe the one they hear first.

Think about:

- How can you make your research question as specific as possible?
- How will you ensure you are measuring the variable you intend to measure?
- How can you limit the effects of variables outside of your control? For instance, how can you limit the effect of differing preconceived beliefs?
- How representative are the people who are taking part in the experiment? To what extent can you assume that others would behave similarly?
- A common flaw of psychology experiments is that participants 'guess' what the researcher is investigating and play along, rather than giving genuine results. How can you prevent this?

After conducting your experiment, analyse your results. To what extent do they support your chosen theory?

What were the limitations of your study? If you were to do the study again with more resources at hand, what would you change? Consider:

- Sample size
- Participant demographics (e.g. age, sex, cultural background etc.)
- Confounding variables (influences you cannot control)
- Analysis techniques
- Researcher biases
- How do results differ from those of classmates investigating similar theories? Do you think this is due to flaws in experimental design or something else?

Andy uses models to support his experimental design and results. How would a model have helped you?

More resources

- You can learn more about Andy's experience, see his papers, access a range of other resources, and read his personal blog: perfors.net

- This TED-Ed video explains some of the reasons why people fall for misinformation: www.youtube.com/watch?v=hz6GULbowAk
- This article from the Institution of Engineering and Technology takes a deep dive into how the field of AI is learning from cognitive science to simulate human ways of thinking: ietresearch.onlinelibrary.wiley.com/doi/full/10.1049/ccs.2019.0022