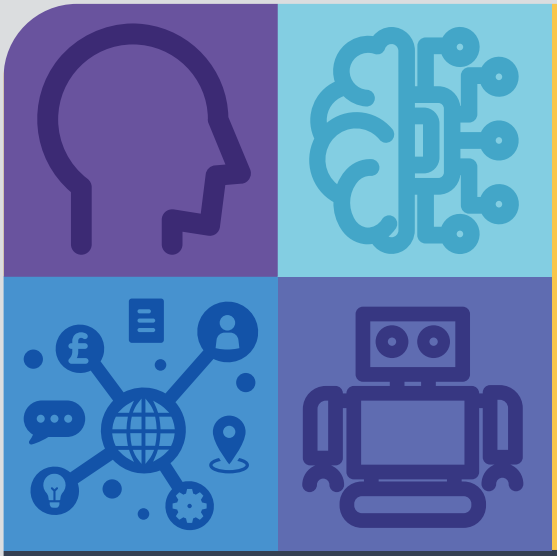


Thinking Science

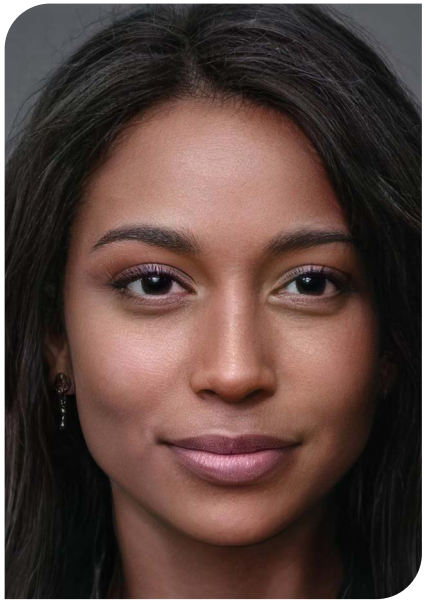
Information Technology and People

www.bristol.ac.uk/thinkingscience

University of BRISTOL

We created AI and data
but now they are changing us and how we live

- Artificial Intelligence (AI) can play games, recognise faces, translate languages and much more.
- AI makes important decisions previously made by humans, for example, whether to approve someone for a bank loan, or whether someone has a medical condition.
- AI learns from huge amounts of information that humans provide through their online behaviour. This information is used in big data systems.
- We already interact with AI and big data systems every day, for example, *recommender systems* make personalised suggestions of videos on YouTube and decide which items to present on social media. Soon people will start interacting with AI controlled robots that have access to lots of data about them.
- We rarely stop to consider these systems but they are radically changing the world and how we behave and think.



How to use

You can work through the topics in order or pick and choose individual topics, questions or activities. Each topic includes an activity that will help build students' understanding, followed by a set of philosophical facilitation questions for students to discuss. Some topics also feature short starter activities to prepare students for the main activity.

You can choose to do all the sections in a topic or select sections.

There is also a section that invites students to deliberate about rules to govern our future with technology. If you have done three or more of the topics, your students will be able to complete this section. We invite you to share your responses with us via email.

At the end of the resource, there is also a glossary.

For more information about our work and other resources, visit our website: **www.bristol.ac.uk/thinkingscience**

We invite you to share your responses with us via email: **thinking-science@bristol.ac.uk**

Starters should take 5-10 minutes and activities 10 – 15 minutes. If you choose to do all the sections in a topic, it should take between 20 mins – 1 hour, depending on how many of the questions you choose to discuss.

Look out for this icon for ideas on how to facilitate activities.

Curriculum links

- KS3 and KS4 Citizenship
- KS3 & 4 and KS5 PSHE: Living in the Wider World – Media; Literacy and Digital Resilience

You may also like to use these resources in non-curriculum time such as tutor time or assemblies.

Contents

The Self Online

- The online and offline ‘you’
- Choices
- Image and media

Artificial Intelligence

- Kinds of intelligence
- Recommender systems
- AI decision-making

The Grid

- You and your data
- Advertising
- News and politics

Robots

- ‘Caring’ robots
- Robot decisions
- Gendering and personifying robots

Governing our future with technology

Glossary

The Self Online

The online and offline 'you'

Choices

Image and media

Most people interact with others online through social media. This communication with others is mediated by AI systems. New kinds of language are evolving online. Communication face to face and online are different.

Social media has been designed to get and keep our attention, and it can even be addictive. Other technologies can also be designed to hold our attention for as long as possible, or to persuade us how to act or what choices to make.

The online and offline 'you'

Activity

Make a list of five features that are important to who you are *online*.

Discuss why you think those features are important.

Make a list of five features that are important to who you are *offline*.

Discuss why you think those features are important.

Compare the lists.

Questions

- What replaces posture, body language and eye contact on social media?
- What new ways of communicating have evolved in the online world, and in what ways are they positive or negative?
- Are there things you would say online but not face to face, and if so, why?
- Does it matter if we have different standards of behaviour online and offline?

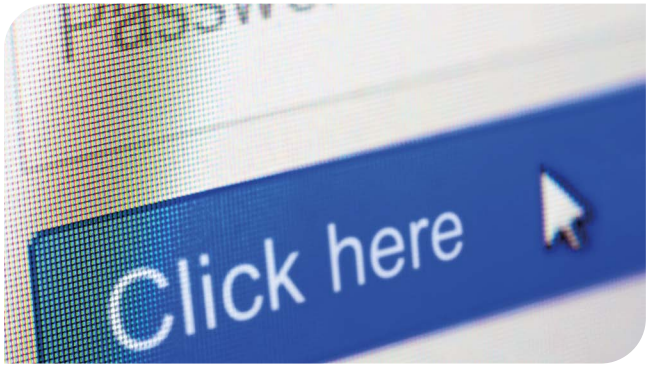
Choices 1/2

Starter

Should the following decisions be made slowly or quickly, or does it not matter? Why?

- Whether to watch a film
- Where to go on holiday
- Whether to buy a pair of trainers
- What to have for dinner
- Whether to check a social media account
- Whether to vote for a particular political party
- Whether to support an environmental campaign

How do online systems get people to make choices quickly?



Take a poll for each example and record the results. You could return to the social media example after completing the activity and questions in this topic to see if students have changed their mind.

Choices 2/2

Activity

Tobacco was once freely advertised and there were very few restrictions on who could buy cigarettes. Now we recognise that smoking is harmful to our health, young people are not allowed to buy cigarettes and tobacco companies are restricted in advertising and packaging their products.

“Social media companies say they are giving users what they want. The same can be said about tobacco companies.”

Is this a fair comparison?

Questions

- If someone persuades you to do something, are you choosing it freely?
- What makes someone a social media addict?
- If you don’t want to keep using social media, but you do keep using it, are you free in that choice?
- Is your freedom of choice different online compared to offline?

For the activity, get students to debate in pairs, with one student arguing for, the other against.

You can then get them to swap positions, seeing if they can come up with new arguments that their partner had not thought of. Finally, ask students what they personally think.

Image and media

Starter

Do you aspire to be, or have you ever aspired to be, a social media influencer?

Ask students to vote yes or no in answer to this question.

Activity

What would the world be like with no social media?

List as many differences as you can think of.

Questions

- Do you change your actions and behaviour because you plan to share photos of what you are doing online? If so, how and why?
- Social media influencers are people who earn money from their online content through advertising. What effect do you think they have on other people using social media?
- Social media companies have a lot of power to choose which people and accounts get attention. Should social media companies have that power?
- How is being popular online similar and different to being popular offline?

Artificial Intelligence

Kinds of intelligence

Recommender systems

AI decision-making

AI systems are sometimes used to make decisions that were made by humans, for example, whether to approve someone for a bank loan, or whether someone has a medical condition. AIs can recognise faces and play complex games, as well or better than human beings. There are some things they can do that we cannot do. For example, they can process huge amounts of data about us. However, there are also some things that we can do, for example, empathise, that they cannot.

There are many kinds of AI that are very different from each other in how they work and how they interact with us. To understand AI we must understand the different kinds of intelligence we and other creatures have.

The most common way most people interact with an AI is through a recommender system. Recommender systems are the AIs that choose what to offer you to watch, listen to or buy, based on information about you and people with similar online profiles to you stored on the grid. Recommender systems are designed with a specific goal – for example to keep the user's attention for as long as possible, or to get them to buy something. Many AI systems including recommender systems are designed to persuade us in one way or another.

Kinds of intelligence

Starter

With the help of an interpreter, you are talking with a native speaker of another language. You discover that the word ‘intelligence’ has no direct translation in their language. **How do you explain the word ‘intelligence’ to them?**

Activity

Sort the following things according to how intelligent they are.

- Rock
- Bird
- Submarine
- Computer
- Baby human
- Swarm of bees
- Robot

Get students to share their responses and discuss whether the examples have different types of intelligence.

Questions

- Does something need to be alive in order to be intelligent? Why or why not?
- Are there kinds of intelligence that you cannot have if you do not have feelings?
- What kinds of intelligence are there?
- A company has designed human-looking robots that imitate human behaviour. Should we treat them as intelligent?

Recommender systems 1/2

Recommender systems are designed with a goal, for example, to keep us watching videos. Recommender systems can be designed to maximise many different things, but often the goal is engaging the user in ways that will make them more likely to watch more advertisements.

Starter

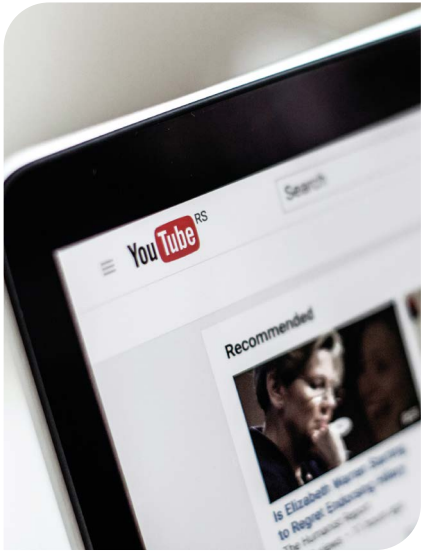
Click here to listen to the clip

Read the following transcript extract.

> *When you watch a cat video then the recommendation engine can say, oh, you watched a cat video so we're going to give you – another cat video, and then another cat video. And then another cat video – more of the same, more of the same, more of the same. At the time I was really worried about wasting human potential. If you could go on all of YouTube, but then the thing that's going to keep you watching the most is cats, is it the right thing to do to give you, again, cats on cats on cats?*

Guillaume Chaslot, former Google and YouTube engineer.

Should YouTube keep recommending more cats?



Recommender systems 2/2

Activity

Find a short funny cat video on YouTube and show it to students.

1. **What videos might be recommended to someone who has just watched this video?**
2. **Which of the examples of videos you have listed would encourage people to click more often and which videos would keep them watching for longer in total?**

Share this quote from Guillaume Chaslot with students:

> "So initially, when YouTube started, what was best was clicks. Like, the more people clicked on videos, the better they thought it was... then they switched their measure to total watch time."

Under the shift to 'the more watch time the better system', YouTube's watch time went up by 50 percent.

Questions

- Why do you think YouTube would want to maximise watch time?
- What might the effect of the two different strategies, 'the more clicks the better' or 'the more watch time the better', be on us?
- Do technology companies and their customers want the same thing?
- Do recommender systems have the power to change what you do?
- Do recommender systems have the power to change what you believe?

AI decision-making 1/2

Starter

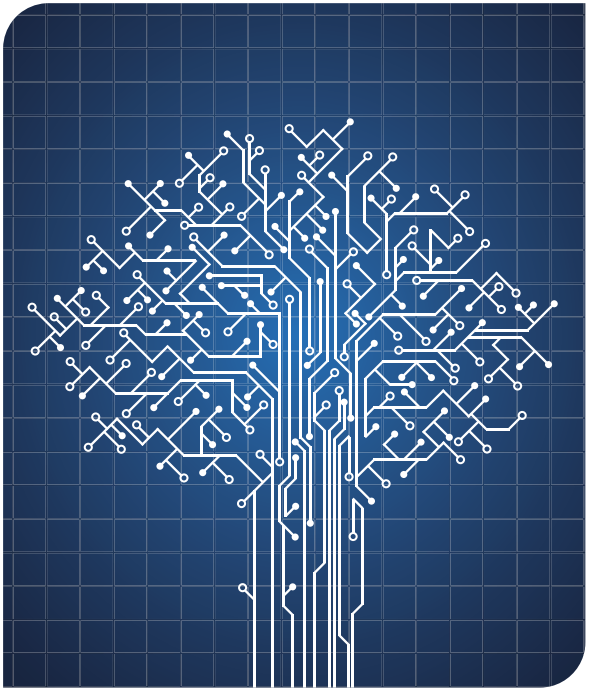
Imagine a ‘perfect decision maker’. Make a list of all the features this person would have, and then select the three most important.

Activity

Here are examples of decisions that AI systems already make, or could make in the future.
For each case, do you think it would be better for an AI or a human to make the decision?

- Deciding whether someone who is near the end of their prison sentence is likely to reoffend (and so whether they should be allowed out of prison).
- Diagnosing a patient with an illness.
- Predicting exam grades for A Level students.
- Deciding whether someone is approved for a bank loan.
- Deciding whether to select someone for a job interview.
- Deciding how expensive car insurance should be for someone.

AI decision-making 2/2



Questions

- What – if anything – can a human bring to a decision, that an AI cannot?
- What – if anything – can an AI bring to a decision, that a human cannot?
- What might the impact be on society if the kinds of decisions above were all made by AI systems?
- The way AI systems make decisions is based on them learning from vast amounts of data. Who is responsible for a decision made by an AI – the AI system, the people who designed it, the company who owns the AI, or someone else?
- What could it mean for an AI to be ethical?

The Grid

You and your data

Advertising

News and politics

Data is collected and stored about people all the time. For example, every day most search-engines record all the searches made on them throughout the world. People's activity on entertainment and social media sites and their online purchases are also recorded. This data is collected from the electronic devices people use, such as smart phones, tablets, 'intelligent personal assistants', smartwatches and laptops.

The grid is the network that links all this data together by connecting all the electronic devices that are on the internet. The information stored on the grid determines the content we see online, for example, you may see adverts online that are targeted at you based on your recent search history. Almost all the money from entertainment and social media sites comes from advertising. The news articles and political content you see online may also be targeted for you based on your previous online behaviour.

You and your data 1/2

Starter

Make a list of your normal online activity over the course of a day (consider internet searches, watching/ listening to online content, social media activity). Think about all the different kinds of data that might be gathered and stored about you.

Activity

Compare the following examples. For each example (online and offline):

1. Is any information being obtained by the data grid? **2. If so, what information is being gathered?**

Online	Offline
Watching an advert online	Watching an advert on a non-smart TV
Listening to music through a streaming service	Listening to a CD
Checking the weather forecast on an app	Reading the weather forecast in a newspaper
Using an online dictionary	Using a paper dictionary
Using a sat nav	Using a paper map
Paying for bus ticket with an electronic bus pass	Paying for bus ticket with cash

You and your data 2/2

Questions

- What do you think the data obtained from our online activities is used for?
- Who should have control over the data that is obtained from our online activities?
- When the grid gathers data about your actions, what, if anything, does it learn about you?
- If you don't like the fact that information is being gathered about your activities online, you could choose to use the offline alternative. Is this a fair choice?
- Why is it easier to persuade someone you know a lot about?

Advertising 1/2

Starter

Imagine you work in advertising. You have been tasked with advertising running trainers and you can choose how and where to advertise them.

Discuss the following questions:

Where might you want to advertise them online?

Who might you try and target?

How could you work out if you are targeting the right people?

What data would be useful?

For the activity on the following page, you could split your class in two and get half to act as advertisers, the other half as regulators. If you have more time, ask the whole class to act as advertisers and then as regulators.

Get students to debate in role and then get them to come out of role to discuss their own viewpoint.

Advertising 2/2

Activity

Step into the role of advertisers and regulators. Regulators make sure that advertisements follow certain rules, for example they cannot make false claims about their products and they must not cause harm or offence. **From the perspective of your role (advertiser or regulator) do you think the following scenarios are acceptable? Why or why not?**

- Placing adverts for trainers in a running magazine.
- Targeting adverts for trainers at people who have recently used a search engine to look for trainers.
- Targeting adverts for trainers at people who have recently used a search engine to look at weight loss programmes.
- Targeting magazine articles about diets for running at people who have watched videos on anorexia.
- Changing which sports and health news different people see on social media depending on the things they have 'liked'.

Questions

- How are targeted adverts better for users than non-targeted adverts? How are they worse?
- Should we trust targeted news articles more or less than non-targeted news articles?
- Are there problems with people being targeted with news articles based on the news articles they have previously read?
- What should the rules be about advertising on social media?

News and politics 1/2

Activity

Political messages, like other forms of advertising, target particular groups of people in different ways. Advertising can be highly targeted, taking into account the many different groups that a person might fall under, for example, their age, what TV programmes they watch, and the area of the country that they live in.

1. List as many different groups (other than the examples given above) that people might fall under as you can.
2. Do you fit into any of these groups? If so, which?
3. Can people be understood by their different groups? Should they be?

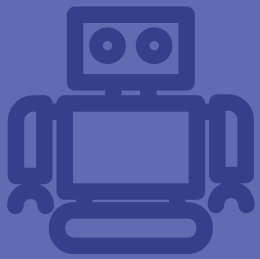
Are you happy to receive political advertising that is targeted according to the demographics you fall under?

News and politics 2/2

Questions

- If news articles are targeted at us will we be better or less well-informed?
- If a political advert is targeted, should it have to state that it is targeted?
- Political parties may change their message depending on what kind of people are receiving the message. Should politicians be allowed to use targeted adverts in this way?
- Does it matter if people see many more political adverts for some parties than for others?
- Are political ideas and voting habits like products to be sold?

Give students a few minutes to write their personal responses to these questions before discussing.



Robots

‘Caring’ robots

Robot decisions

Gendering and personifying robots

Robots will soon be part of everyday life, and some will have AIs linked to the data grid built into them.

Robots are being designed to imitate humans. They may be able to use facial expressions and language to persuade us how to act and what to believe.

There are already robots that are designed to act like soldiers and decide who or what to target on a battlefield and robots that are designed to act like human carers for the elderly or infirm.

‘Caring’ robots 1/2

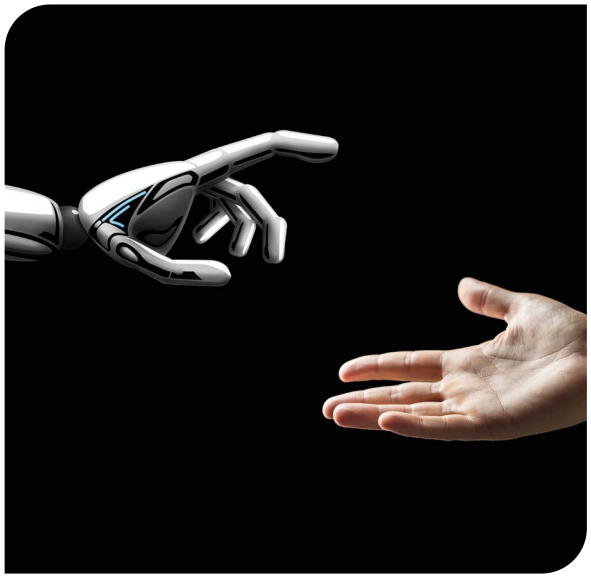
Starter

When we experience emotions, we have accompanying bodily changes. For example, when we are hungry, our tummies might rumble and we may feel irritable. When we are angry, our heart rate may increase and our body may release the hormone adrenaline.

1. What are the bodily expressions (if any) of the states listed below?

2. Can a robot have any of the states listed below?

- hunger
- tiredness
- jealousy
- outrage
- love
- wonder
- calculation
- joy
- amusement
- concentration
- stress



‘Caring’ robots 2/2

Activity

Recently, robots have started being trialled as caregivers in care homes, carrying out many tasks that human care workers do. **Which of the following tasks would you be happy for a robot to carry out for you (if you needed that care)?**

- Dispensing medication
- Delivering a meal to your table
- Lifting you in and out of the bath
- Having conversations with you
- Feeding you
- Telling you who is ringing when your phone rings

Questions

- When a recorded voice, a smart speaker or a robot says something like, “I’m sorry, I don’t understand” does it mean the same thing as when a human says it?
- Who is responsible for the consequences of the decisions an AI makes – the AI, the designer of the AI, the company who owns the AI, or someone else?
- Can a robot care about someone?
- Can a robot care for someone if it cannot care about them?

Robot decisions

Activity

Certain decisions could one day be made by robots. For example, autonomous vehicles may use robotics and AI to make decisions about what to do in a crash situation. Human drivers sometimes react poorly, whereas the reaction of an autonomous vehicle will depend on how it has been designed.

Discuss the pros and cons of giving over decision making to robots in the following situations:

- Autonomous vehicles driving across a city
- Security robot at a shop deciding if someone might be shoplifting
- Soldier robot deciding who is the enemy and who is an innocent bystander

Could a robot decide what 'innocent' means?

Questions

- Can an AI do anything by accident?
- Who is responsible for the consequences of the decisions an AI makes – the AI, the designer of the AI, the company who owns the AI, or someone else?
- How would you feel using an autonomous vehicle that was programmed to sacrifice its passengers to save a greater number of other people?
- When we answer CAPTCHA tests to prove we're not a robot, selecting images with common road and street objects such as traffic lights, we are often helping train AI. Why do you think this is

Gendering and personifying robots

Starter

Make a list of technologies that use voices. Identify which have a female voice and which have a male voice.

Activity

Imagine you are working for a technology company, designing the following robot technologies. **What type of robot might you choose for each and why?** Consider the qualities you might want the robot to appear to have, for example, assertiveness, ability to intimidate, friendliness, kindness, subservience and consider the perceived gender and age of the robots that you might choose.

- Security robot
- Personal assistant robot
- Robot with care giving responsibilities
- Soldier robot
- Housekeeper robot
- Personal trainer robot

Questions

- Why do you think different genders and voices are given to different technologies?
- What impact could pretending that robots are female or male have on gender stereotypes for humans?
- Should we be polite to a robot, even if it does not have feelings that we can hurt? Does being polite to robots falsely personify them?
- Does it matter if most of the computer scientists working on AI robots are men?

Governing our future with technology

Applying learning from previous sections, students here have an opportunity to share their thinking about how intelligent technologies *should* work and what our future with these technologies could be.

Governing our future with technology

Activity

Applying learning from previous sections, students here have an opportunity to share their thinking about how intelligent technologies should work and what our future with these technologies could be.

1. Discuss in small groups what our shared future with technology could be and what the opportunities and risks might be, for people, planet and profit. Then, for each risk, think about what rules could be put in place to help reduce that risk and ensure that technology does good and not harm. As a group, discuss and write down some of the opportunities, risks and rules in this table:

2. Share what each group has written with the whole class. Focusing on the rules, are there any common themes? Work together as a class to distil the rules from each group down to five rules.

   If you had to choose just one rule, which would be the most important? Hold a class vote.

3. Share your five class rules (and the one your class thinks is most important) with the University of Bristol Thinking Science team at **thinking-science@bristol.ac.uk**.

Impact of technology on:	Opportunities	Risks	Rules
People			
Planet			
Profit			

Glossary

Artificial Intelligence (AI) - Like animals and people, machines can now learn (see 'intelligence' and 'machine learning' below). Machines that can learn are called 'artificial intelligence' or AI.

Data – Data is information of any kind in any form. The amount of data now held in computers is vast.

Grid - 'The Grid' is the network that collects and integrates data from computers, payment machines, phones, tablets and many other devices.

Intelligence – There is no general agreement about how to define intelligence but usually, intelligence is associated with learning. Old-fashioned chess computers are very good at chess, but they never get any better; they do not learn.

Machine learning - Machine learning is the process of machines learning from data. An example of machine learning is machines being programmed to recognise when two images are of the same human face. This can be done by training the machines with a very large collection of images, the machine classifying them and then being corrected on its errors.

Recommender system - A recommender system is a software system that chooses what to offer you to watch, listen to or buy. For example, when you use a video streaming service, a recommender system will work out what videos to offer you to watch. It does this based on information about what you and other people who have similar online profiles to you have watched in the past.

Robotics/ robots – Robots are machines that can work autonomously to perform complex physical tasks.

Social media – Social media are IT systems for exchanging ideas and information in social networks.

Acknowledgements

These resources were created by:

Ellie Hart and **Professor James Ladyman** (Centre for Science and Philosophy, University of Bristol) with **Louisa Aldridge** (Cabot Learning Federation), **Grace Lockrobin** (Thinking Space) and **Marta Halina** (Leverhulme Centre for the Future of Intelligence).

Special thanks to **Ellie Cripps** (Public Engagement, University of Bristol) for her advice and support in the development of these resources.

Special thanks to **Nello Cristianini**. These resources draw upon 'An Analysis of the Interaction Between Intelligent Software Agents and Human Users', by Christopher Burr, Nello Cristianini, and James Ladyman.