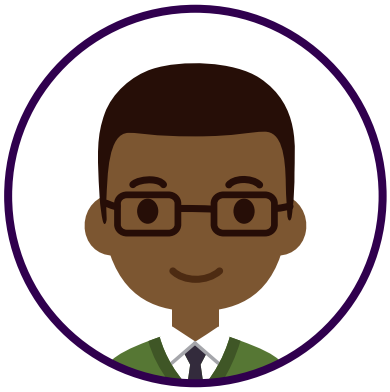
Debate



Simon Adeyemi – Phone developer

The people I work with spend our time trying to make people's lives better, with technology. Our customers want voice-activated technology. It's so much easier and more natural to give voice commands than to read a menu and click or type. We need to learn to navigate menus, but speaking is how we communicate in real life! Spoken human language started developing at least 100,000 years ago - possibly 2 million years ago, but for most of human history, most people couldn't read or write.

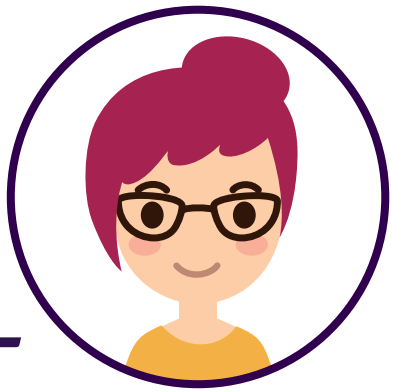
Fact: 1 in 5 adults in the UK can't read or write well.

Issue: If a microphone isn't always-on, then your device can't be voice-activated. You have to manually switch it on.

Question: Why stop developing technology that works with how our brains work?

I'm a Scientist Get me out of here

Debate



Alberta Feynman – Security consultant

I advise people on keeping their data and money safe. I think microphones that are always on are a terrible idea. How much do you trust the people who made the device? They say it's only listening sometimes, but what's to stop it recording all the time? And what happens to that data once they've got it? The recording gets sent to a web server to be interpreted, and anything that is sent to servers can be intercepted or hacked.

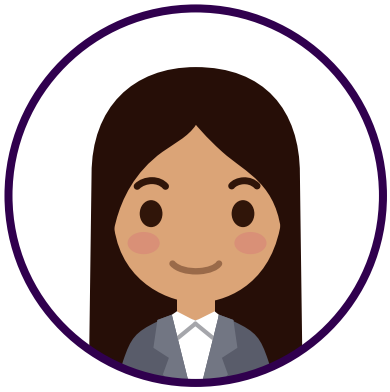
Fact: Payday loan company Wonga had a data breach in 2017 where 250,000 people's financial information was leaked.

Issue: The things you might say when your phone is near can reveal your thoughts, who you're 'talking to', your habits, when you go on holiday and your house is empty...

Question: Have you ever said anything that you wouldn't want some people to know you've said?

I'm a Scientist Get me out of here

Debate



Min Liang – Privacy campaigner

Research shows that people are bad at making privacy decisions. Probably because it's hard to understand the long-term consequences. I think privacy is a 'public good', not just an individual right. If workers can't talk privately about the company they work for, then they can't organise for workers' rights. If citizens can't criticise the government privately, then we don't have freedom. I think we need to protect our democracy with laws that protect people's privacy.

Fact: Current law allows 48 UK authorities to access a record of websites you have visited in the last year. They do not need a warrant for this information.

Issue: If people don't need a warrant, they may abuse their right to access your information.

Question: The law protects people by making drugs illegal, and drink-driving, and lots of other things. Shouldn't the law protect privacy too?

I'm a Scientist Get me out of here

Debate

Jake Beecham – Year 10 student

My parents are really strict. When they gave me a new phone for my birthday, they insisted I had a tracker app on it. What I didn't know was that it also recorded me some of the time! They misunderstood a joke I had with my mates and were convinced we'd done loads of stuff we hadn't. I got grounded for three months. It's not nice to realise you've been spied on, and it's not right that my mates were recorded just because they were near my phone.

Fact: The UN convention on the rights of the child says that children have a right to privacy.

Issue: I didn't know I was being listened to, but I was.

Question: Why can't this technology be more honest? Why isn't there a red light that tells you when the microphone is recording you?

I'm a Scientist Get me out of here

Debate

Aarni Nylund – Grandmother

I'm 83 and I can't learn new things as easily as I used to. I have arthritis in my hands and my eyes are failing. When my husband died I became quite isolated, but getting a voice-activated smartphone has changed my life. I can keep in touch with my family in Finland, I can shop on the internet, I even play scrabble with my grandchildren. I'm no longer alone.

Fact: 11% of people over 75 have a visual impairment. And 16% struggle with co-ordination or fiddly tasks.

Issue: If I can just turn on my phone by talking to it, I'm liberated. I can't manage to switch it on and enable the microphone by hand.

Question: Why should my freedom be taken away because of your fears of things that might not happen?

I'm a Scientist Get me out of here

Debate

Helen Ade – Taxi driver

I'm driving for 45 hours a week, often on busy roads, in rush hour, or on fast dual carriageways. The voice assistant on my phone has its microphone on all the time, so that when I talk to it, it hears and can 'wake up' and follow my instructions. I can turn on the satnav, get directions to new addresses, or warnings of accidents and traffic news. I can also change the music, check my calendar, or text my husband to say I'm running late, all without risking an accident. It's a godsend!

Fact: Between 2006 and 2010, mobile phone use contributed to 1,690 road accidents where people were injured. 110 of these accidents were fatal.

Issue: Voice-activated devices are much easier and safer to use in any situation when you can't easily look at a screen or use your hands.

Question: Why ban a technology with so many benefits, just because of possible privacy issues? Why not just make it secure instead?

I'm a Scientist Get me out of here

Debate

Wesley Grady – Technology enthusiast

I love modern technology. Today we can look up anything by just speaking into a device, talk to people on the other side of the world, and cure all sorts of diseases with modern medicine. There are fantastic things online like Facebook and Google, provided for FREE, so anyone can use them. I'm totally happy that I give up a bit of my privacy, so that providers can gather data about me and make money from advertisers. I even like having targeted adverts, at least it's ads for things I might want to buy.

Fact: In 2016, Facebook made £20 billion in advertising, and spent about £6 billion on research and development.

Issue: Free things still have to be paid for somehow.

Question: How would all these great things online be paid for, if they don't make money from advertising?

I'm a Scientist Get me out of here

Debate

Rory Travers – Former shopaholic

I kept spending money I didn't have, and ended up in a lot of debt. I know it was my own fault. But the constant advertising we are surrounded by doesn't help. Adverts tell you you'll be happy if only you have this thing they are advertising. I wasn't happy, but I wanted to be. If your phone is always listening, they could show you ads for exactly what you've just been talking about. Social networks say they don't do that at the moment. But I'm pretty sure they will one day. I don't want to be manipulated any more.

Fact: It's estimated that we are exposed to about 3,500 adverts every day.

Issue: If advertising didn't get people to buy things, companies wouldn't spend so much money on it.

Question: Do you think social networks have your best interests at heart? Or do they just want to make money off you?

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The Royal Institution Science Lives Here

Lloyd's Register Foundation

Kit No. 10

Science Debate Kit: Privacy

For more activities and debate kits in this series go to debate.imascientist.org.uk

Debate Kit: Privacy

Should mobile phones be always listening?

A structured practice debate on a controversial topic.
The different 'rounds' of the debate help students think through the issues and reconsider their opinions.
The structure also shows them how to build a discussion and back up their opinions with facts.

You can use all eight characters, or fewer, as you wish.

The minimum is the four essential characters **(in bold)**, this gives two for and two against.

Characters

Yes – Mobile phones should be always listening	No – Mobile phones should not be always listening
• **Simon Adeyemi – Phone developer**	• **Jake Beecham – Year 10 student**
• **Aarni Nylund – Grandmother**	• **Alberta Feynman – Security consultant**
• Helen Ade – Taxi driver	• Min Liang – Privacy campaigner
• Wesley Grady – Technology enthusiast	• Rory Travers – Former shopaholic

Facilitation tips

- Ensure pupils know there is no right or wrong answer.
- Be observant of ones who want to speak and are not getting a chance.
- Encourage students to give a reason for their opinions.

KS4: Designed for KS4 but can be used with ages 11-18.

For groups who may need extra support you can put the following prompt sentences upon the board:
"I think we should/ shouldn't have phones always listening because..."
"I think …… is the most important point to think about."

Learning notes

Learning objectives:

- To practise discussing and debating issues and expressing an opinion.
- Understand the economic, social and ethical issues around advancing technology and data processing.
- Develop scientific literacy by asking and answering questions.

Other learning outcomes:

- Consider economic, social and ethical issues in an integrated way.
- Think about different points of view.
- Learn to back up opinions with facts.
- Write a 6-mark exam-style evaluation.

Curriculum points covered:

Working scientifically

- Appreciate the power and limitations of science and consider ethical issues which may arise.
- Explain everyday and technological applications of science.
- Evaluate associated personal, social, economic implications.
- Make decisions based on the evaluation of evidence and arguments.
- Evaluate risks in the wider societal context, including perception of risk.

Teacher Notes

Question: Should mobile phones be always listening?

Lesson plan

The different 'rounds' of the debate help students think through the issues and reconsider their opinions. The structure also shows them how to build a discussion and back up their opinions with facts.

Go to debate.imascientist.org.uk/privacy-resources for a PowerPoint to guide your debate lesson and additional resources to support the debate. Please also share your class thoughts throughout the debate using this site.

Starter: 5 minutes
Think, pair, share - Is privacy important to you? What do people want to keep private and why? Who do you want to keep things private from?

Extension - Is something private if it's written in a paper diary? Told to one person? Sent in an text or DM? Posted on Facebook?

KS4: Designed for KS4 but can be used with ages 11-18.

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Main Activity: 35 minutes
1) Split students into groups – one group for each character you want to use.
2) Give out the character cards – one per group, and give them a few minutes to read them over.
3) Get one student in each group to read out their first section to the rest of the class.
What are the class's initial thoughts? Is there one position they identify with or reject?
4) Take turns to read the fact to the class. *Does it change the way they think?*
5) Read the issue. *Any different feelings?*
6) Each group asks their question to the character of their choice.

Plenary: 10 minutes
Vote for which position they agree with most (if there is one). Why? Which arguments were the most persuasive?
Don't forget to share your class thoughts with us at debate.imascientist.org.uk/privacy-resources

Extension or homework activities:
1) **Develop exam-technique** - Write an exam-style answer to "Evaluate the use of phones having 'always-on' microphones." [6 marks] A model answer should include a range of points for and against and their opinion to conclude. *When making comparisons, encourage students to use linking words like 'however', 'whereas' and 'but'. For younger students, a list of pros and cons may be more appropriate.*
2) **Poster competition** - Pick a side! Design a poster to either warn about the issues surrounding privacy or to inform people about the benefits this technology can bring.
3) **Create a new character** - Include a **name**, a **summary** of who they are and their position, a **fact**, an **issue** and a **question**. This character could share your views or be totally made up. *Support students by discussing other issues that came up in the debate and who might feel strongly about this technology as part of a plenary.*

Note – Pupils can stay in roles all the way through debate, or only for the first round if you prefer. If it's all the way through, give them a chance to express their own opinion at the end and in the plenary.

For groups who are not confident at class discussion, it might help to have them start by discussing the question and/or their character's position in pairs, and then compare notes in groups. They've then had a chance to rehearse some of what they want to say before having to do it in front of the whole class.

Background notes for teachers

Teenagers and privacy
Adults have moral panics about young people's social media usage; concerns about sexting, extreme content, online bullying. Are kids addicted to their smartphones? Are they being groomed by paedophiles? Research by American media researcher danah boyd suggests that teenagers are actually fairly savvy about privacy settings and conscious about what they share online. They just aren't concerned about the same things adults are concerned about. They want privacy from their parents and teachers – the people who have authority over them – and are less concerned about privacy from governments and corporations.

Voice-activated technology
Voice-controlled "intelligent assistants" like Apple's Siri, Google Assistant, and Amazon's Alexa are becoming more common. They depend on computers being able to do two kinds of process - **speech recognition** (the ability to take an audio recording and work out what words were said), and **natural language processing** (the ability to make sense of those words, and work out from them what the user wants the assistant to do). Both of these things are complex tasks for the human brain, and we have been evolving to do exactly that for hundreds of thousands of years. It's only quite recently that computers have been able to do these two things well. Developments in machine learning technology and huge advances in computer processing power have made them possible.

There are many benefits to voice-activated technology. It's very easy for the user. We don't have to learn where to find something in the menus. We don't even need to learn to type. We just talk, in a fairly natural way, and the device does all the work. Toddlers can use them. Technophobes can use them. People with mobility issues or visual impairment can use them. People whose hands or eyes are busy on another task can use them.

Some technologists predict that eventually, voice-activated technology will become the main way we interact with devices. We are really at the start of that process now, and it's impossible to predict how fast this technology will develop.

Voice-activated devices contain a processor in the device, and an 'always-on' microphone, which is simply listening for its 'wake word'. After the 'wake word', the device starts sending data to other computers (those belonging to Apple, Google, Amazon etc.) which is where it's processed. According to the developers, although the device is always

listening, you aren't always being eavesdropped on. We spoke to a technologist who tested Amazon's Echo Dot in a laboratory and confirmed that it only started sending data after its wake word. However, if the microphone is always on, it's possible that could change in the future, or that the technology could be hacked by third parties.

How is audio different to other kinds of input to devices?

Many things can be revealed without audio eavesdropping. Most websites you visit will save 'cookies' on your computer, and many of these are then accessed by third parties (e.g. advertisers). Cookies help to 'follow us around' online, so advertisers and others know where we've been and what we've done. Facebook and Google, for example, use these to show you targeted advertising, based on what you've been doing online.

An audio recording could include private conversations, reveal holiday plans, political views, sensitive financial or security information. The way you sound when saying something can reveal your mental state, in ways that typing into a search box doesn't. Even without spoken language, audio may reveal where you are, when you sleep, when your house is empty and could be burgled without interruption, and what TV programmes you are watching. By comparing audio from different devices, it's possible to work out who is in the same room with you.

Corporations and public authorities have access to some of your data already. And there are many examples of this kind of data being leaked. Journalist Quinn Norton has suggested that over time, all data ends up either deleted, or made public. The only way to be absolutely certain something will remain private is never to record or share it.

Other resources:
Go to debate.imascientist.org.uk/privacy-resources

All facts in this kit have been researched.
References can be found online at debate.imascientist.org.uk/privacy-resources

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