Science Media Centre
where science meets the headlines

communicating uncertainty in a soundbite

a guide for scientists

This guide offers some effective ways for scientists to talk about uncertainty in a brief news interview. It covers the big questions:

- Why is science uncertain?
- Why do scientists disagree?
- Why don't scientists always have the answer?
- Why do scientists change their minds?
- Why can scientific studies appear to contradict each other?

The content of this guide was compiled by a working group of scientists, press officers and journalists.

This guide forms part of the Science Media Centre's *How Science Works* series designed to encourage scientists to use the opportunities provided by a news interview to communicate more about the process of science.

Other guides available from the SMC include; *Communicating Risk in a Soundbite, When Animal Research Hits the Headlines,* and *Peer Review in a Nutshell.*

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‘Science moves from observation to observation and you get scientific progress. There is no end point.’

‘Doing science is like trying to bake a cake without a recipe; you keep trying things and eventually find a way that works.’

‘Science is a leap from not understanding how something works to having a view about how something works. This is very rarely achieved in one step so people try out lots of different things until it works.’

‘Science is rarely about absolute certainties. It is a process of assessing evidence and coming to the best conclusions that we can.’

Why is science uncertain?

‘It is the nature of scientists to disagree with each other – that’s how science moves on.’

‘We often advance by picking holes in someone else’s work.’

‘Scientists meet and discuss what they think and then disagree and debate. And that is how they find the next step forwards.’

‘Disagreement happens in science. There are lots of bubbling disagreements at the edges that eventually deposit something of a general consensus into the middle.’

‘Scientists may differ over the evidence when it is limited, but as more facts accumulate, it is likely that there will be less disagreement.’

‘Scientists agree about most things – otherwise we wouldn’t be able to teach science in school. It’s mainly at the cutting edge where there’s disagreement.’

“Our disputes and uncertainties are an essential part of the concept of science, and are not an indication of disagreements between individuals.”

Sir Colin L Berry, Emeritus Professor of Pathology, Queen Mary, University of London

"We continue from era to era of growing understanding, always with uncertainty at the leading edge."

Sir John Sulston, Nobel Prize-Winner

Why don't you have the answer?

'Scientists don't know everything. If they did, there would be no need for any more science.'

'Science works in shades of grey, not black and white.'

'Science doesn't always have the answer – we're scientists, not politicians.'

'The truth isn't set in stone which is why we carry on asking questions.'

'We shouldn't try to make everything simple but give people the credit for understanding the bigger picture. The public can understand uncertainties.'

'To the best of our knowledge right now, this is the right thing to do. But this is not going to be right for everybody all of the time – further research is necessary.'

'I would... (e.g. eat GM maize, give my baby the MMR jab). I'm not certain, but I'm certain enough.'

'I can't say this is absolutely certain because science cannot give absolutes, but based on the huge body of evidence supporting this, I am 99.9% certain...'

'We live in a society that seeks certainty however it is not always possible for science to provide this. This research is a valid step towards greater certainty...'

'Science is always working to find the answer – we now understand much more about... (e.g. HIV/AIDS, vCJD/BSE, SARS).'

Why do scientists change their mind?

'Science moves in gradual steps towards certainty, accumulating evidence. This may involve what looks like a change of mind along the way.'

'If I wasn't prepared to change my mind in the light of compelling new evidence, I wouldn't be a good scientist.'

'Huge changes in scientific opinion do not happen all the time, but sometimes new evidence does cause us to change our minds. This is usually a gradual process although it may appear to happen suddenly to those outside science.'

'The hallmark of a bad scientist is they don't challenge their knowledge or entertain the possibility that it may be wrong – uncertainty is a sign of good science.'

"Scientific knowledge grows through a never-ending quest for a better understanding, providing us with more certainties in some areas, and more uncertainties in others."

Lord Bob May,
ex-President of the Royal Society

What happens if a small study is published which contradicts the mass of evidence?

'It is important to let your listeners know that the vast majority of scientists think X, a small minority think Y.'

'Some scientists think that eating apples will give you cancer but the vast majority of scientists think it won't.'

'A study of 2 million children in Sweden suggests that there is no link between eating crisps and intelligence. A study of 15 children in Paris suggests there is a link.'

'When you have a huge body of convincing evidence, you would need something equally huge to successfully challenge that and change your conclusions.'

'This is initial research, a small study which shows us where more work needs to be done in the future, but at the moment we can't draw any wider conclusions.'

'The whole question 'is GM safe?' cannot be answered by any single experiment. Specific studies can answer specific parts of that question but alone cannot answer the whole question.'

"Science is about uncertainty. We do not yet know the answers to most of the important questions – nature is smarter than we are. But if we are patient, and not in too much of a hurry, then science gives us a good way to find the answers."

Freeman Dyson, Emeritus Professor of Physics, Institute for Advanced Study, Princeton

The Science Media Centre is an independent venture working to promote the voices, stories and views of the scientific community to the news media when science is in the headlines. If you would like to find out more please visit:

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"The scientist has a lot of experience with ignorance and doubt and uncertainty, and this experience is of very great importance, I think. When a scientist doesn't know the answer to a problem, he is ignorant. When he has a hunch as to what the result is, he is uncertain. And when he is pretty darned sure of what the result is going to be, he is in some doubt. We have found it of paramount importance that in order to progress we must recognise the ignorance and leave room for doubt. Scientific Knowledge is a body of statements of varying degrees of certainty – some most unsure, some nearly sure, none absolutely certain"

Richard Feynman