THE UNCERTAINTY HANDBOOK

A PRACTICAL GUIDE FOR CLIMATE CHANGE COMMUNICATORS

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About COIN

COIN is a non-partisan Oxford-based charity and Europe's leading climate change communication specialists, with 10 years of experience widening and broadening public engagement with climate change

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THE UNCERTAINTY HANDBOOK is the second in a series of handbooks on the topic of climate change led by Stephan Lewandowsky, and follows publication of The Debunking Handbook in 2011 (http://sks.to/debunk).

The content of this handbook was informed by interviews with 11 stakeholders who work in the science-policy arena. Anonymised quotes from these interviews are included throughout the handbook.

This handbook was vetted and reviewed prior to publication by five leading experts in risk research and two climate communications practitioners. We are grateful for their comments which have improved the final product.

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Should you move to a new city? Change job? Raise a child?

Uncertainties are everywhere, yet crucial personal decisions are still made

Organisations routinely trade in the currency of uncertainty. Investment decisions are taken based on imperfect knowledge; risks are managed every minute of every day. And just like in any area of complex science, uncertainty is a feature of climate change that will never go away.

Uncertainty is not an enemy of climate science that must be conquered — it is a stimulus that drives research forward. The fact that we have imperfect knowledge about climate change should only increase our motivation for taking preventative action against uncertain risks

But unlike in economic forecasts (which are widely accepted despite sometimes proving inaccurate), or medical diagnoses (which everyone accepts contain an element of chance), uncertainty has become an argument for discrediting and doubting climate science, and for delaying policy responses.

UNCERTAINTY

Friend of science and enemy of inaction

For the public, uncertainty is a significant barrier to engaging more readily with climate change. For policy-makers, the focus on uncertainty can obscure the important messages underneath. And too often, climate scientists find themselves apologising for what they don't know, rather than confidently communicating what they do know.

Partly, this is because political players who are opposed to societal action on climate change (so-called 'Merchants of Doubt'[1]) have intentionally manufactured distrust around the science of climate change, exaggerating areas of uncertainty while down playing areas of strong consensus and agreement.

But even without such distorting influence, the communication of uncertainty is still a formidable challenge.

If you have ever struggled with the communication of uncertainty, then this handbook is for you. It distils the most important research findings and expert advice into a few pages of practical, easy-to-apply techniques providing scientists, policy-makers and campaigners with the tools they need to communicate more effectively around climate change

What are the actual implications of scientific uncertainty about climate change?

Although public debate often cites uncertainty as a reason to delay policy action, the reality is very different: several recent scientific papers have shown that greater scientific uncertainty provides a greater, rather than lesser, impetus for climate mitigation.[2] That is, if we were less certain than we are about what will happen to the climate in the future, then we should try even harder to deal with the problem. The physics and mathematics of the climate system thus point in the opposite direction from people's intuitions.

This handbook offers some strategies for closing the gap between people's intuitions and the scientific implications of uncertainty in the climate change debate

1. Manage your audience's expectations

If uncertainty is not particular to climate change, why has it proved so problematic? One reason is that people find the uncertainty generated by 'conflicting messages' difficult to deal with.[3] When people hear politicians contradicting each other on climate change, or when newspapers offer a 'false balance' between scientists and sceptical voices, people tend to doubt the credibility of what they're hearing. Different people reading the same conflicting information may reach different conclusions.[4]

Science is often presented by the media as a series of definite facts and figures: either 'unprotected exposure to UV rays causes skin cancer' or it doesn't. But in reality, scientists work with probabilities (so the truth is that unprotected exposure to UV rays makes skin cancer more likely).

In schools, science is taught as a series of 'answers' rather than as a method for asking questions about the world. And as a consequence, people seem to have different expectations about uncertainty in science, relative to 'everyday' situations where uncertainty is seen as a given.[5]

One study found emphasising that 'science is a debate' as opposed to 'science is a fixed body of facts' influenced people's motivation to act on uncertain messages.[6] Participants who understood that 'science is a debate' were less likely to dismiss messages containing uncertain information. So uncertainty will not always undermine the effectiveness of science communication, as long as it fits the audience's understanding of how science works.

> "People make decisions based on uncertainty all the time. You make the best decision you can with the information you have. And climate scientists have a lot of information to base a decision on." *

How might people react to an 'uncertain' climate change message?

A report by the UCL Policy Commission on Communicating Climate Science suggests the following likely responses:[7]

'Surely after all that effort and expenditure you could do better than that?'

'Why aren't you telling me what you really know?'

'Let's wait until the science is settled.'

Allowing for these expectations — and anticipating how people might react — is an important skill for communicators. When communicating about the more uncertain areas of climate change practitioners should be sure to:

- Use plenty of analogies from 'everyday life' so people can see that uncertainties are everywhere
- Emphasise that science is an ongoing debate, and just because scientists don't know everything about a subject, they do know *something.* We know that the climate is changing, and that delaying our response to this increases the risks

* Stakeholder quote

2. Start with what you know, not what you don't know

It may seem obvious, but it is crucial to start with what you do know, not what you don't

Scientists should be honest about the uncertainties in their work, but too often communicators give the caveats before the take-home message. On many fundamental questions — such as 'are humans causing climate change?' and 'will we cause unprecedented changes to our climate if we don't reduce the amount of carbon that we burn?'— the science is effectively settled. Communicators should not shy away from stating that clearly.

Of course, on other important questions — for example, whether climate change will make hurricanes more common — the science is not settled. But uncertainty at the frontiers of science should not prevent focusing on the 'knowns', in order to establish a common understanding with your audience.

If you can, trial or test your messages first to see how they are received. There is no substitute for audience research when it comes to constructing successful climate messages, and using language that resonates with the people you want to engage

"Many people are put off by climate change and particularly the uncertainty aspect ...so maybe emphasise what we do know first." *

"There is a fine balance to be struck between being clear that uncertainty is a factor but stressing that this doesn't necessarily undermine what we are certain of... what we do know." *

* Stakeholder quote

3. Be clear about the scientific consensus

All of the world's national science academies agree that humans are causing climate change, and that this will have serious negative impacts unless action is taken to prevent it. 97% of climate scientists and virtually all of the world's climate science literature endorse the idea that humans are causing climate change.[8]

But most people don't realise how much consensus there is among scientists.[9] Having a clear and consistent message about the scientific consensus is important because some research suggests it is a 'gateway belief' that affects whether people see climate change as a problem that requires an urgent societal response.[10]

The best method for communicating the scientific consensus is to:

- Use a graphic such as a pie chart to visually enhance the message[11]
- Use a 'messenger' who is trustworthy to communicate the consensus
- Try and find the closest match between the values of your audience and those of the messenger (see Section 6)

4. Shift from ‘uncertainty’ to ‘risk’

Most people are used to dealing with the idea of ‘risk’. It is the language of the insurance, health and national security sectors.[12] So for many audiences — politicians, business leaders, or the military — talking about the risks of climate change is likely to be more effective than talking about the uncertainties.

The more that the risks of climate change can be brought to life through vivid ‘mental models’, the better. This means using clear practical examples of the risk of a village flooding, or a farmer’s crops being destroyed, or a coastal building slipping into the ocean.

Shifting from an ‘uncertainty’ to a ‘risk’ framing also makes it easier for people to weigh up the costs and benefits of inaction, rather than getting stuck in the perception that knowledge is still imperfect.[13] Familiar, everyday examples of risk management offer useful comparisons and analogies, as shown by the quote below, drawn from a study of how businesses think about climate risk:

“If people don’t see it impacting on their daily lives it’s very difficult to communicate risk and uncertainty.” *

DO say	DON’T say
“The risk of our town flooding, disrupting our businesses and schools, is now higher than ever before because of climate change.”	“Although there is a great deal that is unknown about how local services will be affected, climate change is likely to cause more flooding in the future.”

“Climate change has been caused by man-made activities, that’s [a scientific consensus] in excess of 90 per cent. When was the last time you made a business decision with that degree of certainty? So I think you’re foolish if you’re not starting to take action around [that].” [14]

5. Be clear what type of uncertainty you are talking about

A common strategy of people who reject the scientific consensus is to intentionally confuse and conflate different types of uncertainty.[15] So, it's critical to be clear what type of uncertainty you're talking about

Cause of climate change

DO say

"Scientists are as certain about the link between human behaviour and climate change as they are about the link between smoking and lung cancer."

DON'T say

"Although we can never be 100% certain of anything, it is highly likely that changes in our climate are due to an anthropogenic influence."

Climate impacts

DO say

"As the Earth warms there is more moisture in the air, which increases the chances of intense rainfall. So this flood is consistent with what scientists have long been predicting."

DON'T say

"No single weather event can be attributed to climate change."

Climate policies

DO say

"We know how much more carbon we can burn if we want to limit the risks of climate change. Most of the world's remaining coal, oil and gas must remain in the ground. How to achieve this is a matter of political debate."

DON'T say

"Science can never tell us which climate policy is best."

6. Understand what is driving people's views about climate change

When a subject is politically charged — like the genetic modification of crops, or the uptake of certain vaccinations — people filter the scientific facts according to their own political views.[16] Climate change is a highly 'polarised' issue in many countries around the world, and so the same facts can be understood very differently by people with different political perspectives.

In fact, there is a consistent relationship between 'conservative' political views (i.e., to the right of centre) and doubt about the reality or seriousness of climate change.

Uncertainty about climate change is higher among people with right-leaning political values

But a growing body of research points to ways of communicating about climate change that do not threaten conservative belief systems, or which use language that better resonates with the values of the centre-right.[17] Risk-aversion, pragmatism, security, and a desire to 'conserve' natural beauty are key features of conservative ideologies, and so may offer a more constructive way of discussing climate change uncertainties for this audience.

Conservative narratives for embedding uncertain messages about climate change

The following narratives are recommended by COIN in their 2012 report, *A new conversation with the centre-right about climate change: Values, frames and narratives*.[18]

Putting the 'conserve' into conservatism

Conservatives tend to value the aesthetic beauty of nature. Use this as a way of anchoring a wider conversation about climate risks.

"The landscape and countryside of our country is something we should all be proud of, and work together to protect. Over the years, we have cleaned up our rivers, banished smog from our cities, and protected our forests. Climate change poses new dangers to the countryside we value so much: more frequent and extreme flooding, disruption to seasonal changes, and the wildlife which depends on them. Our cities too will become congested and polluted without a shift to clean energy. So the only responsible course of action is to reduce the risks we face from climate change."

Climate policies may seem to threaten the 'status quo', which is a key centre-right concern. But climate impacts are more of a threat.

Being responsible and risk-averse is something most centre-right citizens are likely to endorse.

A safe, secure and healthy future

Many people are proud of the industrial revolution and all it has achieved. Rather than demonise it, recognise it – and the new opportunities offered by renewables.

"During the industrial revolution we built our countries using our natural resources — coal, oil and gas — and we led the world into a new, prosperous era. But we are also rich in the natural resources that will meet the challenges of the 21st century: clean technologies that won't damage our health or spoil our environment. To keep the lights on, we must make ourselves more resilient: our future security rests on renewable energy sources that will never run out, and will provide safe, secure, long-term jobs and opportunities for engineers, labourers, technicians, scientists and tradespeople."

Resilience and security are core centre-right values.

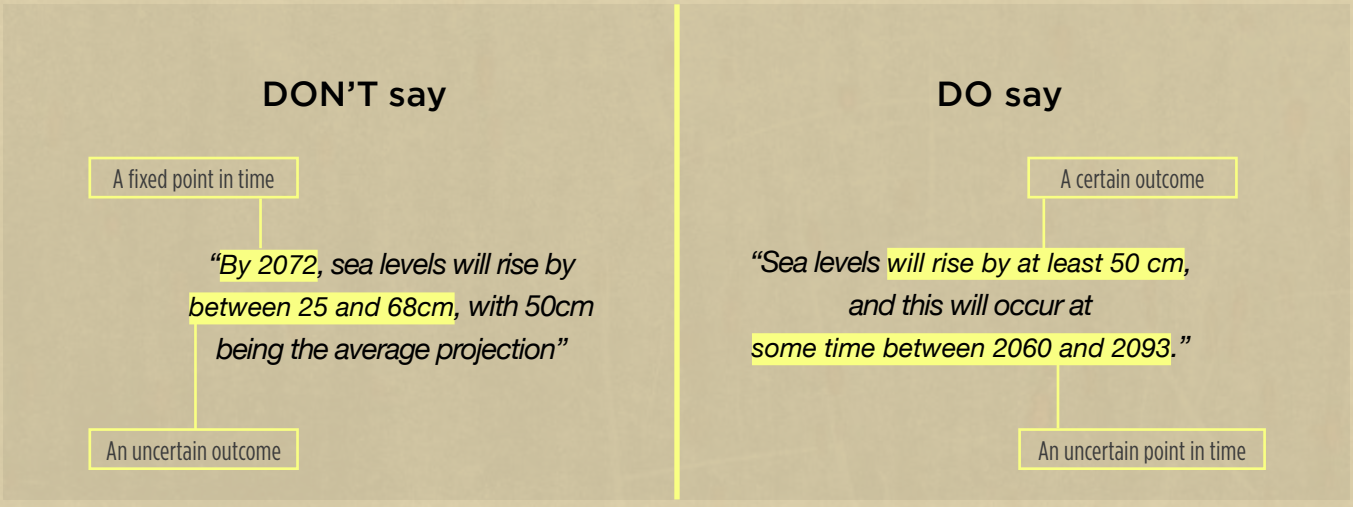
7. The most important question for climate impacts is ‘when’, not ‘if’

If you are told that there is a 70% chance of something terrible happening, it is comforting to focus on the 30% chance that it won’t. The further into the future potential risks and hazards are the easier they are to ‘discount’ or ignore. Climate change is a notoriously ‘distant’ risk for most people — not here, and not now. And the uncertainty inherent in climate predictions opens the door to wishful thinking about how dangerous climate change really is.[19, 20, 21,22]

> “Having examples of recent flooding, which people have experienced, has made talking about risk with local communities much easier because it’s not a matter of ‘if’ but ‘when’ and how can we prepare.” *

Climate change predictions are usually communicated using a standard ‘uncertain outcome’ format.

But flip the statement around — using an ‘uncertain time’ framing — and suddenly it is clear that the question is *when* not *if* sea levels will rise by 50cm.



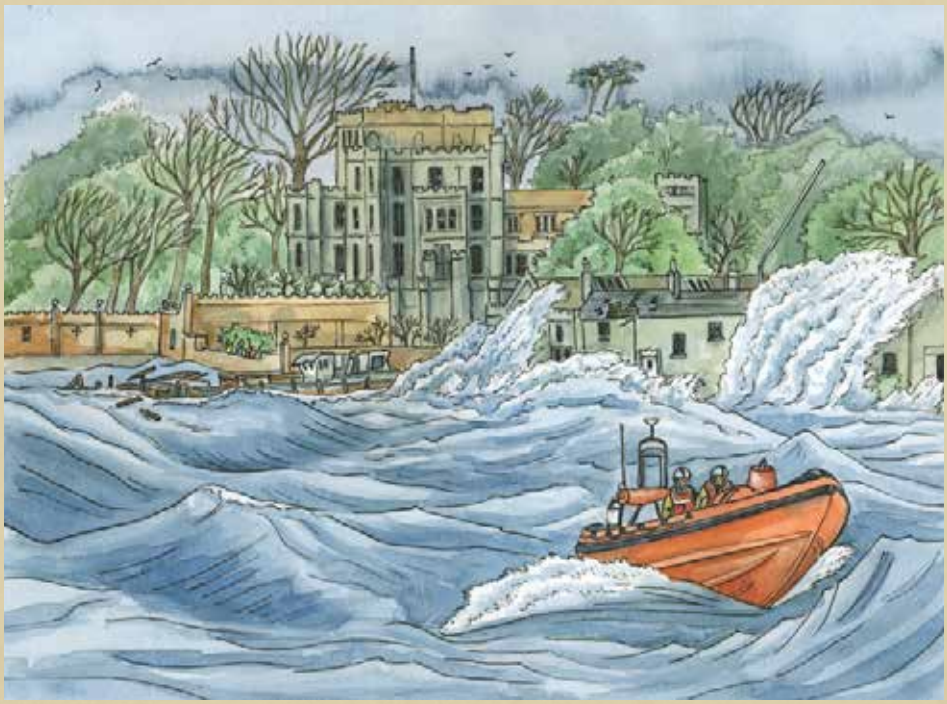
This simple switch in the framing of the uncertain information was found to increase support for government action on climate change in a recent study.[23]And the focus on ‘certain’ events also helps to bridge the psychological distance between climate change and people’s everyday lives — making it seem more tangible, less abstract, and more relevant.

* Stakeholder quote

8. Communicate through images and stories

Every 4-5 years the Intergovernmental Panel on Climate Change (IPCC) releases an assessment report summarising thousands of scientific papers compiled by hundreds of leading scientists. The reports contain a commensurate number of probability statements that show scientists' level of certainty and confidence on different aspects of climate science. This statement taken from the 2007 4th Assessment Report would be a typical example:

'Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations'



An artist's impression of projected storm surges affecting visitor access to national heritage infrastructure on the seafront, Brownsea Quay Island. The result of future scenario workshops with the public exploring challenges and opportunities around coastal erosion in the UK. Part of Living with a Changing Coast (LiCCo), an EU-funded project led by the UK's Environment Agency. Illustrator Maria Burns.

But while the IPCC reports are an essential means of quantifying scientific uncertainty, a series of studies have found that the people severely underestimate the meaning of some probability statements (e.g., 'very likely'), while overestimating the probability of others.[24, 25] The reality is that most people understand the world through stories and images, not lists of numbers, probability statements, or technical graphs, and so finding ways of translating and interpreting the technical language found in scientific reports into something more engaging is crucial.

One strategy is to create a vivid 'mental model' of climate change in people's minds. A visual artist can capture the concept of sea-level rise better than any graph and still be factually accurate if they use the scientific projections to inform their work.

"The use of case studies is a good way to engage people who haven't experienced extreme weather events directly... This really hits home with people - personal narratives." *

* Stakeholder quote

9. Highlight the 'positives' of uncertainty

Which of the following statements makes you feel more confident about acting under uncertainty?

"If we act now, the chance of destructive winter floods occurring is 20%"

POSITIVE FRAME

"If we fail to act, the chance of destructive winter floods occurring is 80%"

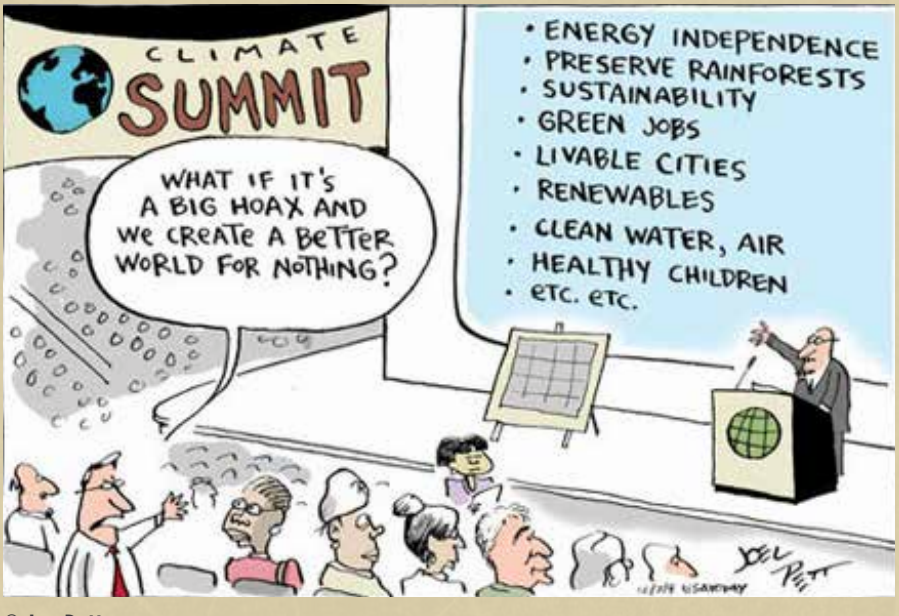
NEGATIVE FRAME

Uncertainty is not necessarily a barrier to communication if a positive 'framing' of the problem is used.[26] Academics at Exeter University gave people short messages that contained uncertain information framed in either a positive or negative way. The researchers found that when uncertainty was used to indicate that losses might not happen if preventative action was taken (i.e. the positive frame), then people were more likely to indicate stronger intentions to act in a pro-environmental way.

"If you talk about uncertainty in a positive way it creates hope, if you talk about it in a negative way it creates feelings of hopelessness." *

Uncertainty is not an inevitable barrier to action provided communicators frame climate change messages in ways that trigger caution in the face of uncertainty

It's also important to emphasise that acting on climate change — even under conditions of uncertainty — entails many co-benefits that most people would support. This cartoon captures the sentiment perfectly.



© Joe Pett

* Stakeholder quote

10. Communicate effectively about climate impacts

All around the world, extreme weather events (consistent with predictions made by scientists decades ago) are occurring more and more frequently

The tangible and traumatic experiences that arise from extreme weather events reduce the 'psychological distance' between people and climate change, allowing affected communities to relate more easily to the issue, as they will have to deal with similar risks in the future.

But can we legitimately claim that a particular weather event was 'caused by' climate change? Scientists are beginning to show how some individual extreme weather events are made more likely by climate change.[27] In fact, all weather events are now affected by climate change because the environment in which they occur is warmer and wetter than it used to be.[28]

But the question 'is this weather event caused by climate change?' is misplaced. When someone has a weak immune system, they are more susceptible to a range of diseases, and no one asks whether each illness was 'caused' by a weak immune system. The same logic applies to climate change and some extreme weather events: they are made more likely, and more severe, by climate change.

Not surprisingly, there is growing evidence that people are starting to join the dots between climate change and extreme weather.[29] But engaging people around extreme weather events must be done in a way that speaks to your audience's values, and interests. It is not the 'climate impacts' themselves, but their implications that are important for developing meaningful public narratives about what climate change means.

When climate change is present in the stories that people use to discuss their lives, and what they expect from the future, individual climate impacts will more easily slot into them.

A volatile climate means a vulnerable tourist industry

Unpredictable seasons produce unreliable harvests

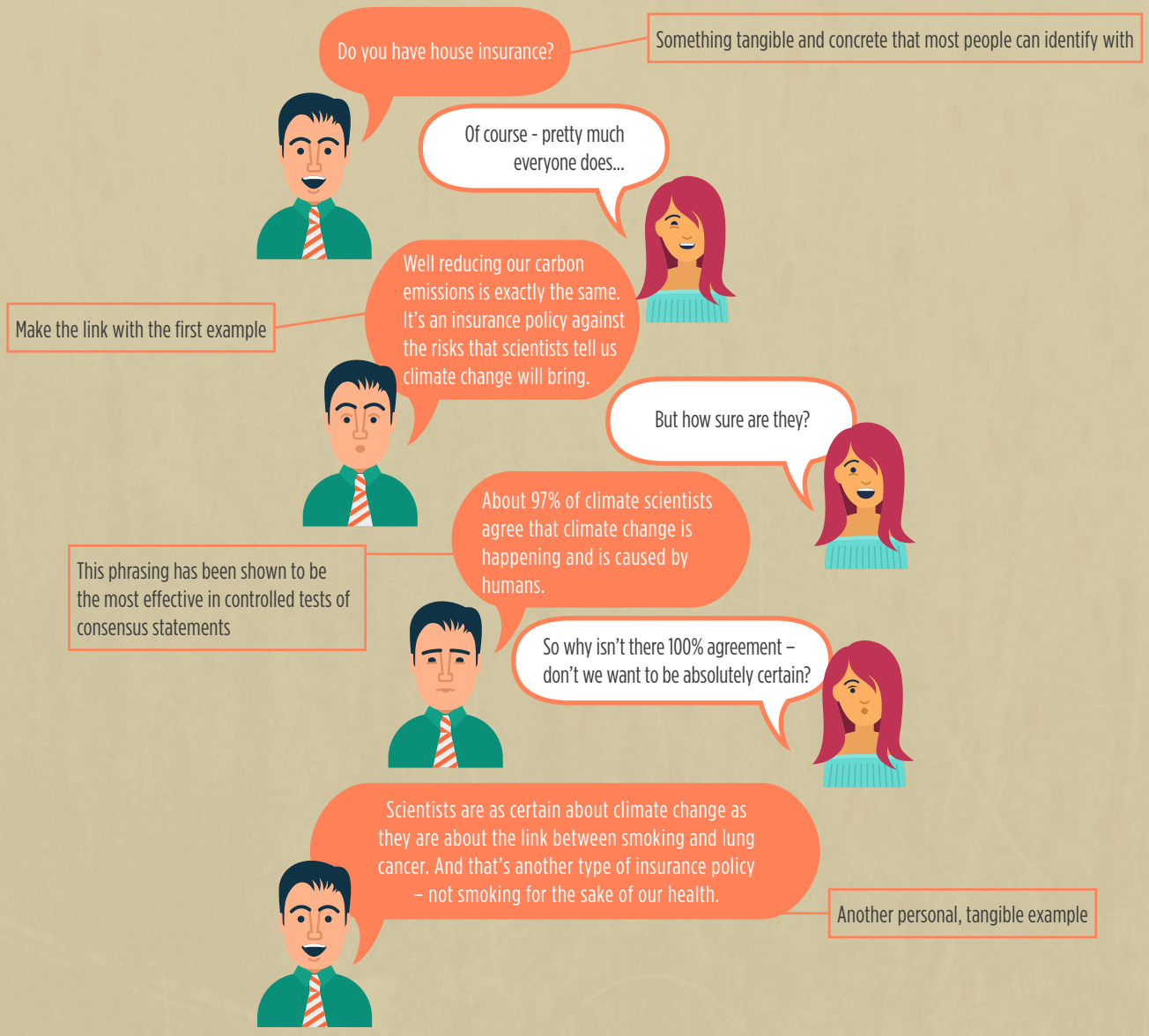
Travel and food (to pick just two examples) are much easier starting points for a conversation about climate change than computer models or probability statements.

11. Have a conversation, not an argument

Despite the disproportionate media attention given to 'sceptics', most people simply don't talk or think about climate change all that much. This means that the very act of having a conversation about climate change — not an argument or repeating a 'one-shot' slogan — can be a powerful method of public engagement. When people take part in organised, structured discussions about climate change, they tend to become more supportive of policies that respond to it.[30]

Having a conversation about climate change uncertainty, rather than simply finessing a one-sentence message, is another way of diffusing antagonism and scepticism.

A conversation about climate change



12. Tell a human story, not a scientific one

People's tendency to prioritise daily personal experiences over statistical learning, and their existing political views, have a far greater influence on our beliefs about climate change than the error bars on scientists' graphs. When people feel inspired by the answers to climate change, they no longer see uncertainty about the future as the central question.[31, 32] This means that telling human stories about the people affected by climate change (and how they are responding to it) is crucial - shifting climate change from a scientific to a social reality.

The amount of carbon dioxide that is emitted over the next 50 years will determine the extent to which our climate changes. Even on the most conservative scientific assumptions, burning half of our known reserves of fossil fuels will unleash unprecedented changes in the chemistry of our planet. So what we choose to do — and how quickly we can muster the collective willpower to do it — is an uncertainty that dwarfs all others.

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