SMC NZ

Science Media Centre.

DESK GUIDE FOR COVERING SCIENCE

This third edition of the *Desk Guide for Covering Science* is designed with busy journalists in mind.

It's meant for all reporters who want to get the science right. It covers the basics of everything from the peer review process in scientific research, through to the tricky issue of trying to write a "balanced" science story when the weight of scientific evidence may be overwhelmingly on one side.

You'll find a ten-point checklist for approaching science-related subjects and the updated centrespread infographic lays out the New Zealand science system, introducing you quickly to the diverse areas of research underway in the country.

You'll also find information about Scimex.org, our go-to portal for journalists, where you will gain embargoed access to new research, an expert database and a multimedia library of science-related images that are free to use.

Keep your Desk Guide handy. We hope you'll find it useful next time science is in the media spotlight.

Peter Griffin, SMC Director

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Need some help?
We are here for you!

ON THE WEB

sciencemediacentre.co.nz
sciblogs.co.nz
scimex.org

The Science Media Centre was set up in 2008 specifically to help journalists covering science-related stories. Here's how we can assist you:

Find an Expert

Need help getting your head around a complex issue or looking for an expert to quote in your story? One of the 7000 scientists in our Expert Database should be able to help you. Drawn from research organisations across the country, this list of media-savvy experts cover everything from climate change to criminal psychology. Contact the SMC to find an expert.

Scimex: The Science Media Exchange

Scimex is your one-stop-shop for science news. We collate the best embargoed and breaking research stories for New Zealand and abroad, providing easy access to press material, research papers, multimedia, expert commentary and more - before it hits the headlines. We highlight the most relevant and newsworthy research every week in the *SMC Picks*, which can be emailed to you as a regular alert. Register for access at scimex.org.

Expert Reaction

When a science story is breaking the SMC will round up comment from experts across the country, offering quotes from them in an SMC Expert Reaction email designed to give journalists a quick overview of how scientists are responding. The SMC Expert Reaction alerts are great sources of comment, offering a range of evidence-based perspectives on breaking stories in the agriculture, environment, health science, technology and even political and business rounds. You can tailor the alerts you receive to suit your areas of interest.

Online briefings

Journalists can take advantage of our regular online media briefings examining topical science issues. Brief slideshow presentations from a panel of experts are followed with an extended Q & A.

Dozens of briefings so far have covered everything from drinking and driving to petroleum exploration. All briefings are recorded and posted to the SMC website for playback. Better still, journalists can log into an SMC briefing live from their computer or smartphone, giving them quick and easy access to experts and their research.

International connections

The New Zealand SMC is part of a growing network of Science Media Centres helping journalists cover science all over the world. If you are looking for overseas experts for input into a story, we can help by connecting you to the SMC network spanning the United Kingdom, Australia, Japan, Canada and Europe. Registering to receive alerts from the SMCs also grants access to relevant information from the rest of the SMC network and access to joint briefings.

Sciblogs science blogging network

Established by the Science Media Centre and independently funded, Sciblogs is the largest science blog network in Australasia, with 30 scientists blogging about their areas of expertise. Sciblogs is a vibrant forum for discussion of topical science-related issues and a good place to identify confident science communicators.

When is research ready for primetime?

Often the first time you hear about an interesting area of science is when a press release arrives proclaiming the latest discovery or scientific breakthrough.

But how did the scientists get to this point? Understanding how scientists work can show another side of the story, and may affect how you cover it.

Scientific method

Scientists deal with **uncertainty** all the time because they are pushing the boundaries of what is known. "Breakthroughs" nearly always build on years of incremental progress, with many false starts and dead ends.

Scientists collect data through observation and experiments to test a **hypothesis** – a potential explanation.

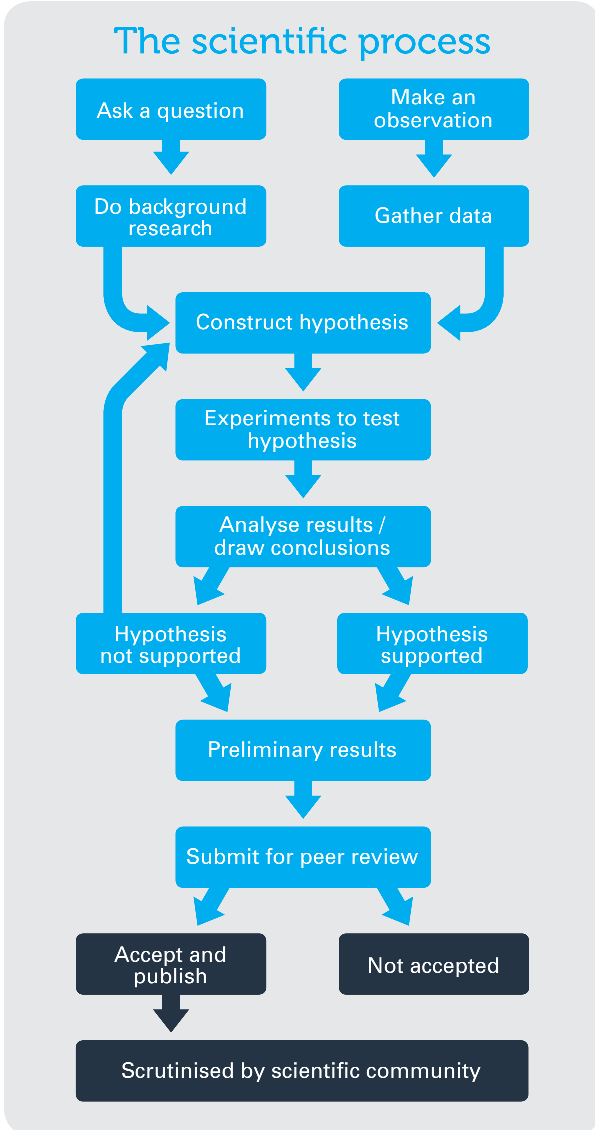
Testing the hypothesis can involve **experimentation** and **observation**, the result of which is **measurable evidence**. The testing needs to be designed in a way so that the results are **objective**, to reduce the likelihood of a biased interpretation of the results.

Scientists document everything, not just the results of their experiments, but the **methodology** they used, so that other scientists can try to replicate the results of the experiments. As such scientists place a lot of emphasis on **disclosure** of data, so it can be scrutinised by other researchers working in the field.

Uncertainty remains

After analysing their results, scientists will determine whether the new evidence supports their hypothesis and write up **preliminary findings**. The answer, which may eventually be reported in the form of a scientific paper in a peer-reviewed journal, will add to a growing body of evidence but will rarely be conclusive on its own.

Reporting on research



When to report

Research proposals and funding announcements make for good stories, but we are a long way off getting results.
Approach with caution

Reporting on experiments and scientific fieldwork is fine, but scientists don't have the whole picture yet.
Extreme caution

Results may be presented at conferences and meetings, but haven't been subjected to external scrutiny.
High caution

Research is published in peer-reviewed journals and literature reviews.
Safest time to report

Types of scientific evidence

Being able to evaluate the evidence behind a claim is important, but scientific evidence comes in a variety of forms. Here, different types of scientific evidence are ranked and described, particularly those relevant to health and medical claims.

INCREASING STRENGTH OF EVIDENCE

ANECDOTAL & EXPERT OPINIONS

Anecdotal evidence is a person's own personal experience or view, not necessarily representative of typical experiences. An expert's stand-alone opinion, or that given in a written news article, are both considered weak forms of evidence without scientific studies to back them up.

ANIMAL & CELL STUDIES (experimental)

Animal research can be useful, and can predict effects also seen in humans. However, observed effects can also differ, so subsequent human trials are required before a particular effect can be said to be seen in humans. Tests on isolated cells can also produce different results to those in the body.

CASE REPORTS & CASE SERIES (observational)

A case report is a written record on a particular subject. Though low on the hierarchy of evidence, they can aid detection of new diseases, or side effects of treatments. A case series is similar, but tracks multiple subjects. Both types of study cannot prove causation, only correlation.

CASE-CONTROL STUDIES (observational)

Case control studies are retrospective, involving two groups of subjects, one with a particular condition or symptom, and one without. They then track back to determine an attribute or exposure that could have caused this. Again, these studies show correlation, but it is hard to prove causation.

COHORT STUDIES (observational)

A cohort study is similar to a case-control study. It involves selection of a group of people sharing a certain characteristic or treatment (e.g. exposure to a chemical), and compares them over time to a group of people who do not have this characteristic or treatment, noting any difference in outcome.

RANDOMISED CONTROLLED TRIALS (experimental)

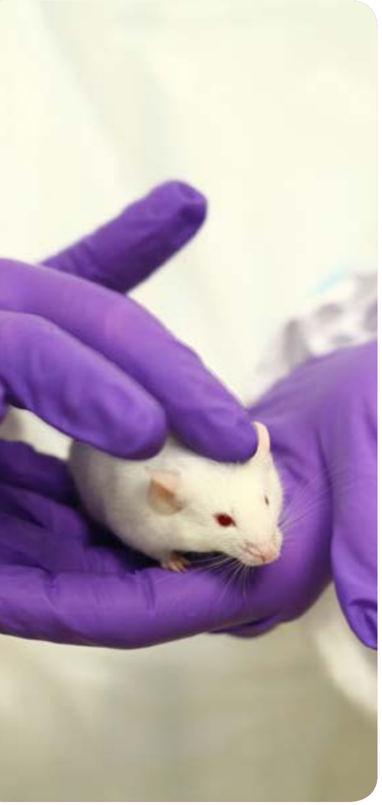
Subjects are randomly assigned to a test group, which receives the treatment, or a control group, which commonly receives a placebo. In 'blind' trials, participants do not know which group they are in; in 'double blind' trials, the experimenters do not know either. Blinding trials helps remove bias.

SYSTEMATIC REVIEW

Systematic reviews draw on multiple randomised controlled trials to draw their conclusions, and also take into consideration the quality of the studies included. Reviews can help mitigate bias in individual studies and give us a more complete picture, making them the best form of evidence.

Note that in certain cases, some of these types of evidence may not be possible to procure, for ethical or other reasons.

Best practice guidelines for reporting on science



Developed in consultation with scientists, science reporters, editors and sub editors, these guidelines are intended for use by newsrooms and general reporters as a checklist to help ensure the accurate reporting of science and health stories.

- **State the source of the story** – e.g. interview, conference, journal article, a survey from a charity or trade body, etc. – ideally with enough information for readers to look it up or a web link.
- **Specify the size and nature of the study** – e.g. who/what were the subjects, how long did it last, what was tested or was it an observation? If space, mention the major limitations.
- **When reporting a link between two things** indicate whether or not there is evidence that one causes the other.
- **Give a sense of the stage of the research** – e.g. cells in a laboratory or trials in humans – and a realistic time-frame for any new treatment or technology.
- **On health risks, include the absolute risk whenever it is available** in the press release or the research paper – i.e. if 'cupcakes double cancer risk' state the outright risk of that cancer, with and without cupcakes.
- **Try to frame a new finding in the context of other evidence** – especially on a story with public health implications, e.g. does it reinforce or conflict with previous studies? If it attracts serious scientific concerns, they should not be ignored.
- **Be wary of scientists and press releases over-claiming for studies** – if there is space, quote both the researchers themselves and external sources with appropriate expertise.
- **Distinguish between findings and interpretation or extrapolation** – don't suggest health advice if none has been offered.
- **Remember patients** – don't call something a 'cure' that is not a cure.
- **Headlines should not mislead** the reader about a story's contents and quotation marks should not be used to dress up overstatement.

Developed by Fiona Fox,
Director of the UK Science Media Centre

Scientists as sources

The SMC's Expert Database lists 7000 scientists who are expert in their field and willing to talk to the media. Contact the SMC if you are looking for an expert.

Some tips on approaching and interviewing scientists

Cultivate your sources Spend time talking to scientists when you're not on deadline. Help them get to know and trust you, and understand how you work. If a researcher seems particularly approachable, see if they might be willing to help you get your head around a crucial bit of research or fact-check an assertion on short notice in future.

Make your deadline clear up front Scientists often are not used to the tight time frames which journalists tend to work to. They may not instinctively give a media enquiry the highest priority on their long to-do lists. If you need a response within the next few hours or days, spell it out clearly (and go ahead and show your appreciation if they manage to drop everything to accommodate you).

Use email We've found that many scientists are virtually unreachable by phone but respond obsessively to emails. Scientists tend to travel frequently, and many juggle appointments at multiple research institutions or are regularly away from their offices for teaching commitments or lab / field work. The SMC also has mobile numbers for many media-friendly scientists.

Head off over-preparation Scientists will often think they need to spend unnecessary hours prepping with background research on in-depth facts and figures you'll never cover. Give your scientist a rough idea of the outcome you are shooting for, particularly if you have strict constraints on your word or time limit. (i.e. Are you producing a 7 minute segment? 300 words? A 30 second bulletin item?) It may also pay to make sure you're on the same page regarding what territory you'll be covering in the interview.

Don't be intimidated If you're not following something, or the scientist starts slipping into jargon, don't hesitate to interrupt or ask them to explain in simpler terms. It's often hard for scientists to judge exactly how much background explanation they should provide.

Who's who in New Zealand science

There are a number of different types of organisations involved in science and research in New Zealand, and figuring out who's who can be confusing.

On the following page we have mapped out the major players in the science sector and their research specialties.*

Who is doing research in New Zealand?

Universities: These institutions house the majority of New Zealand's researchers. Most comprise a broad range of experts beyond the major specialties highlighted overleaf.

Crown Research Institutes (CRIs): Crown-owned science research companies, formed when the government's Department of Scientific and Industrial Research was disbanded in 1992.

Centres of Research Excellence (COREs): Collaborative research networks hosted by a university, involving multiple science organisations as partners.

Independent Research Institutes: Outside of the University and CRI systems, many independent organisations also contribute to New Zealand research. The institutes shown on the next page are just a few examples of the many independent research entities in New Zealand.

National Science Challenges: Eleven separate challenges focus funding and research effort towards issues of national significance, such as healthy ageing and protecting biodiversity. Each challenge involves multiple institutions.

Major Funding Agencies

Ministry of Business, Innovation and Employment (MBIE); Callaghan Innovation; Health Research Council; Marsden Fund, Royal Society of New Zealand, Ministry of Primary Industries (MPI) and Tertiary Education Commission.

ON THE WEB

Universities
universitiesnz.ac.nz

CRIs
sciencenewzealand.org

COREs
acore.ac.nz

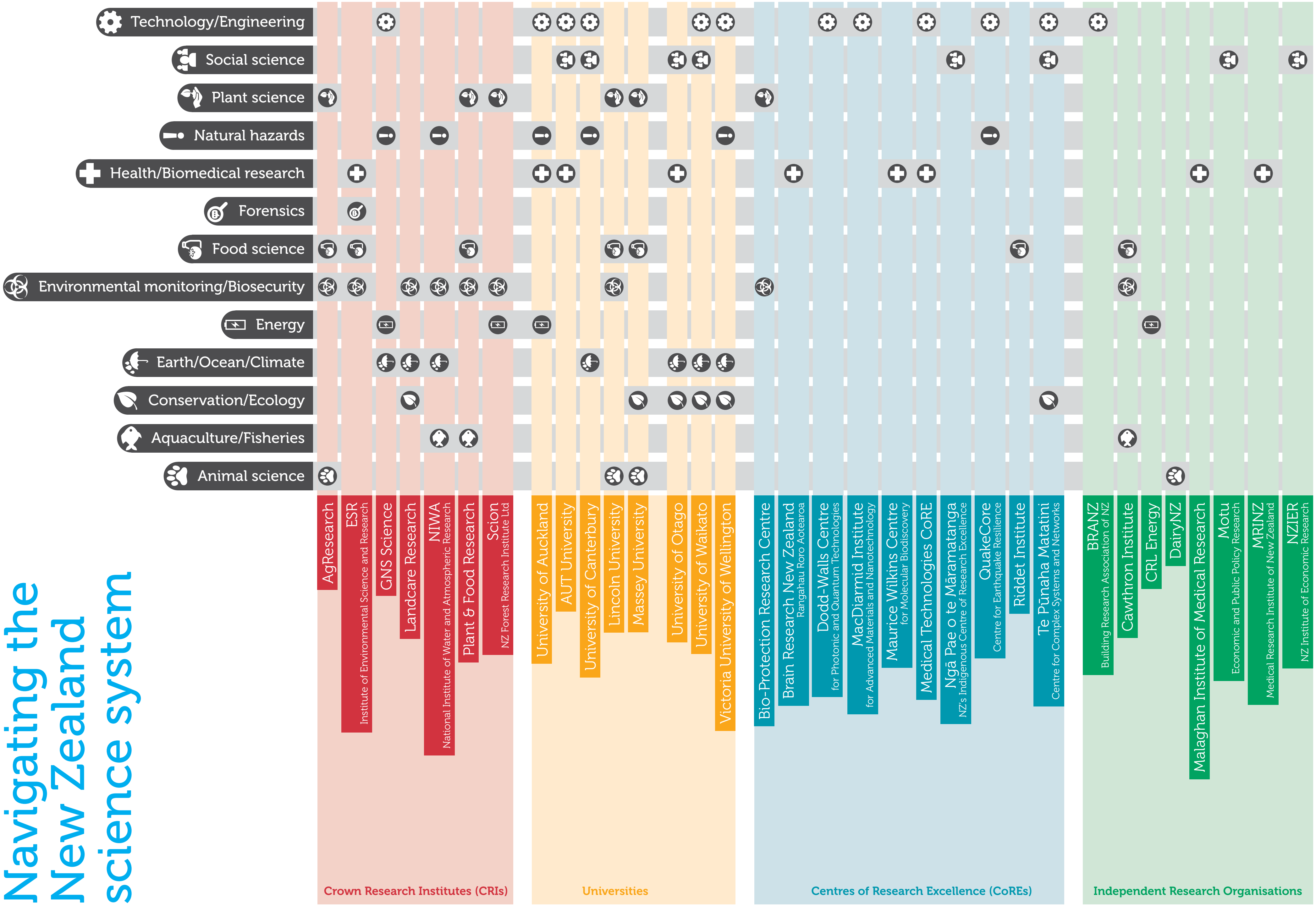
Independent Research Institutes
iranz.org.nz

National Science Challenges
tiny.cc/nscnz

PM's Chief Science Advisor
pmcsa.org.nz

**Disclaimer: Specialties indicate key research strengths and are not intended to be exhaustive.*

Navigating the New Zealand science system



Getting access to research

Science news is frequently driven by publications in the major peer-reviewed scientific journals. So for journalists covering science, health and related fields, getting access to research ahead of time is crucial.

Staying in close contact with key scientists and press officers and asking regularly about forthcoming research is a great way to find out what is coming up. However, we appreciate that this approach can be time-consuming and sometimes uneven. Here, the SMC can help.

Scimex: *To help busy journalists navigate the sources below, the Science Media Centre created Scimex, a website which provides journalists with access to the latest embargoed and breaking research from NZ and overseas. We curate the best research from sources around the world, including those below. Register for access at scimex.org.*

Many research journals provide free, early access to scientific papers to journalists under embargo. You'll generally be asked by journal publishers to prove your credentials, often with a letter of introduction from your editor. Here are some of the main points of contact:

EurekAlert: An indispensable resource for thousands of journalists worldwide, the EurekAlert portal provides embargoed access to major journals including *Science*, *PLOS ONE*, *PNAS* and *Cell Press*, as well as press releases from scientific conferences and institutions.

Nature: A prestigious multidisciplinary scientific journal published weekly. *Nature* has an extensive press portal allowing access to the journal papers, press releases and multimedia resources as well as to related publications such as *Nature Geoscience* and *Nature Genetics*.

Royal Society of London: The 350 year old Royal Society publishes numerous journals such as *Proceedings B*, its respected biological research journal. Registered journalists can gain embargoed access to journal papers and associated resources.

Medical research: Several journals publish weekly on medical science, including *The Lancet*, *BMJ* and *JAMA*. *Cochrane Reviews* publishes systematic reviews of medical treatments and drugs. A major source for local medical research is the *New Zealand Medical Journal*.

Local research: The Royal Society of New Zealand has a stable of journals covering everything from agriculture and botany to geology and zoology. These can be accessed via journal publisher Taylor & Francis on the InformaWorld web portal.

Department of Conservation staff publish regular scientific and technical reports on native species and ecosystems. Journalists can sign up for notifications on the DOC website.

Government-commissioned research reports are regularly posted to the Ministry of Health, Ministry for the Environment, Ministry for Primary Industries and other government sites, usually without prior notification.

You can contact the Science Media Centre any time for help tracking down specific research papers.

Peer review

Publications
– QUALITY MAY VARY

Scientific journals are ranked according to various measures of their impact.

- Prestigious, multidisciplinary journals (Nature, Science, etc.)
- Field-specific journals (e.g. physics, agriculture) with varying degrees of selectivity
- Wide assortment of less well-known journals that may be narrow in scope or unselective

Publication in top journals is incredibly competitive, while more obscure journals may struggle to get enough submissions to fill their pages. Some journals require researchers to pay for publication, while others rely on subscription fees.

How does the peer review system work, and why is it important?

Scientists spend a lot of time writing up, revising and publishing their research. It's an extremely important part of the scientific process, because it allows other scientists to offer feedback and test the research for themselves to verify its accuracy. Publishing is also an important measure of output for many scientists.

Before a study can be published in a reputable journal, it must be peer-reviewed. In a process which can last months, the study is sent to scientists working in the same field, who are best positioned to decide whether the methods used were appropriate and the conclusions make sense.

These 'peer reviewers' offer journal editors advice on the quality of the paper, whether or not it should be published and what changes should be made if it is to be published.

While peer review acts as an internal check on the quality of research, it isn't infallible.There is potential for bias among reviewers and not all mistakes are identified. Peer review is based on trust that the data are real and cannot identify fraudulent results.

The evaluation of research doesn't end after peer review. Once published, a study may receive further critique from other scientists through letters to the editor of the journal, commentary articles or further research attempting to replicate the finding of the original study -- science is an ongoing process.

Photo credit: NASA

Balance in science reporting

'Giving both sides their due' is a basic principle of newsgathering, particularly when covering political and social debates. But good reporting on science issues requires more than a 'he says, she says' approach to balance.

In science, claims need to be backed by evidence. Science, at its best, embraces transparency and subjects new results to intensive scrutiny. Persuasive arguments are not enough – science advances by accumulating evidence to support, refine or overturn current understanding.

Scientific consensus evolves over time, but the majority opinion represents the cumulative effort of thousands of scientists around the world and carries the weight of countless hours of analysis and refinement.

The best way to provide balance and help the public gauge the truth of competing claims is to provide this essential context for a research report or scientific viewpoint.

The balance of evidence

On controversial issues, rather than merely presenting opposing views of the science, it's important to weigh their merits.

Scientists engage in vigorous debate as a way of progressing understanding within their fields. From an outsider's perspective, it can be easy to mistake normal debate over a nuanced interpretation of the facts for a more fundamental controversy.

The majority opinion may not always be right, but a solitary dissenting voice or outlier study doesn't always deserve an equal platform. Before including such counterpoints, consider whether the audience will be able to fairly take away what the relative merits are of the evidence backing up each side's case.

Scientific claims that fall outside the mainstream should be approached with healthy scepticism. Beware of isolated, obscure or long out-of-date research findings. A single study or two can easily present a distorted view of the science when taken out of context. The more extraordinary the claim, the more extraordinary the evidence required back it up.

Weighing claims

Of course, figuring out how much credibility a scientific opinion deserves can require substantial background knowledge. Start by looking into what research has already been published on the topic, and what major peer-reviewed assessments or reviews have to say about it.

Supplement what you can find out on your own by consulting scientists who are knowledgeable in the field, but not directly involved with the research in question. The Science Media Centre can help suggest relevant experts.

Some things to consider when choosing sources:

- Does the expert have a scientific background that is relevant to the area they are weighing in on?
- Do they have established credentials? An active research career? A reasonable standing among fellow scientists?
- Are there any conflicts of interest or ties to organisations that may unduly influence their views?

Bear in mind that there is often a diverse range of opinion within the scientific consensus. By exploring several scientists' views, you may uncover new angles that hold more interest than a predictable retread of the same debate.

"Journalists and scientists espouse similar goals. Both seek truth and want to make it known. Both devote considerable energy to guard against being misled. Both observe a discipline of verifying information. Both insist that society allow them freedom to pursue investigations wherever they lead."

BOYCE RENSBERGER
Science writer, editor and former Director of MIT's Knight Science Journalism Fellowships

ON THE WEB

World Federation of Science Journalists

http://www.wfsj.org/

Communicating statistics and risk responsibly

Comparing risks

It may be tempting to try to put risk in perspective by comparing it to something your audience is familiar with (e.g. road accidents, smoking a pack of cigarettes a day). But be careful! When translating statistics and risk from one context to another, it's all too easy to get things wrong. Here are a few common pitfalls.

Absolute risk vs. relative risk

Absolute risk refers to the naturally-occurring frequency of an event. It gives an ordinary frame of reference that is easy to understand.

Example: Four out of every 1000 women will die of breast cancer in the next 10 years.

Relative risk refers to a change in the level of risk. This kind of figure often sounds very impressive, and is frequently used in reports of drug trials or new treatments, but it has little meaning unless it is put into the correct context.

Example: This drug reduces a woman's risk of dying from breast cancer by 25%.

One of the most common confusions occurs when these two types of risk are mixed up. In the example above, the 25% decrease actually means that for every 1000 women taking the drug, three will die of breast cancer instead of four. In other words, this treatment could potentially save one life in 1000.

When the percentage is given in terms of a woman's overall risk of dying from breast cancer, it means a reduction of 0.1%. This is because the risk of dying from breast cancer is relatively small to begin with, so even a large reduction in that risk does not equate to many lives saved.

Using the context of absolute risk (or getting an expert to provide this) is the best way to explain what a result will mean for your audience in their daily lives.

Positive vs. negative frame

Pay attention to the way statistics are framed. While a 97% chance of survival, and a 3% chance of dying may both be correct, they don't always mean the same to the person listening.

Evidence shows that positive framing is more effective than negative framing in persuading people to take risky treatment options.

Single event probabilities

The chances of a single, undesirable event taking place can be easily confused with the everyday likelihood of things going wrong.

Example: A psychiatrist prescribes a drug to his patients with the warning that they will have a "30% to 50% chance of developing a sexual problem" such as impotence or loss of sexual interest.

His patients may understand this to mean 30 – 50% of their own sexual encounters will be problematic, and refuse the drug. But the psychiatrist actually means that of every 10 patients taking the drug, three to five will experience a sexual problem at some stage. Explaining it this way, he finds his patients are less concerned about the risk.

Rare exposures

If being exposed to some harmful factor increases your risk a lot, but that harmful exposure is very rare, it may be important for a small number of individuals but cannot have a big impact on the average reader.

Example: Angelina Jolie has a particular genetic variant in the BRCA gene that gives her an 85% lifetime risk of breast cancer.

This is a very high risk, but the genetic variant is rare – only about 1% of women have it – so only a very small fraction of all breast cancer could be prevented by genetic testing.

> "Virtually all new technologies pose risks along with benefits. Thus 'safe' and 'effective', whether applied to new drugs, devices or processes, are always relative terms. It is irrational to ask whether something is safe or not. Nothing is 100 percent safe. Policy decisions involving science must balance risks and benefits."
>
> **BOYCE RENSBERGER**
> Science writer, editor and former Director of MIT's Knight Science Journalism Fellowships

ON THE WEB

statschat.org.nz

stats.govt.nz

senseaboutscience.org.uk

Reviewed by Professor Thomas Lumley, University of Auckland statistician and founder of the blog Stats Chat, which aims to help improve statistical literacy by scrutinising facts and figures used in the media and in the world around us.

Dealing with scientific uncertainty

Uncertainty is part of the process: Science cannot prove a negative – no matter how many carefully designed experiments they've already run, scientists will never be able to say, they're "100% certain" that something is safe. That's because they are always open to the possibility that new research tomorrow could overturn current understanding. This flexibility of approach is one of science's great strengths.

Enough is enough: That said, when the studies start to stack up, most scientists will agree that they've done everything in their power to rule out a given risk or association. Accept a "high confidence" level as the scientist's most strongly worded statement on the subject, and don't vilify scientists who won't categorically rule out a given possibility.

Experts may focus on the gaps in knowledge: Be aware that scientists may spend less time talking about what they do know (which they assume everyone probably knows already), than talking about what they don't know. This is because the unknown is an area of intense interest and potential discovery for scientists. Overall, this can give a skewed view of how important the gaps in knowledge actually are.

Qualifiers and caveats are essential: Sub-editors hate them, but qualifiers indicate the level of scientific uncertainty and are not the result of weak writing in science-related stories. If scientists are uncertain about their results, it's important to report this accurately. Leave notes to the sub-editors when you file your story to try and avoid qualifiers and caveats being cut and inappropriate headlines being created for your stories.

Avoid single-source stories: It can be tempting to spin a yarn from a well-crafted press release and the one scientist it quotes, but you need to get views from other scientists, particularly when dealing with uncertainty in results. Scientists are often too close to their work to accurately say how much weight their findings should be given. Check their claims against the peer-reviewed literature and their peers.

The flipside – don't exaggerate uncertainty: Sometimes media reports give the impression that scientists can't even agree on the basics. But as you've already read in this guide, science is a process and the big picture changes as new studies are completed and scientists add to the body of work that came before them. Contrasting scientific views should be noted but not beaten up to suggest uncertainty reigns supreme.

Be careful about "dueling experts": There's nothing as quote-worthy as a good argument between experts. But two opposing talking heads doesn't mean a rift in the scientific community. Be careful you are not making the science out to be less certain than it actually is by playing up disagreement between scientists. Go to scientific bodies, societies and associations for a big picture view.

Don't pit scientist against non-scientist: A science-related story may originate from a politician, lobby group or a man in the street. While their points of view are important, save the discussion of scientific uncertainty to experts in the topic under discussion.

Chief Science Advisor to the Prime Minister, Professor Sir Peter Gluckman, writes in his paper *Interpreting science - implications for public understanding, advocacy and policy formation:*

"Public opinion is central to policy formation in a participatory democracy: that is why the public requires an understanding of how data can be well-used or misused, how advocacy can create confusion, intentionally or otherwise, and why it is that science can appear to be used or misused by both sides of a contentious argument."

> "Uncertainty is a sign of honest science and reveals a need for further research before reaching a conclusion. Cutting-edge science is highly uncertain and often flat-out wrong."
>
> **BOYCE RENSBERGER**
> Science writer, editor and former Director of MIT's Knight Science Journalism Fellowships

Spotting bad science

Being able to evaluate the evidence behind a scientific claim is important. Being able to recognise bad science reporting, or faults in scientific studies, is equally important. These 12 points will help you seperate the science from the pseudoscience.

CORRELATION & CAUSATION

Be wary of confusion of correlation and causation. A correlation between variables doesn't always mean one causes the other. Global warming has increased since the 1800s, and pirate numbers decreased, but lack of pirates doesn't cause global warming.

UNSUPPORTED CONCLUSIONS

Speculation can often help to drive science forward. However, studies should be clear on the facts their study proves, and which conclusions are as yet unsupported ones. A statement framed by speculative language may require further evidence to confirm.

PROBLEMS WITH SAMPLE SIZE

In trials, the smaller a sample size, the lower the confidence in the results from that sample. Conclusions drawn can still be valid, and in some cases small samples are unavoidable, but larger samples often give more representative results.

UNREPRESENTATIVE SAMPLES USED

In human trials, subjects are selected that are representative of a larger population. If the sample is different from the population as a whole, then the conclusions from the trial may be biased towards a particular outcome.

NO CONTROL GROUP USED

In clinical trials, results from test subjects should be compared to a 'control group' not given the substance being tested. Groups should also be allocated randomly. In general experiments, a control test should be used where all variables are controlled.

NO BLIND TESTING USED

To try and prevent any bias, subjects should not know if they are in the test or the control group. In 'double-blind' testing, even researchers don't know which group subjects are in until after testing. Note, blind testing isn't always feasible, or ethical.

SENSATIONALISED HEADLINES

Article headlines are commonly designed to entice viewers into clicking on and reading the article. At times, they can over-simplify the findings of scientific research. At worst, they sensationalise and misrepresent them.

MISINTERPRETED RESULTS

News articles can distort or misinterpret the findings of research for the sake of a good story, intentionally or otherwise. If possible, try to read the original research, rather than relying on the article based on it for information.

CONFLICT OF INTERESTS

Many companies employ scientists to carry out and publish research - whilst this doesn't necessarily invalidate research, it should be analysed with this in mind. Research can also be misrepresented for personal or financial gain.

SELECTIVE REPORTING OF DATA

Also known as 'cherry-picking', this involves selecting data from results which support the conclusion of the research, whilst ignoring those that do not. If a research paper draws conclusions from a selection of its results, not all, it may be guilty of this.

UNREPLICABLE RESULTS

Results should be replicable by independent research, and tested over a wide range of conditions (where possible) to ensure they are consistent. Extraordinary claims require extraordinary evidence - that is, much more than one independent study!

NON-PEER REVIEWED MATERIAL

Peer review is an important part of the scientific process. Other scientists appraise and critique studies, before publication in a journal. Research that has not gone through this process is not as reputable, and may be flawed.

CONTACTING THE SCIENCE MEDIA CENTRE

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