



Certainty clouds the IPCC

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‘When I use a word,’ Humpty Dumpty said, in a rather scornful tone, ‘it means just what I choose it to mean—neither more nor less’. ‘The question is,’ said Alice, ‘whether you can make words mean so many different things’.

‘The question is,’ said Humpty Dumpty, ‘which is to be master—that’s all’.

—Lewis Carroll
Through the Looking-Glass

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‘It’s almost certain’, *The Weekend Australian* headline told us, that human activity is the cause of global warming. The Intergovernmental Panel on Climate Change (IPCC) brought out a draft version of its ‘Summary for Policymakers’ in February this year. The data within the report is final, but the report itself is still subject to ‘editorial adjustments to figures’. Importantly, the summary states that there is a ‘very high confidence that the globally averaged net effect of human activities since 1750 has been one of warming’. In other words, human events since the Industrial Revolution began have contributed to global climate change. Most of the increase in average temperature is very likely due to human activity. Readers who struggle through the entire 21-page document (with 33 drafting authors and 18 draft contribut-

ing authors it is a difficult effort) will notice the terms ‘very likely’, ‘very high confidence’ and the like. But what do these terms mean? The IPCC employs very clumsy terminology and, indeed, manages to conceal precise meanings in its report. In this article we investigate what the IPCC is telling us and show that it is far from clear that global climate change is induced by humans.

The IPCC Process

The IPCC was created in 1988 by two United Nations organisations: the UN Environmental Programme and the World Meteorological Organisation. The IPCC exists to ‘to assess on a *comprehensive, objective, open and transparent basis* the scientific, technical and socio-economic information relevant to

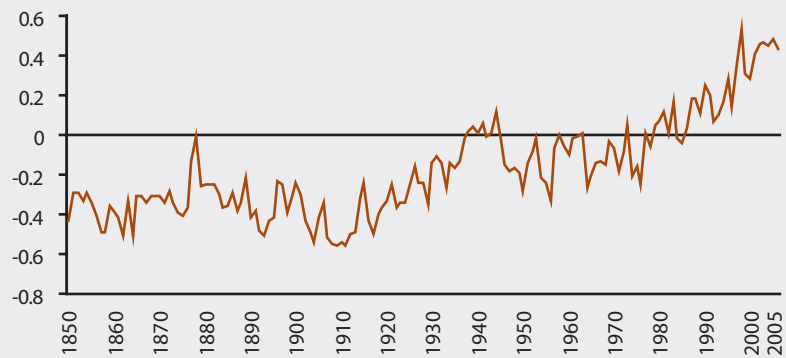
understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation' (our emphasis). In this regard, the IPCC is in the process of releasing its 'Fourth Assessment Report on Climate Change'. These assessment reports, written by experts in the field, are comprehensive summaries and syntheses of the extant peer-reviewed literature (non-peer-reviewed literature can be included, but must be justified). The draft assessment reports are meant to provide a 'balanced and complete assessment' of the body of knowledge. There are then two review processes—first by 'experts' and second by 'government and experts'. The review process is meant to be 'objective, open and transparent'. What is important to note is that experts in the field are summarising work they have contributed to, and experts whose own work is being summarised are reviewing those summaries. In other words, there is no external disinterested evaluation. The IPCC process is incestuous. This, however, is not as problematic as one might imagine. The original research is peer-reviewed and is less likely to be corrupted. What is problematic is the interpretation of the work contained in the summaries for policymakers.

What we're being told

The IPCC has concluded that global warming is occurring. This would seem to be uncontroversial. Many people have seen the diagram shown in Figure One. This shows the difference between annual global mean temperature and the average global mean temperature for the period 1961 to 1990. Relative to the average, it can easily be seen that the global temperature has risen quite dramatically in the last 30 years. The IPCC report contains a figure very much like our Figure 1, showing dramatic global warming.

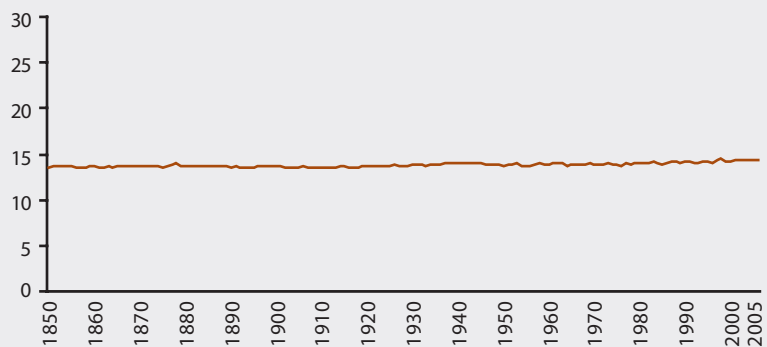
Looking at the data, the warmest year was 1998 and the equal coldest years were 1909 and 1911. The temperature differential between the warmest and the coldest years is 1.09 degrees centigrade. The range of maximum and minimum global mean temperature over the past 156 years is just over 1 degree centigrade.

Figure 1: Temperature Anomaly (1850–2006)



Source: http://www.bom.gov.au/web01/ncc/www/cli_chg/timeseries/global_t/0112/global/latest.txt

Figure 2: Global Mean Temperature (1850–2006)



Source: Derived from the Australian Bureau of Meteorology Data
http://www.bom.gov.au/web01/ncc/www/cli_chg/timeseries/global_t/0112/global/latest.txt

People looking at a contrived figure such as our Figure 1 can be forgiven for thinking that global warming is a huge urgent problem. There is no reason why the temperature is shown relative to an average over the period 1961 to 1990. There is nothing obviously special about those years. What the IPCC does not show is the actual global mean temperature over the period 1850 to 2006. We show that data in Figure 2.

The IPCC then also says that this warming is 'extremely unlikely' to be due to natural variation in climatic processes, and that it has 'very high confidence' that this is due to human behaviour. Terms

such as 'extremely unlikely', 'highly likely' and 'very high confidence' have absolutely no scientific basis, and there is no scientific justification whatsoever for associating numerical, model-based probabilistic assessments (if that is indeed what they are) with such loaded expressions. A 5 per cent chance means precisely what it says, whereas 'highly unlikely' could mean anything. It needlessly confuses the reader.

Hidden away in the footnotes, the IPCC report translates these terms. 'Extremely unlikely' means less than 5 per cent probability and 'very high confidence' means 'at least a 9 out of ten

chance of being correct', or 90 per cent probability. These terms indicate 'the assessed likelihood, using expert judgement, of an outcome or a result'. The layman reading this might think that there is a 90 per cent probability that human activity is causing global warming—indeed, the Australian newspapers reported the IPCC in that manner. Yet, it is unclear what that 90 per cent represents.

The IPCC helpfully provides a table to guide our understanding of climatic trends and human effects on those trends. We reproduce part of that table, and augment it with the statistical meaning that the IPCC has hidden in its footnotes. Of the seven extreme weather events identified by the IPCC, two have a better than 66 per cent probability of human contribution, and five have a better than 50 per cent probability of human contribution. Yet, the IPCC also tells us that the probability of human contribution to climate change is better than 90 per cent. The whole, according to the IPCC, is substantially greater than the sum of its parts.

How big is big?

Scientific method requires researchers to posit a hypothesis, collect data, and then test the hypothesis. Hypothesis-testing is a well-known technique taught in all first-year statistics classes. In other words, hypotheses are falsifiable. That human activity is causing the planet to warm is a testable hypothesis. The IPCC seems to imply that it has tested that hypothesis and failed to reject it. It is at least 90 per cent confident that the hypothesis is not false. Should we be concerned? Probably, not. If this is what the IPCC has done, it has very weak evidence. Hypothesis-testing normally requires confidence levels either of 90 per cent, 95 per cent, or 99 per cent. Ninety per cent is the weakest level of confidence. Yet, the IPCC tells us that its understanding is based 'upon large amounts of new and more comprehensive data, more sophisticated analysis of data, improvements in understanding of processes and their simulation in models, and more extensive exploration of uncertainty ranges'. As any elementary textbook of statistics reminds its

Table 1: IPCC Expert Assessment of Human Impact on Extreme Weather Events

	Likelihood of a human contribution to observed trend	Probability
Warmer and fewer cold days and nights over most land areas	Likely	More than 66%
Warmer and more frequent hot days and nights over most land areas	Likely (Nights)	More than 66%
Warm spells / heat waves. Frequency increases over most land areas	More likely than not	More than 50%
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	More likely than not	More than 50%
Area affected by droughts increases	More likely than not	More than 50%
Intense tropical cyclone activity increases	More likely than not	More than 50%
Increased incidence of extreme high sea level (excludes tsunamis)	More likely than not	More than 50%

Source: adapted from IPCC table Summary for Policy Makers, February 2007

readers, with large data sets, confidence levels have to be increased, so a 90 per cent confidence level would not then be valid—the hypothesis is falsified.

It is not clear from the report whether the IPCC has, in fact, undertaken such an analysis. It is more likely that it has neither a testable model nor data available for external researchers to replicate such a test. In other words, the IPCC's 90 per cent confidence level has not emerged from a scientific process; it has emerged from scientists evaluating whether they think their own work is correct. Further, in contrast to the IPCC's own requirement, the 90 per cent confidence level is not open, not objective, and not transparent.

The IPCC purports to undertake a huge task summarising the extant literature on global warming and the extent to which humans contribute to that warming. Yet, when all is said and done, it pro-

duces a guess as to what it all means. That may well be an informed guess but it is not a scientific process. How then does the IPCC form its opinions? What proportion of scientists are guessing more than 90 per cent, and what proportion are guessing less than 90 per cent? What is the non-scientific public meant to believe? After all, humans are either causing global warming, or they are not. Despite years of work, and commitments to objectivity, the IPCC is unable to provide the answer to that question. At present, it expects us to take its word at face value—again, a notion that is not scientific.

