

CORRESPONDENCE:

Making use of the IPCC's powerful communication tool

To the Editor — Based on the study of Barkemeyer *et al.*¹ some commentators² and the IPCC leadership³ have concluded that the top-level documents of the IPCC are harder to understand than a paper by Albert Einstein. Although meant as a metaphor, we disagree with the general conclusion that these documents stand out in terms of low readability as important evidence was ignored and text analyses in general tend to be surprisingly trivial.

Barkemeyer *et al.*¹ quantify the comprehension of the top-level documents of IPCC assessments using the Flesch reading ease (FRE) score. The simplicity of this test lies in the fact that the score is based only on the average number of words in a sentence and the average number of syllables per word. They compare the IPCC summaries for policymakers (SPMs) with scientific editorials and news articles in *Nature* and *Science* on the launch of the IPCC Assessment Reports, as well as with articles in quality and tabloid newspapers. From their analysis they suggest that these top-level IPCC documents are significantly more difficult to read than the related coverage in science journals. Worse, with scores as much as six times smaller, they seem to be much more difficult to comprehend than a piece in a quality newspaper. This is potentially problematic as the target audience of these IPCC documents is policymakers, who are in most cases not specialists in the topic of climate change.

However, the authors have overlooked an important, graphically distinct (in as much as they appear in boxes in a different font size and colour) text element that was presented in two top-level documents of the last IPCC assessment. Working Group I (WGI) has pioneered a new communication tool — the so-called headline statements. Although short and succinct statements have been part of earlier SPMs, each section and subsection of the WGI SPM (except for one very short subsection) is now consistently summarized by a headline statement that is free of technical jargon and complex formulations. Taken together, the WGI headline statements provide a

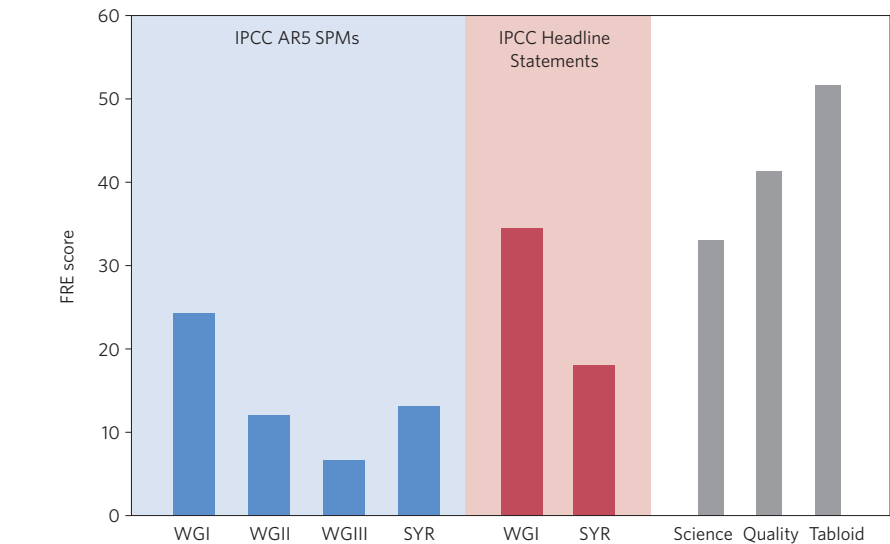


Figure 1 | FRE scores for the SPMs of the three IPCC Working Group contributions (WGI, WGII and WGIII) to AR5 and the Synthesis Report (SYR), compared with the IPCC headline statements of the WGI and SYR SPMs. Editorials and news articles in *Nature* and *Science* on the launch of the IPCC Assessment Reports (labelled as science) and articles in quality and tabloid newspapers were also scored. Data from Barkemeyer *et al.*¹ and calculations by G. Napolitano (IMBIE, Univ. Bonn, Germany).

coherent narrative and concise summary of the comprehensive 1,535-page scientific assessment on just two pages⁴. Although Working Groups II (WGII) and III (WGIII) did not produce such headline statements, the new communication tool was also used for the IPCC Synthesis Report, both in the SPM and the full report⁵.

Barkemeyer *et al.*¹ do not consider the headline statements as a separate category in their analysis. They therefore miss the text element of the SPM that was intentionally simplified and condensed to become the most accessible part of the assessment.

We compare the FRE scores of the headline statements of the SPMs of WGI and the Synthesis Report with the scores of the full SPMs and the reference publications used by Barkemeyer *et al.*¹ (Fig. 1). The WGI headline statements score significantly higher than any of the three WG SPMs from the IPCC Fifth Assessment Report (AR5) and fall between the mean score of scientific editorials and news articles in *Nature* and

Science and the articles on the launch of the IPCC Assessment Reports in quality newspapers such as *The New York Times*, for example. This is a remarkable improvement over the scores of the full SPMs and strongly suggests that carefully crafted, critically discussed and iteratively refined headline statements can indeed be a way to make the major findings collected in the SPM more comprehensible and accessible.

Constructing headline statements is not a simple task that can be completed in just a few days, on the fly during an IPCC approval plenary, or outsourced to communication specialists. Instead, the production of headline statements must be the task of the SPM core writing team. It requires time to ensure that they are robust, effective and true to the underlying scientific-technical assessment. A carefully planned process must therefore be installed that needs to begin at the early draft stage of the SPM.

For WGI, the production of the headline statements started almost a year before

the approval. The statements in the First Order Draft of the SPM were still long and cluttered with jargon and numbers. In the process of preparing the Final Draft of the SPM, the headline statements were continuously refined, taking into account the many review comments and ensuring consistency with ongoing revisions in the SPM and the main report. The most significant step in the improvements, however, happened at an intensive preparatory meeting by the author team just before the WGI approval plenary. In that meeting, during which the final government comments were taken into account and revisions of the SPM draft were discussed, the language of the headline statements was streamlined and cut in length by another 30% — down to just 922 words. At the approval plenary, a mere 26 words were added, indicating that the statements as proposed by the authors had reached a very high level of acceptance.

Most importantly, the headline statements, as an integral element of the SPM drafts, underwent the same multistage expert and government review as all of the other text of the WGI SPM. For instance, the simple headline sentence: “Human influence on the climate system is clear.”⁴ was iterated many times among the authors until finally an agreement was reached and this statement could be presented to the IPCC plenary. The statement, as the high-grade distillate of detailed assessment findings that are elaborated in a section of the SPM and an entire chapter of the main report, was approved unchanged and in consensus by all governments.

It is interesting to note that the score of the SYR SPM headline statements is just over half that of the WGI SPM score, but

still higher than that of both the WGII and WGIII SPMs, as well as of the full SYR SPM. Had this element been an agreed standard for all WG SPMs, and had the construction of headline statements been given higher priority during the writing of the SYR, it may have substantially raised the level of comprehension of these SYR statements and certainly made them more accessible than a complex scientific paper.

We agree with Barkemeyer *et al.*¹ that further improvement is possible with regard to the readability of top-level documents by IPCC. However, progress must also be made in the application of analysis and metrics that measure text complexity in relation to the IPCC reports. Alternative, more sophisticated modes of technical analysis already exist⁶. For instance, using a ‘familiarity score’, measuring the average occurrence of words in quality newspapers, would provide valuable information on general comprehension. The information required to determine this score could be derived from existing and readily available large and comprehensive databases of word frequencies in contemporary English such as Word frequency data (<http://www.wordfrequency.info>). In any case, more detailed linguistic tests should be employed to provide useful assistance in the future production of IPCC headline statements.

But even the simple scores illustrated in Fig. 1 highlight the significant improvement in the accessibility of IPCC key conclusions. Some of the most evocative WGI SPM headline statements, such as the one quoted above, have been used by the media unaltered. In such cases, the collective voice of the scientists — approved verbatim by the

governments — was carried in an unfiltered manner by the media to the public. This avoided the danger of increasingly emotive and opinionated coverage in the popular media as highlighted by Barkemeyer and colleagues¹. IPCC headline statements were also quoted in decision documents of the UN Framework Convention on Climate Change⁷, opening a direct channel for scientific knowledge into the policymaking process. This demonstrates their utility and suggests that they should become a standard element of all top level products of the IPCC in the new assessment cycle. □

References

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CORRESPONDENCE:

Technological change and climate scenarios

To the Editor — Clark *et al.*¹ consider the consequences of twenty-first-century climate policy and present scenarios for the effects of anthropogenic carbon emissions on a 10,000-year timescale. Unfortunately, however, their scenarios are underpinned by the implicit and unrealistic assumption of *ceteris paribus* (all else being equal) with respect to technology, echoing the field’s publications more generally.

Although Clark *et al.*¹ recognize the potential importance of large-scale capture and storage of airborne carbon, their use of language in general does not adequately reflect the implausibility of the ‘all else being equal’ assumption. Declarations such as “the ultimate return to pre-industrial CO₂ concentrations will not occur for hundreds of thousands of years” and “the CO₂ released during this century will commit

Earth and its residents to an entirely new climate regime” are made with unwarranted confidence, and without appropriate caveats.

Today many environmental problems seem intractable because remediation would require the manipulation of the physical world at a scale and/or with a precision that is prohibitively expensive. In the specific case of the carbon and climate problem, carbon dioxide removal (CDR)