

## LETTERS

the ground (3). Dry forests have lower diversity and lower net productivity than do rainforests (4), and the Caatinga is impoverished in comparison to other Neotropical dry forests (3, 5); thus, energy bottlenecks are severe. Capuchins in this habitat frequently use twigs as probing tools, unassociated with terrestriality. Although the use of digging stones is obviously related to the exploitation of subterranean resources, we suggest that this technology is both more diverse and more complex than the link to ground foraging suggested by Visalberghi *et al.*

PHYLLIS C. LEE AND ANTONIO C. DE A. MOURA

Department of Biological Anthropology, University of Cambridge, Downing Street, Cambridge CB2 3DZ, UK.

### References

1. D. Fragaszy *et al.*, *Am. J. Primatol.* **64**, 359 (2004).
2. T. R. Defler, *Primates* **20**, 475 (1979).
3. A. C. de A. Moura, thesis, University of Cambridge (2004).
4. P. G. Murphy, A. E. Lugo, *Annu. Rev. Ecol. Syst.* **17**, 67 (1986).
5. G. Ceballos, in *Seasonally Dry Tropical Forests*, S. H. Bullock *et al.*, Eds (Cambridge Univ. Press, Cambridge 1995), pp. 195–220.

## Consensus About Climate Change?

**IN HER ESSAY "THE SCIENTIFIC CONSENSUS on climate change"** (3 Dec. 2004, p. 1686), N. Oreskes asserts that the consensus reflected in the Intergovernmental Panel on Climate Change (IPCC) appears to reflect, well, a consensus. Although Oreskes found unanimity in the 928 articles with key words "global climate change," we should not be surprised if a broader review were to find conclusions at odds with the IPCC consensus, as "consensus" does not mean uniformity of perspective. In the discussion motivated by Oreskes' Essay, I have seen one claim made that there are more than 11,000 articles on "climate change" in the ISI database and suggestions that about 10% somehow contradict the IPCC consensus position.

But so what? If that number is 1% or 40%, it does not make any difference whatsoever from the standpoint of policy action. Of course, one has to be careful, because people tend to read into the phrase "policy action" a particular course of action that they themselves advocate. But in the IPCC, one can find statements to use in arguing for or against support of the Kyoto Protocol. The same is true for any other specific course of policy action on climate change. The IPCC maintains that its assessments do not advocate any single course of action.

So in addition to arguing about the science of climate change as a proxy for political debate on climate policy, we now can add arguments about the notion of consensus itself. These proxy debates are both a distraction from progress on climate change and a reflection of the tendency of all involved to politicize climate science. The actions that we take on climate change should be robust to (i) the diversity of scientific perspectives, and thus also to (ii) the diversity of perspectives of the nature of the consensus. A consensus is a measure of a central tendency and, as such, it necessarily has a distribution of perspectives around that central measure (1). On climate change, almost all of this distribution is well within the bounds of legitimate scientific debate and reflected within the full text of the IPCC reports. Our policies should not be optimized to reflect a single measure of the central tendency or, worse yet, caricatures of that measure, but instead they should be robust enough to accommodate the distribution of perspectives around that central measure, thus providing a buffer against the possibility that we might learn more in the future (2).

ROGER A. PIELKE JR.

Center for Science and Technology Policy Research,  
University of Colorado, UCB 488, Boulder, CO  
80309-0488, USA.

#### References

1. D. Bray, H. von Storch, *Bull. Am. Meteorol. Soc.* **80**, 439 (1999).
2. R. Lempert, M. Schlesinger, *Clim. Change* **45**, 387 (2000).

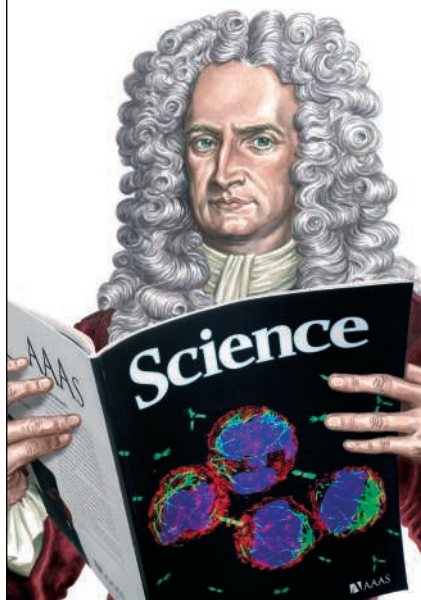
#### Response

**PIELKE SUGGESTS THAT I CLAIMED THAT** there are no papers in the climate literature that disagree with the consensus. Not so. I simply presented the research result that a sample based on the keywords “global climate change” did not reveal any, suggesting that the existing scientific dissent has been greatly exaggerated and confirming that the statements and reports of leading scientific organizations—including the U.S. National Academy of Sciences—accurately reflect the evidence presented in the scientific literature.

Pielke is quite right that understanding the results of scientific research does not implicate us in any particular course of action, and the purpose of my Essay was not to advocate either for or against the Kyoto accords or any other particular policy response. A full debate on the moral, social, political, ethical, and economic ramifications of possible responses to climate change—as well as the ramifications of inaction—would be a very good thing. But such a debate is impeded by climate-change deniers. In this respect, I am in complete agreement with Pielke’s conclu-

# Looking for a career that defies the law of gravity?

Then talk to someone  
who knows science.



Isaac Newton

1642–1727

If you want to head upward in science, don’t leave your career to chance. At ScienceCareers.org we know science. We are committed to helping you find the right job, and to delivering the advice you need. So if you want your career to bear fruit, trust the specialist in science.



**ScienceCareers.org**

We know science



# Q Who's working for tomorrow's scientists today?



“ I read my *Science* with my kids. Theodore and Lillian enjoy the pictures of animals, people, and planets as I browse through the magazine. It's a fun way for us all to learn more about science. ”

AAAS member Mark Petersen

AAAS is committed to advancing science and giving a voice to scientists around the world. Helping our members stay abreast of their field is a key priority.

One way we do this is through *Science*, which features all the latest groundbreaking research, and keeps scientists connected wherever they happen to be.

To join the international family of science, go to [www.aaas.org/join](http://www.aaas.org/join).



ADVANCING SCIENCE. SERVING SOCIETY

[www.aaas.org/join](http://www.aaas.org/join)

## LETTERS

sion, which was precisely the point of my Essay: Proxy debates about scientific uncertainty are a distraction from the real issue, which is how best to respond to the range of likely outcomes of global warming and how to maximize our ability to learn about the world we live in so as to be able to respond efficaciously. Denying science advances neither of those goals.

NAOMI ORESKES

Department of History and Science Studies Program,  
University of California at San Diego, La Jolla, CA  
92093, USA.

## Interpreting Correlation as Causation?

THE BRIEF ITEM “GAMBLING AS ADDICTION” (Random Samples, 21 Jan., p. 349) typifies the serious problems of interpretation that modern imaging techniques seem to have magnified many times.

In the study discussed, gamblers were subjected to functional magnetic resonance imaging (fMRI) scans while playing a simple game. Upon winning, the gamblers showed a less pronounced increase in ventral striatal activity than did control subjects (1). A simple interpretation would be that jaded gamblers had become less reactive to winning, and the research team had observed neurological underpinnings of this habituation. Instead, the researchers are described as having uncovered “abnormalities,” and that gamblers may “compensate for deficiencies in their brain reward systems...”

Any behavioral difference is presumably correlated with a difference in neurological activity. However, the dangers of leaping to causal conclusions involving brain abnormalities can be seen by applying the same logic to the posterior hippocampus enlargement found in London cab drivers (2). Rather than concluding that the enlargement results from spatial demands, we might conclude that this “abnormality” creates an insatiable need for spatial stimulation, chaining its victims to potentially dangerous employment with limited executive prospects.

It is always tempting to treat physiological correlates of behavior as causing behavior, but that should make us doubly vigilant about overlooking the well-known limitations in the information that correlations are capable of providing.

JAMES W. ALDRIDGE

Departments of Psychology and Anthropology,  
University of Texas–Pan American, Edinburg, TX  
78541, USA.

### References

1. J. Reuter *et al.*, *Nat. Neurosci.* **8**, 147 (2005).
2. E. Maguire *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **97**, 4398 (2000).