

procedures. For example, a junior investigator with one grant totalling \$100,000 and one article in *Nature* has performed 2.5 times better than a senior investigator with grants totalling \$1 million and four papers in this journal, and should thus receive priority for an increase in funding over the senior investigator. The application by granting agencies of this formula for high-risk grants could also be useful in an era when 'safe science' grants often score better than they necessarily should.

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A probable paradox

Sir — In September 1993, in your journal, we applied Gott's formulae¹ to predict that the then Conservative UK government would, with 95% confidence, continue for a period between 4.3 months and 546 years².

In fact the Conservative government lost office 3.6 years later, so that the prediction could be regarded as confirmed³. The

success of our prediction naturally pleases us. As we see it, however, there are two problems with this minor success story.

First, had the Conservatives retained power, our prediction would still not be violated. Labour or Conservative victories would both have been in agreement with our inequality. Indeed, any electoral outcome during our lifetimes, or those of our children's children for that matter, would be in agreement with our prediction!

Second, Gott's paper¹ is now 51 months old. It has not so far been refuted (see ref. 4 for a catalogue of successful predictions). Nevertheless, experience has shown that any theory in physics, however successful, is only an approximation to reality and will eventually be refuted and require modification.

Thus, assuming the Copernican hypothesis with respect to the refutation of Gott's theory, and applying the conclusions of Gott's theory to his theory, then with 95% confidence it will remain unrefuted for at least $51/39 \sim 1.3$ months. We can regard this condition as satisfied.

In addition, however, we predict with 95% confidence that it will have been refuted after 39×51 months, that is, 165.75 years. Thus we have the paradox that, on the one hand, if the theory is refuted within the next 166 years, then its predictions will be verified. On the other

hand, if it is not refuted within the next 166 years then it does not satisfy the prediction that, with 95% confidence, it should have failed by the year 2163 and is therefore probably wrong, with 95% confidence. We are here clearly close to a Russell-type paradox, albeit in terms of probabilities.

We cannot use a 100% confidence limit in the argument, as the upper limit of permitted values then becomes infinitely large and the theory becomes meaningless. On the other hand, use of any upper confidence limit (less than 100%) makes the theory vulnerable to a Russell-type paradox. It is saved from this paradox only by the existence of this probability.

We conclude that, while the Gott argument can undoubtedly be enlightening in individual cases, as a general theory it is subject to serious shortcomings.

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1. Gott, J. R. *Nature* **363**, 315–319 (1993).

2. Landsberg, P. T., Dewynne, J. N. & Please, C. P. *Nature* **365**, 384 (1993).

3. Gott, J. R. *Nature* **387**, 842 (1997).

4. Gott, J. R. in *Clusters, Lensing and the Future of the Universe* (Trimble, V. & Reisenegger, A., eds) 140 (Astron. Soc. Pacific Conf. Series, Vol 88, 1996).