

THE TRUTH, THE WHOLE TRUTH, AND NOTHING BUT THE TRUTH, SO HELP ME GOD

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2009-12-17

The text of this article's title is commonly used as part of an oath, for instance when giving testimony in court. But unfortunately, upholding such an oath is impossible. The following proof shows:

1. any entity that produces all possible true statements must also emit at least one false statement, and
2. any entity which doesn't emit any false statements is also incapable of emitting all the true statements.

Imagine a machine that prints statements like the following:

- P*X, meaning machine will print X
- NP*X, meaning machine will never print X
- PR*X, meaning machine will print XX
- NPR*X, meaning machine will never print XX

and consider the statement NPR*NPR*, meaning that the machine will never print NPR*NPR*.

If the machine prints NPR*NPR*, then it has printed a false statement (point #1, above). But if it never prints NPR*NPR*, then it is a true statement that the machine never prints (point #2, above). QED.

This discussion is based on a proof of Godel's theorem by Raymond Smullyan in his book "5000 B.C. and Other Philosophical Fantasies", which I discovered via <http://blog.plover.com/math/Gdl-Smullyan.html>