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## On the End of the World, Expi(r)atory Theories and Poor Theoretical Physics

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Recent authors herald, on so-called scientific grounds, the end of the world (as it would deserve, probably) in  $2052 \pm 10$ . [1] This was one more reason to hurry up and give here my comments. These authors write up in Statistical Mechanics, where they handle large data sets and plot them against and versus various variables. This time they took the world population over the last 2000 years, Gross Domestic Product (GDP), Research and Development (R&D) and technology and plot them *vs* time. The plots show a sudden and abrupt increase, much beyond any exponential, of a characteristic power type, at a finite critical time, estimated as about  $2052 \pm 10$ , as said above. Hence, the authors conclude that the world nears soon an end.

First, large sets of data, say  $N$ , are affected by statistical errors that are  $\sqrt{N}$ , which diverge precisely at the critical point, rendering futile any  $\chi^2$ -test of the fit. This is a well-known point in the so-called theory of the critical point, telling that "if the critical transition exists then the singularity goes like that divergence", but, oppositely, "from no empirical divergence can be inferred a critical point", because we can not derive a divergence from an "empirical" divergence. This is a very nice point, where the accurate knowledge can only be derived from theory, and not from empirical world.

Secondly, leaving aside that R&D and technology are hard to define, they and the GDP span a few hundreds of years, precisely near the "divergence", while the population is taken from year 0. The coincidence of the critical times for all these three data sets could therefore be merely a wishful thinking, because short data sets can be fitted with anything over long variables sets.

Nevertheless, the authors believe that after reading their paper people would stabilize population and the demographic growth, possibly by terrorism and segregation, return to an ecological life, transfer the resources from developed to developing countries, populate other planets, or adopt a knowledge-based society, where "knowledge, intellectual, artistic and humanistic values replace the quest for "material wealth". Indeed, knowledge is non-rival, *i.e.* using it in some place does not prevent it being used elsewhere, while a clothing item can not be used simultaneously by someone else. What is sure is that people will not be doing theoretical physics anymore, after reading this paper.

Which is a pity, because the Ginsburg-Landau functional for population with complex coefficients (to exhibit oscillations) can be constructed, Wilson's theory of renormalization group [2] may be applied, and critical exponents might be derived for a phase transition of the world. Which would be a nice exercise.

## References

- [1] A. Johanson and D. Sornette, *Physica* **A294** 465 (2001).
- [2] K. G. Wilson, *Revs. Mod. Phys.* **55** 583 (1983).