

“In Response” Letter to *Significance*

Dr Fisher’s Casebook from the February issue (“Play it again, Sam”) was about the famous and ubiquitous quote attributed to George Box: “Essentially, all models are wrong, but some are useful.” Interestingly, the article states that George Box himself didn’t remember writing those words, but the author traced them to *Empirical Model-Building and Response Surfaces* by Box and Draper published in 1987.

As it turns out, in a 1979 University of Wisconsin-Madison Mathematics Research Center technical paper¹, Box titled a section of the paper “All Models Are Wrong But Some Are Useful” (p. 2). The first two sentences of the section read, “Now, it would be remarkable if any system existing in the real world could be exactly represented by any simple model. However, cunningly chosen parsimonious models often do provide remarkably useful approximations.” Thus, while the quote is often invoked to literally mean *all* models, at least in this discussion Box was really talking about the use of parsimonious models to usefully approximate some real world phenomenon. He concludes the section by saying, “For such a model there is no need to ask the question ‘Is the model true?’. If ‘truth’ is to be the ‘whole truth’ the answer must be ‘No’. The only question of interest is ‘Is the model illuminating and useful?’”

Box was not the first to express this sentiment. Recently we have been reading *Statistical Method from the Viewpoint of Quality Control* by Walter A. Shewhart published in 1939.² On page 19, in a discussion about how to build a model of a process in the state of statistical control, Shewhart expressed the same idea in a less catchy way. He wrote:

...we can not reasonably hope to construct a model that will represent *exactly* any specific characteristic of a particular state of control even though such a state actually exists. Here the situation is much like that in the physical science where we find the model of a molecule; *any such model is always an incomplete though useful picture of the conceived physical thing* called a molecule (emphasis added).

*R.D. Fricker, Jr &
William H. Woodall
Department of Statistics
Virginia Tech
Blacksburg, Virginia*

¹ Box, G.E.P. (1979). Robustness in the Strategy of Scientific Model Building, University of Wisconsin-Madison Mathematics Research Center technical paper. Accessed on-line at <http://www.dtic.mil/docs/citations/ADA070213>.

² Shewhart, W.A. (1939). *Statistical Method from the Viewpoint of Quality Control*, Graduate School of the Department of Agriculture, Washington D.C., as reprinted by Dover Press in 1986 with a forward by W. Edwards Deming.