The limits of predictability

The Deniers -- Part VIII

Lawrence Solomon, Financial Post

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When Frans Nieuwstadt, a distinguished Dutch meteorologist, engineer, editor and professor, died in 2005, his obituary recounted seminal events in his accomplished life. Among the experiences worthy of mention: Nieuwstadt had studied under the celebrated professor, Henk Tennekes, and along with other colleagues had been instrumental in convincing Tennekes to return to Europe in 1978 to become director of research at the Royal Netherlands Meteorological Institute and later chairman of the august Scientific Advisory Committee of the European Centre for Medium-Range Weather Forecasts.

Henk Tennekes, in ways both personal and professional, has touched an extraordinary number of lives in his own distinguished career, among academics and laymen alike. He is loved for his popular 1997 book, The Simple Science of Flight From Insects to Jumbo Jets, and for his scholarly 1972 work, A First Course in Turbulence, a classic that logs more than 2,000 citations on Google Scholar. His provocative 1986 speech, "No Forecast Is Complete Without A Forecast of Forecast Skill," led to the now-common discipline of "ensemble forecasting" and spurred "multi-model forecasting." Scientists today continue to wrestle with the fundamental critiques that he first presented.

Tennekes became more than an inspiration for his students and a model for other scientists, however. He also became an object lesson in the limits of scientific inquiry. Because his critiques of climate science ran afoul of the orthodoxy required by the Royal Netherlands Meteorological Institute, he was forced to leave. Lesser scientists, seeing that even a man of Tennekes's reputation was not free to voice dissent, learned their lesson. Ever since, most scientists who harbour doubts about climate science bite their tongues and keep their heads down.

Tennekes, more than any other individual, challenged the models that climate scientists were constructing, saying models could never replicate the complexity of the real world. What was needed was a different approach to science, one that recognized inherent limits in such scientific tools and aimed less to regulate the environment.

In a landmark speech to the American Meteorological Society in 1986, he argued that meteorology was poised to be the first of the post- Newtonian sciences because it was "at odds with the mainstream of the scientific enterprise of the last 300 years. One goal of science is to control nature, but we know we cannot control the weather. The goal of science is prediction, but we stand in front of the limits of predictability."

Meteorology, in other words, would be the first scientific discipline to hit this brick wall. As Tennekes argued, modern theory "unequivocally predicts that no amount of improvement in the quality of the observation network or in the power of computers will improve the average useful forecast range by more than a few days."

Since Tennekes' speech, a host of scientists have sought to extend the bounds of modelling. They have seen success, but only on the scale Tennekes predicted.

In a paper presented in 2003, a team of European scientists detailed advances in modelling science. "Since the day, almost 20 years ago, in which Henk Tennekes stated … that 'no forecast is complete without a forecast of the forecast skill,' the demand for numerical forecasting tools ... has been ever increasing," they said, explaining efforts to make modelling reliable beyond a three- to four-day period. Thanks to the intense efforts of a new generation of climate modellers, modelling capability has advanced in some instances by 12 to 36 hours, in others by several days. To extend the bounds further, the paper announced a major new research initiative, designed to bring the forecasting discipline to the 120-hour range.

Climate modelling is the basis of forecasts of climate change. Yet this modelling, Tennekes believes, has little utility, and "there is no chance at all that the physical sciences can produce a universally accepted scientific basis for policy measures concerning climate change." Moreover, he states: "There exists no sound theoretical framework for climate predictability studies."

Not surprisingly, Tennekes abhors the dogma that he feels characterizes the climate-change establishment, and the untoward role of climate science in public-policy making. "We only understand 10% of the climate issue. That is not enough to wreck the world economy with Kyoto-like measures."

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