Prediction in Context: On the comparative epistemic merit of predictive success

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Successful predictions are often regarded as one the chief epistemic achievements of science. Lakatos places the theoretical anticipation of novel facts among the paramount distinctions of a progressive research program. In application-oriented research as well, prediction is assumed to play a key role. Targeted intervention in natural processes requires the ability to anticipate the results of one’s action. Science in the context of practice quite naturally places heavy emphasis on foreseeing products rather than epistemic virtues like causal explanation or theoretical unification. In research on medical drugs, causal efficacy and, accordingly, the reliable prediction of future effects is a significant merit. Accounting for this efficacy is of secondary importance. In the same vein, computer simulations are taken to promote a “culture of prediction” in which obtaining pre-dictions from a model counts as a central virtue.

The more general methodological claim tied up with such an approach is that understanding may be suspended without doing harm to the predictive power of science. I explore an episode from biotechnology in which the ability to anticipate the outcome of one’s interventions is claimed to be decoupled from any deeper understanding. Quite unlike approaches such as Lakatosianism, predictive power and theoretical understanding are claimed to be contrastive virtues. The relevant episode is the use of trigger genes for starting a complex process of gene expression. There is no need to follow the details of this process so as to bring about the intended effect. Theoretical understanding is taken to be unnecessary and sometimes even detrimental to controlling the phenomena.

I try to show that in contrast to such allegations the ability to produce results reliably is typically dependent on epistemic penetration. Generalizing the considerations advanced by biotechnologists shows that the argument against theory-based predictions collapses.

A second item I deal with is the different roles that predictions play in epistemic contexts as op-posed to practical ones. In theoretical science, predictions often serve to test theories and to count in favor of their validity (this is Lakatos’s point of view). In the framework of practice, predictions are taken as a basis for action. As a result, the requirements imposed on predictions are at variance with one another. For instance, precision is a chief distinction of predictions within epistemic science. The highly accurate prediction of the so-called anomalous magnetic dipole moment of the electron is celebrated as a triumph of quantum electrodynamics. By contrast, it is neither desirable nor feasible to anticipate the precise value of the human-made rise of global temperature during the 21st century. What is rather essential is a virtue I call epistemic robustness. This means that the consequences of the model that are relevant for action remain invariant although the underlying conditions and parameters are fluctuating or unknown. It doesn’t make a difference for action whether the global temperature rises by 1.5 or 2.5 K. The consequences for action remain pretty much the same.
These considerations are intended to suggest that in practical contexts predictive power does not play the outstanding roles sometimes accredited to it in an epistemic framework. Rather, predictive power is part of a network of other merits and achievements. Predictive power need to be judged differently according to context.

Third, the inability to predict is an important failure in practical contexts as well. Consider economic theory that seeks to derive economic macro variables and features from individual preferences or micro parameters. The failed attempts to arrive at substantial predictions whose correct-ness can be empirically examined supports the assessment that such micro-approaches are epistemically barren.