

Synthetic Biology is Changing Things – Just not in the Way You (Might) Think

An intuitive way to think about the relationship between science and technology is the linear model whereby scientific inquiry first develops conceptual frameworks for understanding some phenomena and only later is the framework applied in the development of technology. Essential to this model is that technological development and use does not contribute to conceptual and theoretical change in science (Bunge 1966). In this talk I aim to paint a more nuanced picture according to which the use and development of technology aids in the conceptual refinement of scientific work. I'll do this by drawing on contemporary synthetic biologists (i.e., the Dennis Dougherty Lab) working on the protein folding problem. After wading through the hyperbole of (some) synthetic biologists, I'll argue that this emerging discipline is distinguished by its interest (and occasional success) in making biological parts and processes that have not evolved by natural means and – importantly – are unlikely to do so without human intervention. I'll argue further that this approach doesn't fit a common mould philosophers and historians have attributed to the life sciences more generally (Mitchell 2008, 2009, 2015; Weber 2015; Waters 2007; Ronai 2017; Keller 2009). I'll contend that the synthetic techniques incorporated into various methods for studying protein structure – i.e., X-ray crystallography, NMR, and model organism studies – have ushered forth two forms of conceptual change. The first form concerns the protein coding gene concept. For researchers working with synthetic genetic codes, the meaning and referent of the protein coding gene concept is different from what most other researchers have in mind. The second concerns protein structure concepts. By refining the techniques of structural biologists, synthetic biology has made it possible for novel concepts from chemistry to be integrated into protein models. What this shows is that the relationship between science and technology can be one of epistemic iteration whereby conceptual and technical innovation occur in a non-linear fashion (Chang 2004).