

## When less is more: ancient philosophy for new science

By Steven Gibney

*Her sole function is to discover the truth about things divine and things human- Seneca.*<sup>1</sup>

When you first read this quote you might think Seneca was talking about science. What is the purpose of science but to discover the truth of things? From the celestial bodies scattered throughout the depths of space down to the fleeting biological reactions which fuel life. In actual fact, Seneca was describing philosophy.

Seneca believed that wisdom, specifically philosophical wisdom, was one of the most important characteristics a person could display and that philosophy should not consist of just thought exercises and theoretical discussions, but should inform every aspect of our lives. I'm not here to start an argument about the different philosophical paths you can choose to take in life, but I see no reason that philosophy, or at least old fashioned wisdom, can't inform modern science. In particular I want to discuss an aphorism. If you haven't come across the term, aphorisms are pithy statements designed to provide insight the more you think about them. You have probably come across them at some point but they sound more like clichés, for example *measure twice cut once* and *still waters run deep*. Aphorisms are often passed down from generation to generation, and anything that lasts that long must contain some kernel of wisdom. In this case, the focus falls onto the idea that "less is more".

Scientific research is measured in output. The success of a project is usually based on the outcome of the project, here "outcome" is defined as the number of papers a project generates. Nowhere is this more evident than in academia. An academic is weighed and measured based on the number of papers that they publish and how others perceive them. This perception is quantified using a number of metrics which to an outsider would appear almost arbitrary i.e. h-index, impact factor; the latter of which was merely a tool designed to help librarians select which journals to purchase.

Using publications as the means to measure success could have (and some would argue already has had) a major impact on the research environment. There is an increasing awareness of, as well as an increasing number of publications discussing, the mental health problems observed in PhD students.<sup>3</sup> I'm not suggesting that the pressure to publish is the sole cause, but I'd be lying if I didn't think it could be a contributing factor. Likewise, the rise of the concept of "publish or perish" is now uttered as a threat to academics, suggesting that if they don't publish they will be thrown overboard like excess weight on

a ship. This feeling hardly provides a sense of job security or builds a positive working environment.

The risks of this approach are potentially devastating; it could lead to individuals compromising their research integrity and publishing misleading or false data. One of the most famed examples, which has had far reaching consequences, is that of Andrew Jeremy Wakefield. In 1998 Wakefield and his group published papers making the claim that there was an association between the MRM vaccine and the development of autism.<sup>4</sup> This was the spark which gave rise to the "anti-vax" community which has seen an unfortunate rise over the last two decades. In a more recent example of misconduct, in 2012 Yoshitaka Fujii, an anaesthesiology researcher in Japan, was found to have published false data in 172 published papers over the course of 19 years.<sup>5</sup> While there is no guarantee that these incidents were due to the pressure of publishing it would be naive to suggest that of the speculated 0.02 - 0.2% of papers which are thought to be fraudulent,<sup>6</sup> at least some aren't motivated by a need to publish and remain relevant.

Publishing is undoubtedly a crucial part of science. That is an undeniable fact. As George Whitesides, one of the most prolific scientists in the world, said "Interesting and unpublished is equivalent to non-existent."<sup>3</sup> In the competitive environment that is academia this has always been the case. However, there is a risk that we have overshot competitive spirit and are heading towards a cut-throat environment where it is every scientist for themselves. If publishing is a crucial part of science so is collaboration, otherwise we are just individual parts of a whole not working as efficiently as we could be. When I say collaboration I don't just mean a collaboration out of convenience to get your name on more papers. I mean all scientists working towards the same goal; to gain understanding and to add to the huge pool of knowledge that comprises "science."

Valuing a scientist based on their publication history creates an environment of one-upmanship, relying on external values which leads us to value a scientist based on how they are perceived by others, as opposed to the intrinsic value of their research. It may be better to weigh scientists up on a case-by-case basis rather than creating an environment which encourages researchers to get publications "under their belt." I think we have to at least consider whether there may be a better approach, such as fostering an environment with less focus on publication performance and more on how a scientist has contributed to the field as a whole. In this instance taking a "less is more" approach might mean less pressure to publish leading to more genuinely ground-breaking research which may have gone unexplored for fear that it would waste time or might not be publishable.

Often seen as the antithesis of academia is industry. Despite their differences the pharmaceutical industry and academia share a number of similarities, in this case meaning that they could also benefit from a shift in perspective by moving towards a less is more mentality. As with academia, industry chooses to attribute value according to outcome, however rather than papers (or at least in addition to) it focuses on the ability of a project to produce a marketable product. This is an inevitability; any sensible economist would point out a project is only worth investment if you are going to get a return on that investment.

The term "health care industry" is often used to describe these types of companies which are responsible for investing in research and developing medical products, but that terminology comes with some negative connotations. Working to help others shouldn't be referred to as an industry, which implies that it is just an opportunity to make money from people who need help. As I stated earlier, I am fully aware that research needs funding and it is inevitable that it must be able to recuperate the costs of that research. The question arises does a middle ground doesn't exist, one where you can do interesting and beneficial research without appearing to be solely focused on the bottom line.

The first hurdle to this question is one of external perceptions. More specifically, how industry is viewed from those outside, whether that be potential customers or the general public. There remains a concept that "big pharma" are out to take advantage, a problem which better advertising won't necessarily solve. A less is more approach could improve the situation. In particular, less focus on selling a specific product and more focus on honesty and transparency would carry a lot of weight. Providing a clear view of how companies work and what they are working on would go a long way to increasing customer trust. The biggest pharmaceutical companies work at a global scale so establishing this type of relationship is difficult. Rather than focusing on the international scale, working from the ground up with a less is more approach might provide a starting point. A shift from this bigger picture perspective to one focused on establishing a relationship with individuals or at a community level is how effective engagement is built. This shift would go a long way to making companies appear less financially focused and more genuine in the eyes of those outside of industry, in particular those they are trying to help – patients.

The second hurdle to the "research vs bottom line" atmosphere once again lies in perception. Over the last few decades the biggest pharmaceutical companies have diversified significantly; a smart economist will point out diversification is a way to identify new sources of revenue. However, when every company diversifies it creates a situation

where there is too much overlap in areas of research and it produces what appears to be an arms race. For every disease there is now a race to be the first to identify the most effective treatment because then you can dominate that market. As with academia this creates a situation where, rather than pursuing knowledge to contribute to science as a whole, it is done to be seen as the first to get there.

As with the academic environment a less is more approach could be beneficial, not just from a scientific stand point but there is fiscal precedence as well. Given time any industry will eventually undergo a period of disruptive innovation, where new technology forces the market to change, and the pharmaceutical industry is not immune to such a disruption. In the past the pharmaceutical business model relied on the identification or development of a blockbuster drug which would then be a source of revenue until a new drug was found or the patent ran out. However, reliance on this approach will soon be risky given the shift towards personalised medicine. Given this change, if companies are to remain competitive they need to focus less on bulk manufacturing and distribution and more on adapting to the personalised healthcare trend which will eventually become the mainstream. Just as the arrival of video streaming and Netflix replaced video rentals and Blockbuster, personalised medicine may one day replace the need for the one size fits all approach which has been the model of the pharmaceutical industry of the past.

To highlight this around a decade ago the Association of the British Pharmaceutical Industry published recommendations which identified the importance of personalised medicine. They identified key stakeholders and potential benefits if personalised medicine were embraced. From a business perspective this included an ability to create more cost effective compounds and new therapies with narrower focus.<sup>7</sup> While this shift is beginning to occur it has been slow progress, however the time will come when companies are forced to adapt. This could mean that rather than having multiple companies competing in every area of research, leading to a therapeutic arms race, companies will have to narrow their focus if they want a chance to remain innovative in what will inevitably become a competitive market.

Philosophy is often seen as a subject for ancient scholars but the reason it has survived so long is that it proves that we can always learn. Sometimes reevaluating what we assume to be the "norm" can seem like an exercise in futility. However, it is a scientist's job to think critically, we need to accept that even scientists can get stuck into a rut. Whether that is a company or individual scientists, sometimes we need to reconsider the approach we have been taking. Just because we think we have found the right way, how will we know for sure without considering the alternatives? In this case, thinking about how a /ess

*is more* approach could benefit us. This is by no means the only option or even necessarily the right one. It is merely a suggestion that sometimes we need to be willing to ask the question, what could we do better?

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